

KASEM BUNDIT JOURNAL

Kasem Bundit Journal (Special Edition), October 2017

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Editorial

30 Years it has been since the inception of Kasem Bundit University in 2530. On this auspicious occasion, the University launches an English edition of Kasem Bundit University Journal (EKBUJ), Thai editions of which have been in the 1st tier of standard academic Journals of Thai Citation Index (TCI).

As outlined in the Table of Content, this EKBUJ features 8 research articles and 1 article review. The articles are multidisciplinary in nature on the ground that EKBUJ provides a platform for academics, researchers, and practitioners to contribute to the advancement in the body of knowledge in sciences and arts as well as to policy formulation and implementation for practical purposes.

Nathabhol Khanthachai
Associate Professor (economic) and Chief Editor

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A Model of Thai Agricultural Co-Operative Product Development and Marketing for Niche Markets

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Abstract

This article focused on Thai agricultural co-operative product development and marketing for niche markets. Based upon practical experience at Phak Hai Agricultural Co-Operative Ltd., and using branding strategies and niche marketing concept, “On-Wan rice product development model was developed. The “On-Wan Rice Brand” was successfully distributed in niche markets, such as hospital patients, elderly people, and health – concerned people in both traditional and modern marketing channels.

Keywords: rice, product development, agricultural co-operatives, niche markets

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Introduction

One of the most powerful tools used to end severe poverty, boost shared prosperity, and feed nine billion people in the world by 2050 is agricultural development (World Bank, 2015). Growth in the agricultural sector is about two to four times more effective in raising incomes among the poorest compared to other sectors, particularly for 78 percent of the world's poor who live in rural areas and depend mainly on farming to make a living. Agriculture is also crucial for economic growth. However, agriculture driven growth and poverty reduction, as well as global food security, are currently at risk. Agriculture is more vulnerable to climate change than any other sectors. A warming climate could cut crop yields by more than 25 percent.

As far as rice production and consumption were concerned, annual global rice consumption was approximately 437 million metric tons (MT) on average for the last five years. In less-developed countries, increasing per capita income typically resulted in decreased per capita rice consumption because increased income led to dietary diversification and an ability to purchase more expensive foods. China and India accounted for 51 percent of the world's consumption of rice in 2011, being the

two largest rice consumers in the world. (Foreign Agriculture Services, 2015)

Generally speaking, agriculture in Thailand was highly competitive, well-diversified, and specialized. Rice was the most important agricultural export of Thailand in the world market. Thailand was a main source of the United States' imported rice, being valued at \$436.4 million in 2012, a four percent increase from 2011.

Agricultural co-operatives could be regarded necessary catalysts to enhance economic benefits. They improved farmers' bargaining power in the marketplace, helped reduce costs of production, and provided such services as marketing, all of which were essential for success in agriculture. (Suwandee, et al., 2013). For these reasons, agricultural co-operatives should be established in regions where there were a weak and/or failing market, high input costs, and a lack of input and product marketing services (Ortmann and King, 2006).

Research Objectives

This paper aimed mainly to analyze the supply chain of rice, using Phak Hai Cooperative Ltd. as a case study, i.e, rice farming process, rice product development, branding strategy and marketing.

Methodology

Besed on data collected from Phak Hai Agricultural Co-operative in Ayutthaya province, the methodology of this research were classified into 2 parts. The first part dealt with seeking the appropriate rice variety that was able to tolerate floods annually. The second part was concerned with applying business strategies: stories, images and associations to form the marketing model to increase sell volume of the rice product.

History of the Phak Hai Agricultural Co-Operative

The Phak Hai Agricultural Co-operative was located at 217/1 Moo 4, Tambon Phak Hai, Amphur Phak Hai, Ayutthaya Province. It was registered with the Ministry of Agriculture and Cooperatives under the Co-operative Act on October 1, 1970. The Co-operative was established by merging 39 co-operatives with the intention to help and strengthen its members. As of April 30, 2012, there were 1,975 members. The available working capital was approximately 89 million baht while the shared capital was almost 18 million baht. There were 14 people in the administrative committee, 15 people being responsible for management, and three people in charge of co-operative

inspectors. In addition, it had advisors providing suggestions on such matters as agriculture in general, production, and marketing. The majority of the co-operative members were farmers. The planting areas for the major rice crop and the second rice crop were 72,000 and 8,000 rai, respectively. The major rice production areas were normally a natural buffer zone, a water retention area from the Chao Phraya River and the Noi River, or the so – called “Monkey Cheek” area. During the flooding season, the cultivated areas were reduced to only 8,000 rai. Farmers who were affected by the disastrous flood were unemployed and usually were forced to leave their homes to seek employment in the industrial sector in Ayuttaya or elsewhere. The co-operative also played a role in alleviating these farmers from the burden of the flood damage.

Rice Farming

During 2011 and 2012, there were nearly 4,160 families registered as farmers in the Phak Hai area. There were 69,130 rai (11,060 hectares) of rice fields that could be planted twice a year. The major rice crop was grown from June to October while the second rice crop from November to March annually. The yield of each crop was approximately 50,745 metrickton, which was estimated to

worth approximately 507 million baht. Therefore, the total value of production was approximately 1.015 billion baht per year. There were 2,000 households registered as Phak Hai Agricultural Co-operative members. The total area of rice fields was roughly 64,000 rais which was about 93 percent of the total planted area in Phak Hai.

In 2013, the Co-operative owned a 200 ton-per-day rice mill, a 140 ton-per-day fluidized bed paddy dryer, and a 30 ton-per-day seed screening plant. The National Center for Genetic Engineering and Biotechnology (BIOTEC), under the National Science and Technology Development Agency (NSTDA) and the Ministry of Science and Technology, provided the budget for the paddy dryer and the seed screening plant. The Co-operative was self-sufficient when it was able to produce Homchonlasit paddy seeds in the ratio of 550 tons per 1,000 rais. The ability to produce the paddy seeds helped to reduce paddy production cost, the total of which was approximately 250 baht per rai. In the past, farmers had to buy paddy seeds from outside. In addition, Farmers used 15 kilograms of paddy seeds per rai, a reduction from the previous 25 kilograms per rai. Moreover when a flooding disaster took place, they were able to harvest at least 320 kilograms per rai or

approximately 40 percent of the average yield.

In the past, Thai farmers collected paddy seeds from their fields for plantation in the following year. This activity, which had been practiced continuously from the time of their ancestors, resulted in the deterioration of the quality of paddy seeds, low productivity and poorer grain quality.

Rice Varieties.

Facing floods every year, a suitable flood-tolerant local rice variety was investigated to isolate the gene responsible for flood endurance, high yield, and good grain quality, plus pest/disease resistance. Using the technique known as “marker-assisted backcrossing”, scientists transferred the water tolerance trait of interest into commercially valuable local rice varieties, without losing any useful characteristics, which made these varieties prevalent among rice farmers (Clayton, 2010). The Rice Gene Discovery Unit (RGDU), a joint laboratory between the National Center for Genetic Engineering and Biotechnology (BIOTEC) and Kasetsart University, played an important role in Thailand’s rice research activities. The researchers identified valuable characteristics for rice breeding, including tolerance to antibiotics, advancing Thai’s rice agriculture through

molecular breeding with regard to stresses like submergence, drought, and salinity. They also recognized other useful characteristics, including resistance to diseases, e.g., bacterial leaf blight, blast, and pest, as well as those characteristics that improved rice quality and nutritional value. The genes and quantitative trait loci (QTLs) controlling these useful characteristics were identified and used in molecular-marker assisted selection rice breeding programs to create new and improved rice varieties. Two rice varieties that were commonly targeted for improvements were the jasmine rice called Khao Dawk Mali 105 (KDML 105) and the glutinous jasmine rice (RD6), both of which were highly adaptable to the rain-fed lowland areas of Thailand. Molecular breeding programs in Thailand so far have produced many improved rice varieties. Among them, three showed great promises: Homali 80, Homcholasit, and Thanyasirin. Homali 80, an improved version of KDML 105, was tolerant to flash floods and could survive being submerged for as much as three to four weeks. It could be planted only during the wet season, though. Homcholasit was also derived from KDML 105 and was tolerant to flash floods (Toojonja and Lanceras-Siangliw, 2013).

Homcholasit rice with flash flooding resistance was bred from IR57514 with a resistant gene and KDML105. Biomarkers were used in order to select rice seeds with superior quality, such as flash flooding tolerance, satisfying flavor, ease of cooking, and non-photoperiod sensitivity. In addition, the selected seed could be planted for more than one crop per year. Homcholasit rice could endure flooding for two to three weeks and yield 900-1,000 kilograms per rai. Therefore, this variety is suitable for the central land that normally faces flash floods.

In 2009 the National Center for Genetic Engineering and Biotechnology (BIOTEC) began to transfer the technology needed to enhance the quality of seed production, from registered seeds to certified seeds, to the farmers who were members of the Phak Hai Agricultural Co-operative. This project boosted the farmers' capability to produce these registered seeds by themselves. Farmers planted paddy stalks into submerged fields and laboriously harvest the ears of the paddy. The Technology transferred to farmers by NSTDA and BIOTEC was helpful in that it alleviated the distress of the Co-operative's members and people who faced a flooding problem,



resulting in sufficient income for their families

Branding and Niche Marketing Strategy

Branding accounts for one of the most important aspects of business strategies. Branding is sometimes considered to be merely an advertising function. In addition, many managers and business writers hold the view that branding is about the management of product image. It is also a supplementary task that can be isolated from the main business of product management. There are three forms of branding: stories, images, and associations. Stories and images are the more potent sources of brand culture. Brand stories and images have plots and characters. They rely heavily upon metaphor to communicate and spur our imaginations. Thinking of a brand is associated with the residue of these stories and images. We may overlook the specifics of a product story but still attribute some product characteristics to the brand (Holt, 2003; Thompson, et al., 2006). Moreover, organic farming and specialty agricultural productions are some ways used to create a differentiated product offering, a brand which commands a premium pricing, for example, special rice for diabetics, fortified milk, and organic vegetables. However, the advantage of a

differentiated product is lost with increased competition. Eventually, every agricultural brand needs to find a distinct differentiator to retain its niche (Lakshmi, 2013).

There are three basic requirements that co-operatives must satisfy in order to form the foundation for an effective marketing program. First, there needs to be a well-thought-out plan which utilizes a niche strategy and has a competitive orientation. Second, the plan and its supporting programs should be market-oriented rather than producer-oriented. Third, co-operatives must have management personnel who are experienced with value-added products, possessing broad expertise and perspective, as they strive to be value-added marketers (Hardesty, 1992). Niche markets are created as consumers become more sophisticated and can afford to pay a premium for exotic, novel, or specialty products. These new types of "lifestyle" products, i.e., those that fulfill the needs of an elite consumer group, have created a new market segment, namely niche products. Specialty coffee produced from a limited number of farms is an example of a product that is in such scarce supply that it can command a price many times higher than mainstream coffee products (Ferris, 2012). Thus, Niche market is an

attractive opportunity available to small businesses forced to compete against the scale economies that larger competitors are able to achieve. In agricultural sector, there are a few of the alternative product choices sought by specific consumer segments. Exploring niche markets is representative of the set of management strategic choices, as niche marketing provides creative managers with a means to use new management skills and marketing

strategies while creating new revenue streams (Dawn, 2012).

The Phak Hai Agricultural Co-operative Ltd. created the stories and image strategies under the brand “On-wann,” which in the Thai language means less sugar, or less sweetening. In addition, the stories of the flooded area and healthy food were identified on the product’s package. The modern (right figure) and traditional (left figure) packaging are compared in the figure below:



Figure 1. Comparison between Traditional and Modern Packaging

Marketing Development Model

The Phak Hai Agricultural Co-operative Ltd. would be regarded as an ideal co-operative. Its products were sold in department stores and in general wholesale and retail shops under the brand “On-wann.” In addition, the Co-operative brought members together. They were self-sufficient throughout the whole process as they planted, collected, transformed, sold and

consumed their products. The Co-operative’s marketing strategies focused on the niche markets and merit perception. For example, the Co-operative’s target customers were hospital patients, elderly people, and healthy people. It also created merit perception by supporting and purchasing farmers’ products planted in the flooded areas. Buyers were satisfied from supporting the farmers and healthy

health from the consumption of nourishing rice. The Co-operative aimed to support its members by promoting productivity and enhancing marketing capability. The activities started from preparing the superior quality of rice seeds, arranging budgetary and production factors, transforming products, and selling products to members and nearby communities. The increased revenue was returned to the Co-operative and its members. Members' participation was the foundation of the Co-operative. Therefore, group participation led to shared benefits for the members and the Co-operative's longevity. As a result, the members of the co-operative were increasingly engaged in rice farming as their main activity.

Conclusion

Phak Hai Agricultural Co-operative Ltd. was a case study of a product development and marketing model for realizing economic benefits. The Co-operative was located on the flooded

area, and farmers at that time were often unemployed and mostly encountering poverty. They investigated the rice varieties which had the characteristics of flood endurance and pest resistance. The Homcholasit rice seed was provided by the National Center for Genetic Engineering and Biotechnology (BIOTEC). In addition, BIOTEC transferred the technology to enhance the quality of seed production so that the seeds could tolerate flooding for two to three weeks with a yield of 900-1,000 kilograms per rai. Branding was created in the form of modern packaging under the brand "On-wann," which described all stories and product features. Healthy food and merit perception became the popular aspects of this product which was launched into the niche markets, such as hospitals and nursing homes. Moreover, the product was sold in wholesale and retail businesses in national and international trading. As a result, the Co-operative earned an increasing return and gained more registered members.

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Toward the Development of Research Management System for Faculties in Rajabhat Universities

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Abstract

The main research objectives were to develop the components and indicators of a research management system and to study the current and preferred states of the research management system for faculties in Rajabhat Universities. In Stage 1, seven specialists considered and justified the research management system's components and indicators. Administrators, academic staff, and supporting staff in Rajabhat Universities assessed the current and preferred states of the research management system. It was revealed that the current state of the system was below the preferred state in all aspects, i.e., input, process, output, and feedback. Therefore, it is a must for the managements of Rajabhat Universities to take immediate actions to improve the system.

Key words: Research management system, Rajabhat Universities

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Introduction

The quality assurance by the external quality assurance of the Office of the National Education Standards and Quality Assessment (Public Organization) (2015) has suggested that Rajabhat Universities need to improve the quality of research and creative work.

Research management development in institutes of higher education is crucial for national socio-economic development (Office of the National Research Council of Thailand, 2011; Office of the National Economic and Social Development Board, 2012; Office of the Higher Education Commission, Ministry of Education, 2015). Rajabhat Universities are supposed to produce quality research as specified in the criteria of quality assurance of the Office of the National Education Standards and Quality Assessment (Public Organization, 2011 and 2015).

Research Objective

The main research objectives were to develop the components and indicators of a research management system for faculties in Rajabhat Universities and to assess the current and preferred states of the research management system for faculties in Rajabhat Universities.

Methodology

Two stages were conducted in this research. Stage 1 dealt with the determination of components and indicators of research management while Stage 2 investigated the current and preferred states of the research management system for faculties in Rajabhat Universities.

1. Population and Sample

In Stage 1, seven experts considered, made corrections, and approved the proposed four components and 72 indicators of a research management system. The sample in Stage 2 was comprised of 388 individuals, including administrators, lecturers, staff members, and related personnel in Rajabhat Universities (selected by multi-stage random sampling technique) during the first semester of the 2015 academic year.

2. Research Tools

2.1 The content and structural validity of the questionnaire regarding the proposed four components and 29 indicators of the research management system were verified by means of Item Objective Congruence (IOC) by seven experts.

2.2 The content validity of the questionnaire was determined by the seven experts. It then was administered

to 50 individuals who were not from the sample group to determine the reliability (Cronbach, 1951). The reliability of the whole questionnaire was 0.98.

3. Data Collection

In Stage 1, the seven experts examined, made corrections, and approved the proposed four components and 72 indicators of the research management system. In Stage 2, a questionnaire was used for data collection from a sample of 388 persons from different faculties in Rajabhat Universities.

4. Data Analysis

Descriptive statistics, such as frequency, percentage, mean, and

standard deviation were used for data analysis.

Results from Stage 1

Table 1 represents components and indicators of the research and management system in Rajabhat Universities, as considered and approved by the seven experts in Stage 1. It was revealed that most indicators of these components were at the level of most important in the research and management system, with a total mean of 4.53 out of 5.00, and with the levels of importance for input, process, output, and feedback being 4.54, 4.68, 4.59, and 4.58 out of 5.00, respectively.

Table 1: Mean, Standard Deviation and Level of Importance by Expert Evaluation of Research Management System

Components and indicators	\bar{X}	SD	Level of importance
1. Input components	4.54	0.56	most
1.1 Administrative resources (people, money, materials, management, willpower, and time)	4.57	0.53	most
1.2 Policy and national direction of educational development measures of higher education	4.58	0.46	most
1.3 Reform of country's research system, policy, and national research policy and strategy	4.59	0.47	most
1.4 Policy and strategy of national research for the long-term	4.52	0.56	most

Table 1: (continued)

Components and indicators	\bar{X}	SD	Level of importance
1.5 Policy and strategy of the national research of faculties and universities	4.58	0.50	most
1.6 Quality assurance, both internal and external by ONESQA	4.44	0.51	high
2. Process components	4.68	0.57	most
2.1 Research fund proposals	4.53	0.51	most
2.2 Research monitoring	4.58	0.50	most
2.3 Support system of research distribution	4.57	0.53	most
2.4 Integrative system of research for teaching and learning	4.58	0.46	most
2.5 Integrative system of research for academic services	4.59	0.47	most
2.6 System of introducing research for benefit utilization	4.58	0.46	most
3. Output components	4.59	0.47	most
3.1 Administrator and personnel satisfaction of faculties in Rajabhat Universities with the research management system	4.58	0.46	most
3.2 Having a manual used in the implementation of the research management system of faculties in Rajabhat Universities	4.59	0.47	most
4. Feedback components	4.58	0.46	most
4.1 Self-assessment report (SAR)	4.59	0.47	most
Total mean	4.53	0.51	most

Results from 2nd Stage

The current and preferred states of the research management system in Rajabhat Universities can be summarized as

follows:

Regarding the background of the respondents, it was revealed that 52.60%

were female, 31.70% were 41-50 years of age, 39.70% were master's degree holders, 34.30% were lecturers, and 32.50% were members of Rajabhat Universities, having been attached to Rajabhat Universities for a

period of six to 10 years.

Table 2 shows the assessment results of the current and preferred states of the research management system.

Table 2: The Level of Current and Preferred States of Research Management System of Faculties in Rajabhat Universities (N = 388)

Component of Research Management System	Current State			Preferred State		
	\bar{X}	SD	Implementation Level	\bar{X}	SD	Preferred Level
1. Input Component	3.46	0.34	moderate	4.47	0.35	high
2. Process Component	3.52	0.27	high	4.49	0.27	high
2.1 Sub-component 1 of Research fund proposal	3.54	0.31	high	4.45	0.30	high
2.2 Sub-component 2 of Research monitoring system	3.57	0.20	high	4.50	0.20	high
2.3 Sub-component 3 of Research distribution support system	3.53	0.27	high	4.58	0.24	high
2.4 Sub-component 4 of Research integration with learning-teaching system	3.58	0.33	high	4.56	0.41	high
2.5 Sub-component 5 of Research integration with academic service	3.44	0.24	moderate	4.44	0.23	high
2.6 Sub-component 6 of Research use for benefit	3.48	0.28	moderate	4.42	0.26	high
3. Output Component	3.48	0.36	moderate	4.43	0.47	high
4. Feedback Component	3.53	0.49	more	4.10	0.84	high
Total	3.51	0.40	high	4.43	0.36	high

It was revealed that the current operation of the research management system averaged 3.51 out of 5.00 whereas the average for the preferred state was 4.43 out of 5.00 for the whole system.

Regarding the input component, the current operation of the system was evaluated at a level of 3.46 out of 5.00, on average. The preferred state of the system, on the other hand, averaged higher at 4.47 out of 5.00.

Regarding the process component of the system, it was demonstrated that the current operation of the system averaged 3.52 out of 5.00 whereas the preferred state of the research management system was higher at an average of 4.45 out of 5.00.

With respect to the output component of the current and preferred states of the research management system as a whole, it was determined from the assessment that the current operation averaged moderately at 3.48 out of 5.00 whereas the preferred state of the research management system of

faculties was at a higher level of 4.43 out of 5.00.

As for the feedback component of the current and preferred states of the research management system of faculties in Rajabhat Universities, the assessment of the current state resulted in an average of 3.53 out of 5.00 whereas the preferred state of the research management system was at a higher level of 4.10 out of 5.00.

Concluding Remarks and Suggestions

It was quite clear that the research management system in Rajabhat Universities, according to the sample selected as representative of the system, has many things to do in the future in order to improve. In all aspects, the preferred states, i.e., input, process, output, and feedback were all above operational levels. Under these circumstances, it is advisable that the managements of Rajabhat Universities restructure and enhance the effectiveness of the research management system.

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Analysis of the Main International Tourist Arrivals to Thailand and Their Impacts on Thailand's Tourism Industry

Chariya Chayakul¹

Abstract

Thailand's tourism industry grew rapidly in the past decade. The source of Thailand's tourism growth came from three main regions: East Asia, Southeast Asia and Europe. This paper focuses on analyzing the three main regions of international tourist arrivals to Thailand and their impacts on Thailand's tourism industry

Keywords: Thailand, tourism industry, international tourists

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1. Introduction

Thailand, located in the center of Southeast Asia, is considered a pearl of the Indochina peninsula. The Northern part of Thailand consists of jungles, mountains, and hills. The Southern part of Thailand is where the Gulf of Thailand and the Andaman Sea are both located. The climate is a tropical monsoon climate. Such geographical characteristics and climates make for a variety of different types of natural resources. Thailand has received and has been influenced by the world's large four cultures, which are Indian, Chinese, Khmer, and Western. This makes Thailand a multi-cultural nation with various ethnic characteristics and rich tourism resources. Today, the tourism industry is Thailand's pillar industry. With the Thai government's continuous support, the tourism industry has been growing increasingly, and Thailand has become one of the world's most popular tourism destinations.

1. Types of tourism in Thailand

The tourism of Thailand comprises two main types—natural tourism and cultural tourism. The natural tourism consists largely of inland and coastal vacation destinations. The inland tourism is located in the North, the Northwest, and the West of Thailand. Chiangmai, a province in the Northern part, has a lot of mountains and jungles, both of which are perfect for activities, such as rock climbing and elephant riding. In the Northeast of Thailand, there are Mae Klong River and

Sam Pan Bok, also known as the Grand Canyon of Thailand, which is located in Ubon Ratchathani Province. In Kanchanaburi Province, in the West of Thailand, there are many reserves and national forests, which possess many waterfalls and mountains. The coastal tourism is located mainly in the Eastern and Southern parts of Thailand. Provinces in the East, like Trat and Rayong have many beaches and diving spots, such as Koh Chang and Koh Samed. Pattaya, one of the most famous travel destinations in Thailand, is in Chonburi Province in Eastern Thailand. Marine tourism is more abundant in the Southern part of Thailand. Popular and world-famous destinations include Phuket, Koh Samui, Koh Phi Phi, and Pang Nga Bay, which all offer plenty of recreational activities, such as swimming, snorkeling, and scuba-diving.

The cultural tourism consists largely of architectural tourism and heritage tourism. Thailand is a Buddhist country. There are more than four hundred temples in Bangkok alone. Famous temples in Bangkok include Wat Phra Kaew, Wat Po, and Wat Arun. Furthermore, there are many architectural sites, such as the Grand Palace, Phra Prang, and historical monuments in Ayuthaya and Sukothai. As for the heritage tourism, Thailand has several unique traditions and customs that have been passed down for many generations. Examples of Thai festivals for tourists to experience are the Loi Krathong Festival and

the Songkran Festival. There are also the Royal Ploughing Ceremony, the Chinese Lunar Festival, the Elephant Festival, etc. All of these festivals entertain and are a fun experience for international tourists who visit Thailand.

2. The growth of foreign tourist arrivals to Thailand

2.1 Overview of the growth of Thailand's tourism industry

In 1991, the number of foreign tourists who traveled to Thailand did not reach the expectation (six million) due to the world's economic crisis and political issues in Thailand. During year 1993 to 2000, the number of Chinese tourists travelling to Thailand had grown rapidly. This was mainly because the Chinese government allowed their citizens to travel abroad. Malaysia,

Singapore and Thailand were the three most popular destinations for Chinese tourists. Chinese tourists had contributed greatly to the growth of Thailand's tourism industry and made tourism become the staple for Thai's national income. In 1997, Thailand's economy was in a downturn but Thai government took measures to stimulate and stabilize the growth of tourism industry. From 2005 to 2015, Thailand has seen a slight increase in the number of international tourist arrivals. This was mainly because of political turmoil and natural disaster during this period. However, the number of foreign tourists in Thailand is expected to continue to grow more sharply in the near future.

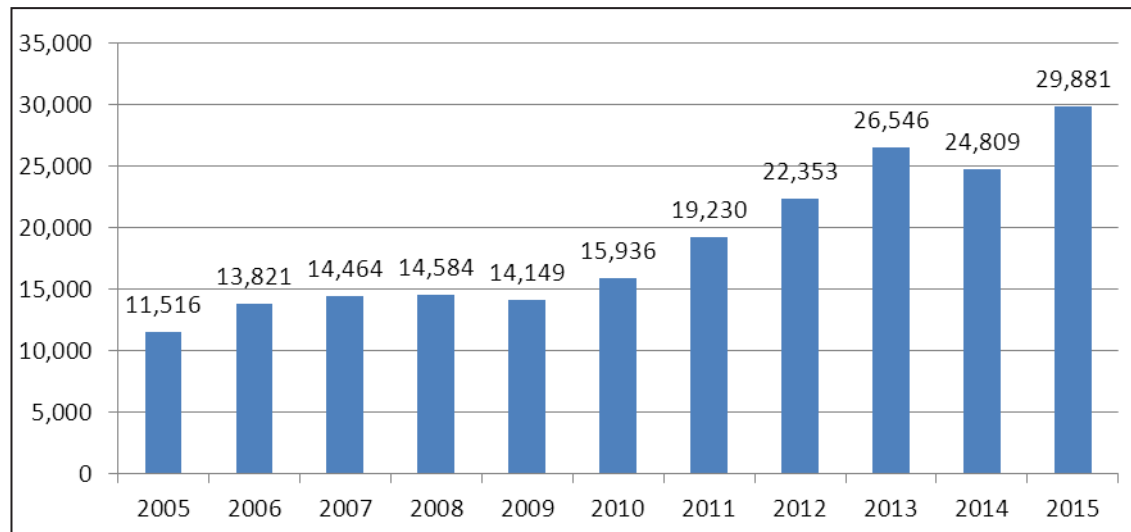


Figure 1: Growth of foreign tourist arrivals to Thailand from 2005 to 2015.

Source: Tourism Authority of Thailand

Figure 1 demonstrates the growth of foreign tourist arrivals to Thailand from 2005 to 2010. The number of tourists increased from 11,516,936 to 15,841,683 within those five years, due to the continuous development of Thailand's tourism industry. From 2005 to 2010, Thailand saw a 7.5% increase in foreign tourist arrivals, especially in 2006, which marked the year that Suvarnabhumi Airport was officially opened. After 2010, there was a steady growth in Thailand's tourism industry. The

Thai government's efforts to promote Thailand's tourism industry, together with the release of a popular Chinese film ("Lost in Thailand" or 泰囧), helped to increase the number of tourists from East Asian nations, especially Chinese tourists, to Thailand. Thus, Thailand's tourism industry experienced a steep rise in 2010..

2.2 The growth of international tourist arrivals to Thailand classified by region

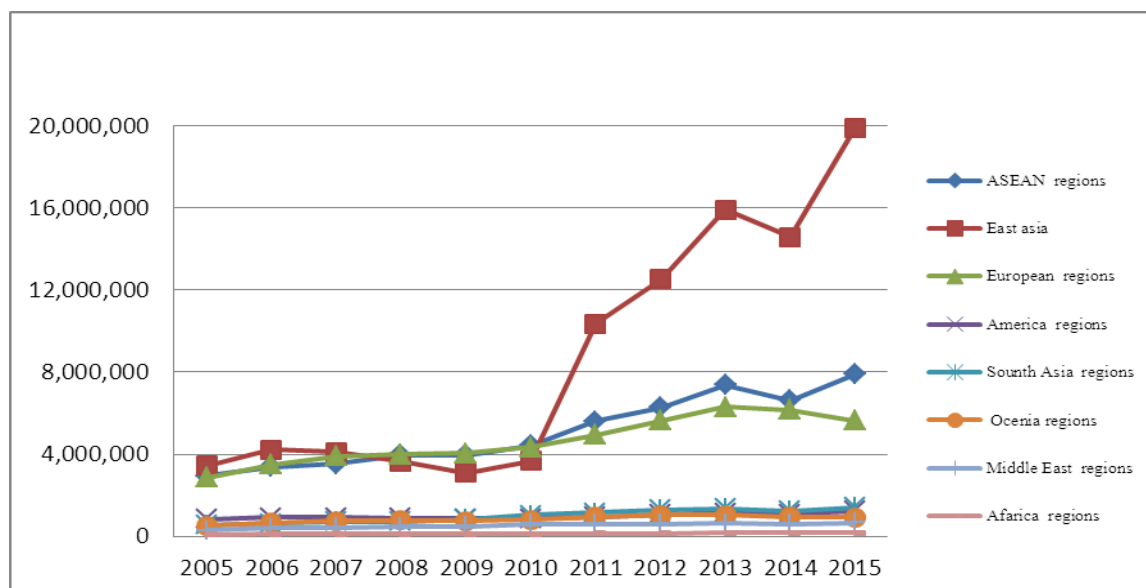


Figure 2: International tourist arrivals to Thailand classified by region from 2005 to 2015 (unit 100 persons)

Source: Tourism Authority of Thailand



Figure 2 demonstrates international tourist arrivals to Thailand classified by regions from 2005 to 2015. International tourists were from the top three main regions: East Asia, Southeast Asia and Europe. Before 2007, there were more foreign tourists from East Asia than Southeast Asian nations and European countries. Thailand suffered greatly from tsunami in 2007. It also went through domestic political conflicts during 2009 and 2010 and an increasing price of oil and gasoline, which caused airplane ticket prices to rise. From the graph above, it can be clearly seen that these unfortunate events had no effect on the Southeast Asian and European tourists who traveled to Thailand. However, East Asian tourists, mainly Chinese

tourists, halted their plans to travel to Thailand as they also faced economic downturn in their country. Meanwhile, changes in the number of tourists from Southern Asia, America, the Middle East and Africa were low and not clearly visible, meaning only few tourists from these regions traveled to Thailand.

2.3 The growth of international tourist arrivals to Thailand classified by country

The analysis from previous section reveals that the source of Thailand's tourism growth came from three main regions: East Asia, Southeast Asia and Europe. This section will explain the growth of international tourist arrivals classified by country.

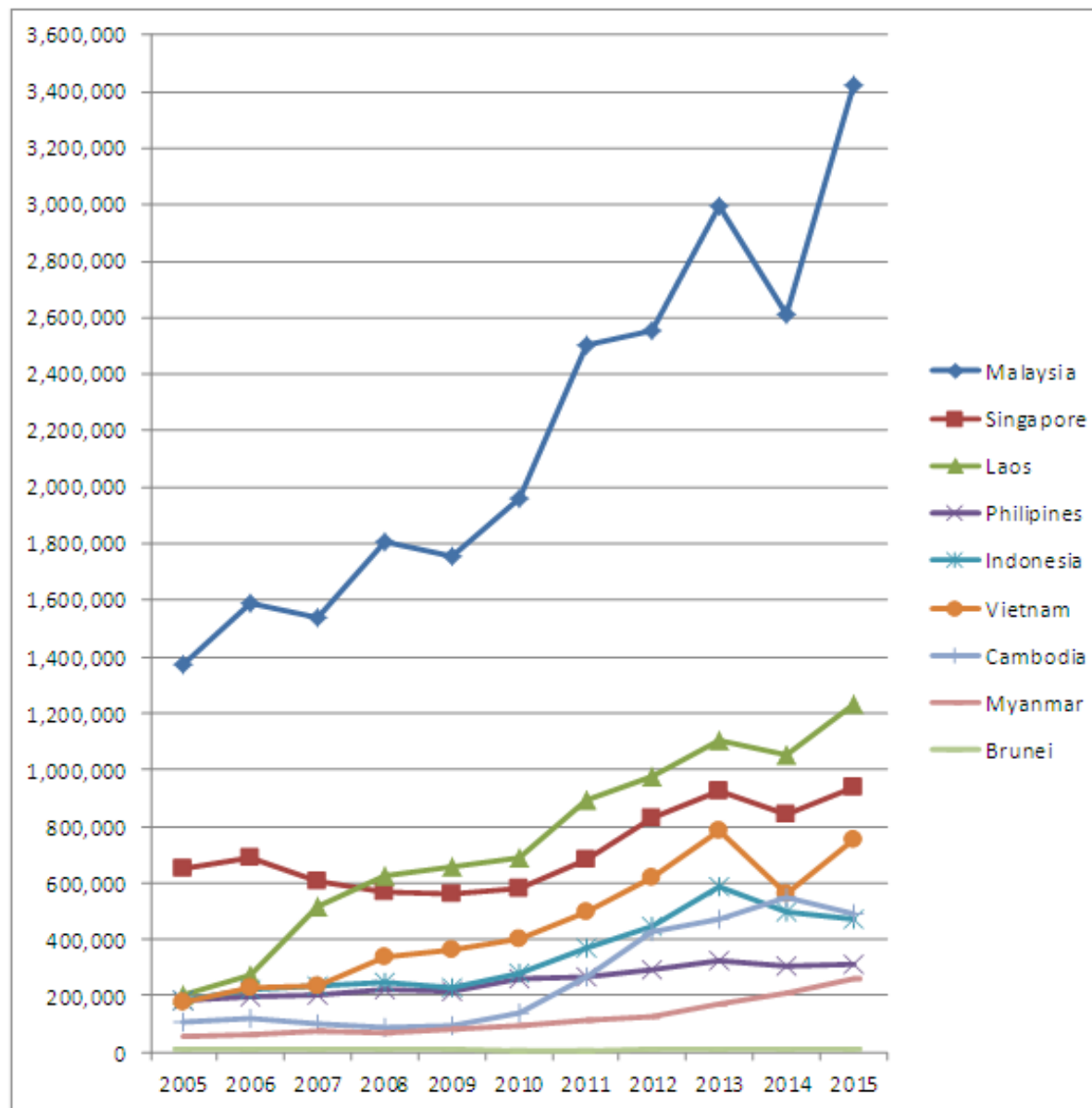


Figure 3: The growth of Southeast Asian tourist arrivals to Thailand classified by country (Unit: person)

Source: Tourism Authority of Thailand

In 2005, the ranking of foreign tourist arrivals in Thailand from Southeast Asian nations was: 1) Malaysia, 2) Singapore, 3) Laos, 4) the Philippines, 5) Indonesia, 6) Vietnam, 7) Cambodia, 8) Myanmar, and 9)

Brunei. A decade later, the ranking changed to: 1) Malaysia, 2) Laos, 3) Singapore, 4) Vietnam, 5) Indonesia, 6) Cambodia, 7) the Philippines, 8) Myanmar, and 9) Brunei. It can be seen in the later rankings that out of

the nine countries, Malaysia, Laos, and Singapore, were the top three nations with residents who travelled to Thailand. Due to the country's development, Vietnam raced ahead of Indonesia and the Philippines to be ranked in fourth place. Indonesia continued to be ranked in fifth place, the

same as it was ten years before. Cambodia, in sixth place, saw some growth in the number of tourists who visited Thailand. The Philippines stood in seventh place, and Brunei still held last place in the rankings.

2.4 The growth of East Asian tourist arrivals to Thailand classified by country

Table 1: Ranking and changes in the amount of tourists from East Asian region travelled to Thailand classified by countries from 2005 to 2015 (unit: person)

Year	China	Japan	Korea	Hongkong	Taiwan
2005	776,792	1,196,654	816,407	274,402	365,664
2006	949,117	1,311,987	1,092,783	376,636	475,117
2007	907,117	1,277,638	1,083,652	367,862	427,474
2008	826,660	1,153,868	889,210	337,827	393,176
2009	777,508	1,004,453	618,227	318,762	362,783
2010	1,127,803	984,763	815,970	321,120	385,689
2011	1,721,247	1,127,893	1,006,283	411,834	447,610
2012	2,786,860	1,373,716	1,163,619	473,666	394,225
2013	4,637,335	1,536,425	1,295,342	588,335	502,176
2014	4,636,298	1,267,886	1,122,566	483,131	394,149
2015	7,934,791	1,381,690	1,372,995	669,165	552,624

Source: Tourism Authority of Thailand.

From Table 1, we can see that the main East Asian countries with residents who travelled to Thailand were China, Japan, Hong Kong, South Korea, and Taiwan. In 2005, Japan became the East Asian country that had the highest number of tourists who travelled to Thailand. South Korea, China, Taiwan, and Hong Kong ranked second, third, fourth, and fifth, respectively.

Years later, these rankings showed some changes. A huge number of Chinese tourists travelled to Thailand, and in 2015, China replaced Japan as the top tourist country in the East Asian region. Almost eight million tourists were from China, which made it a powerful, driving force in Thailand's tourism industry.

The Chinese economy has been fast-growing, and the population have become richer and more modernized. The friendship between Thailand and China is strong, and Thailand does not requires any visa fee or arrival fee from Chinese tourists. The Chinese film, called “Lost in Thailand” (泰囧), has played a huge role in bringing Chinese people to visit Thailand. Beginning in 2005, the Chinese government agreed to collaborate with and assist the Thai government in improving Thailand’s tourism industry. Thai tourist companies and Chinese companies began joint operations of outbound travel and introduced several high-quality services to Chinese tourists, such as business travel, study tours, summer camp tours, and medical tourism. Furthermore, many Chinese tourist firms started up their businesses and invested in Thailand’s tourism industry.

2.5 The growth of European tourist arrivals to Thailand classified by country

The European region was an important source of tourists travelling to Thailand. In 2005, as showed in Figure 4, the

ranking of foreign tourist arrivals from European nations was: 1) England, 2) Germany, 3) France, 4) Sweden, 5) the Netherlands, 6) Switzerland, 7) Italy, 8) Denmark, 9) Russia, 10) Finland, 11) Norway, 12) countries in Eastern Europe, 13) Austria, 14) Belgium, and 15) Spain. The rankings changed greatly in 2015 and became: 1) Russia, 2) England, 3) Germany, 4) France, 5) Sweden, 6) countries from Eastern Europe, 7) Austria, 8) Belgium, 9) Spain, and 10) Ireland. From these rankings, it was obvious that the number of Russian tourists increased a great deal (from ninth place to first place). As for the Eastern European region, it leaped from twelfth place to sixth place.

From this information, we can conclude that the top five European countries with tourists who travelled to Thailand during the said period were Russia, England, Germany, France, and Sweden.

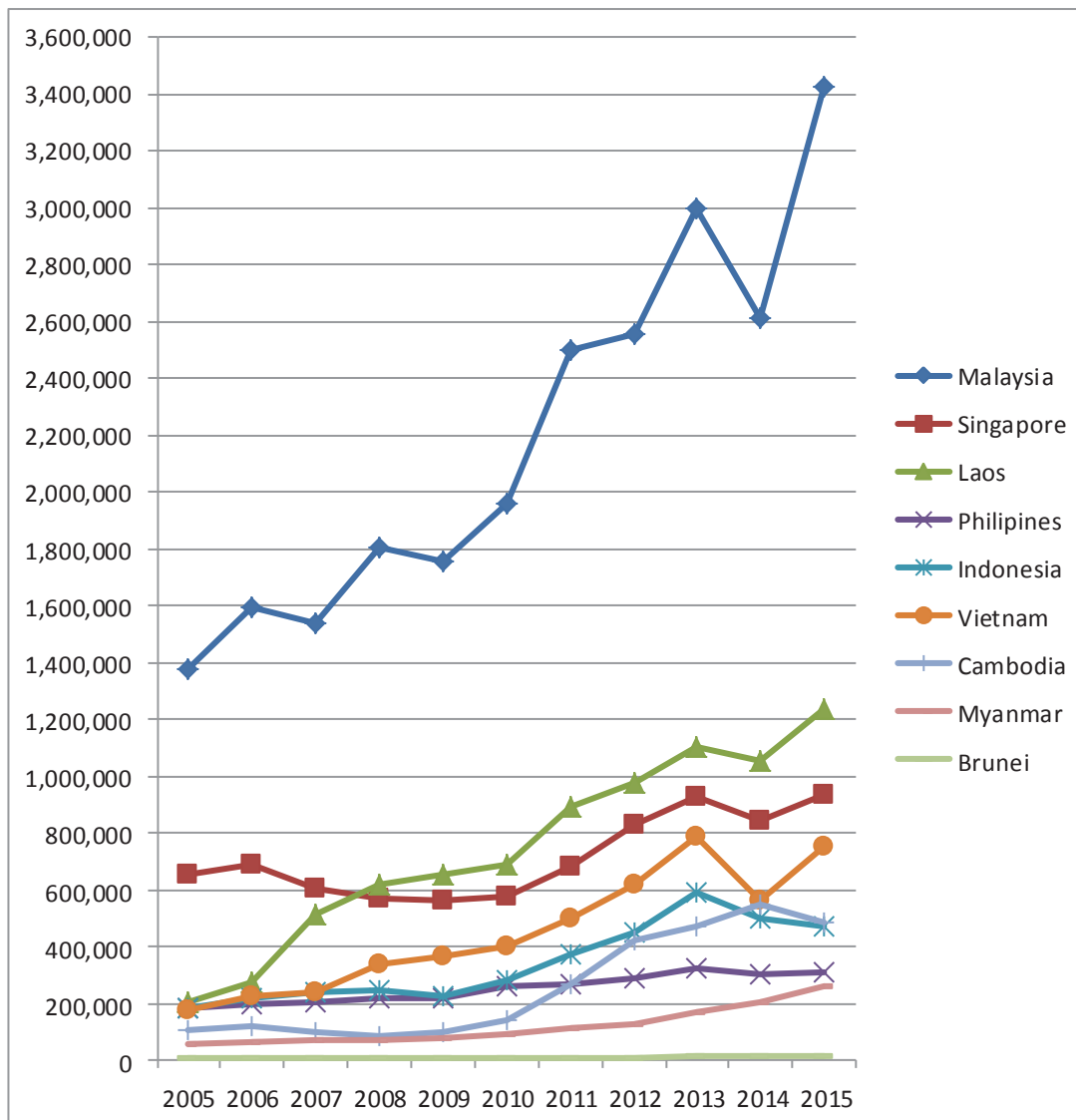


Figure 4: Changes in the amount of tourists from European region travelled to Thailand classified by countries from 2005 to 2015 (unit: person)

Source: Tourism Authority of Thailand

It can also be seen from Figure 4 that since 2013 the number of Russia tourists who travelled to Thailand were slightly decreased. One of the explanations is that the country faced an economic downturn

which resulted from the fell in export oil prices. In 2014, the international community led by the U.S., enforced economic sanctions against Russia, which caused the devaluation of the Ruble, Russian currency.

Thus, the Russian economy collapsed and caused a falling in national income, domestic inflation, and rising food prices. The Russian people suffered and lived with dire consequences.

Thailand's foreign tourists were mainly from three regions: East Asia, Southeast Asia, and Europe. In these three regions, countries in East Asia were the main countries with tourists visiting Thailand, especially China, which supplied Thailand with the highest number of visitors. In Southeast Asia, Malaysia, Singapore, and Laos were the top countries with tourists who travelled to Thailand, especially Malaysia. In Europe, countries like Russia was Thailand's largest supplier of tourists, but due to the collapse of the Russian economy in recent years, the position of Europe's largest source country benefiting Thailand's tourism industry was taken by Britain.

3. The effects on national income resulting from changes in the number of international tourists

The rapid development of Thailand's tourism industry, especially with the expansion in the number of Chinese tourists, has brought a lot of foreign exchange earnings to Thailand. According to statistical data, Thailand's tourism industry entered a golden era in the 1980s. At that time, the foreign exchange earnings created by the tourism industry had already

exceeded those that created by the export of traditional agricultural products of Thailand, such as rice. However, the amount of foreign exchange earnings created then by the tourism industry was quite small, compared with that created by tourism industry in 2015. By 1982, the amount of foreign exchange earnings created by Thailand's tourism industry had reached 3.878 billion baht. (Xin, 2014). In the 1990s, the amount of foreign exchange earnings created by Thailand's tourism industry accounted for 7.1% of the gross national product (GNP) of Thailand while over 70% of the Thai people were engaged in industries related to tourism. According to the Tourism Authority of Thailand, the amount of foreign exchange earnings created by Thailand's tourism industry had reached 8.55 billion dollars. In the 21st century, especially after 2010, the amount of foreign currency earnings created by Thailand's tourism industry has doubled. According to the Tourism Authority of Thailand, the amount of foreign exchange earnings created by Thailand's tourism industry reached 585.961 billion baht in 2010, about 16.742 billion dollars accounting for 11.9% of the GNP of Thailand. At that time, European tourists contributed the most to the foreign exchange earnings of Thailand accounting for 38.86% of the total amount of foreign exchange earnings of Thailand's tourism industry in that year. In 2010, the amount of

the foreign exchange earnings contributed by Chinese tourists was 34,007.81 million baht accounting for 5.8% of the total

earnings of Thailand’s tourism industry, up about 46.9% from 2009. (Figure 2-8).

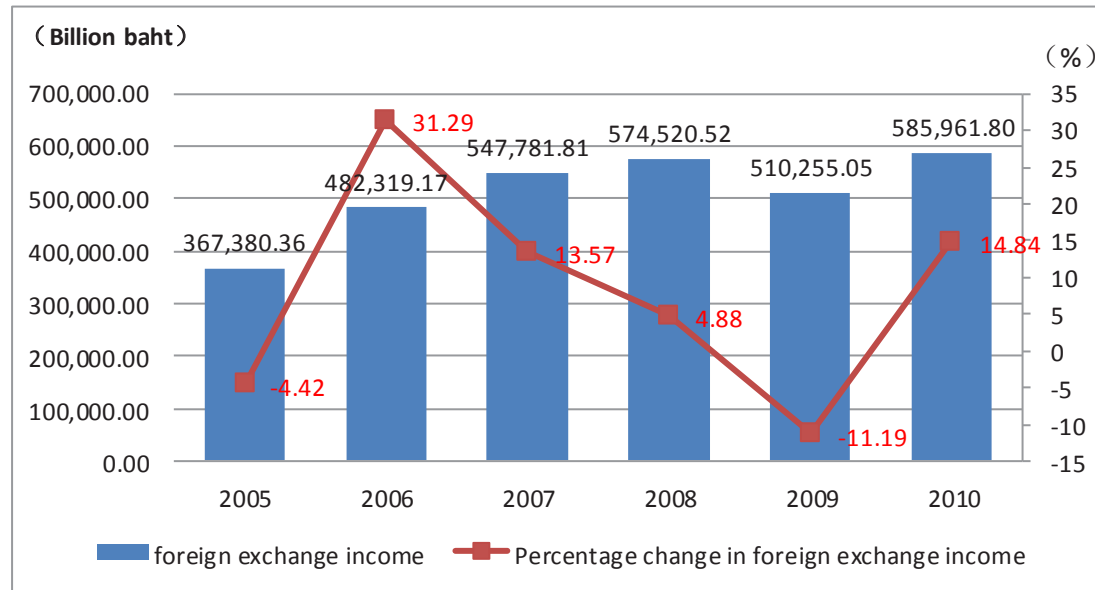


Figure 5 :Foreign exchange earnings created by Thailand’s Tourism Industry (2005-2010)

According to the Tourism Authority of Thailand, the amount of foreign exchange earnings created by Thailand’s tourism industry has reached 776.2172 billion baht in 2011, about 22.192 billion dollar, up 30.94% from 2010. In 2015, the amount of foreign exchange earnings created by Thailand’s tourism industry nearly doubled from 2011 and reached 1,447.15805 billion baht, about 41.347 billion dollar. In 2014, foreign exchange earnings contributed by Chinese tourists were 199.89927 billion

baht. In 2015, this number nearly doubled to 376.00137 billion baht. From the perspective of foreign currency earnings created by the tourism industry, as Chinese tourists contribute most to the foreign exchange earnings of Thailand’s tourism industry among all source countries, the situation of the export of Thailand’s tourism service to China directly affect the income of Thailand’s tourism industry, thus affecting the GNP of Thailand. (Figure 6).

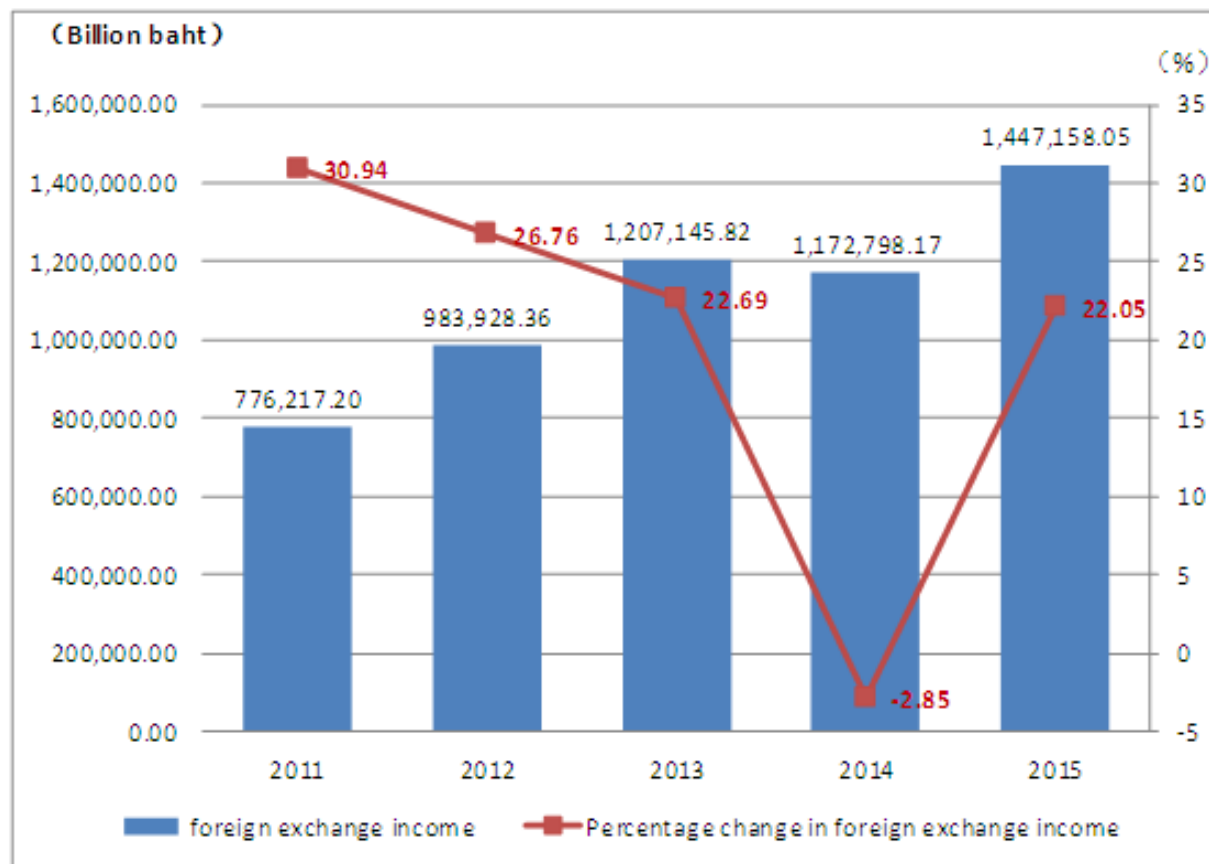


Figure 6: Foreign exchange earnings created by Thailand's Tourism Industry (2011-2015)

4. Concluding Remarks.

It can be concluded that Chinese tourist arrivals to Thailand greatly contribute to expansion in tourism industry in Thailand, which is the pillar of the national economy of Thailand, and consequently affects the national income of Thailand. The above discussion shows that, since China has

become the main exporting target of Thailand's tourism industry and because the number of Chinese tourists traveling to Thailand have increased sharply every year, Thailand's tourism export policy towards China and the relationship between the two countries both have a great influence on the national income of Thailand.

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A Model of Green Behavior for Sustaining Green School

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Suracha Amornpan²

Abstract

This research aimed to develop a model of green behavior for sustaining green school. A questionnaire was used as the main tool for data collection from 275 students in levels four to six at Mahasarakham University Demonstration School (Elementary) in the 2014 academic year. Structural Equation Modeling (SEM) was used for model verification. It was revealed that the exogenous variables, i.e., Environmental Education (EE) and Environmental Management (EM) could influence, through Inspiration of Public Mind (IPM), Green Behavior (GB) for 92.00 percent. Additionally, EE affected GB the most. Moreover, the exogenous variables of EE and EM were able to account for 78.00 percent variation in IPM while EE affected IPM the most.

Keywords: Inspiration of public mind, environmental management, environmental education, green behavior

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Introduction

Children are our hope for future generations in terms of environmental conservation and sustainable development. In order to achieve sustainable development, the children should pay close attention to their participation in environmental conservation with public mind and responsibility for environmental management in school (Thiengkamol, 2011e; Thiengkamol, 2011i). It was also noted that environmental education volunteers and trainers should be equipped with knowledge, understanding, awareness, and responsibility as well as inspiration of public mind. Green behavior, in addition, must be implemented with regard to consumption, recycling, energy conservation, travel, forest conservation, and knowledge transfer since it is essential for the attainment of genuine sustainable development. Such concepts should be implanted in children through all educational channels, i.e., formal, informal, non-formal, and lifelong education (Thiengkamol, 2011e; Thiengkamol, 2011i ; Thiengkamol, 2009a).

As far as elementary school students are concerned, they are energetic and curious learners. For these reasons, they must be inspired with public mind via proper learning and training activities in the fields of environmental management, energy conservation, waste management, and tree conservation, both in school and in the community. As a result, they could become

important change agents in environmental conservation and sustainable development.

Maharakham University launched the green university concept beginning in 2009, with the vision of “First, we must make our university a great place to work and learn with green energy, green technology, green vehicles, and green waste disposal.” Maharakham University received a “Green University” award from Universitas Indonesia (UI), from among 360 universities from 62 countries which took part in the UI GreenMetric World Universities Ranking of 2014. Maharakham University Demonstration School (Elementary) may be able to become a leader for developing students to have public mind for environmental conservation via green behaviors based on energy conservation, waste management, and tree conservation, with integration of environmental education principles through inspiration of public mind for environmental conservation to attain sustainable development.

Objective

The main research objective was to develop a Green Behavior model comprised of Environmental Education (EE), Environmental Management (EM), Inspiration of Public Mind (IPM), and Green Behavior (GB).

Operational Definition

Environmental Education (EE) refers to knowledge and understanding of the environment (X1), environmental attitude

(X2), environmental awareness (X3), environmental public mind (X4), and environmental responsibility (X5).

Environmental Management (EM) is composed of energy conservation (X6), waste management (X7), and tree conservation (X8).

Green Behavior (GB) consists of energy conservation (Y1), waste management (Y2), forest conservation (Y3), and the transfer of knowledge for environmental conservation (Y4).

Inspiration of Public Mind (IPM) is comprised of a person as a role model (Y5), impressive environment (Y6), and impressive event (Y7).

Hypothesis

EE and EM affect GB through IPM as conceptualized in Figure 1.

Methodology

1 Population and Sample

The population consisted of 275 elementary students in levels four to six of Mahasarakham University Demonstration School in the Northeastern region of Thailand in the 2014 academic year. The population was used as the sample group.

2 Research Instrument

A questionnaire was used as the main tool for data collection. The content and structural validity were determined by the Item Objective Congruence (IOC) method, with five experts in the aspects of environmental education, psychology, the

social sciences, and social research methodology. The reliability was checked by means of internal consistency reliability for measures of environmental education, environmental management, inspiration of public mind, green behavior, and the whole questionnaire, the part-total correlation coefficients of which being 0.913, 0.902, 0.905, 0.910, and 0.946, respectively.

5.3 Data Collection

A questionnaire was used as the main tool for data collection from 275 students of Mahasarakham University Demonstration School (Elementary).

5.4 Statistical Analysis

Descriptive statistics as well as inferential statistics, particularly the Structural Equation Model (SEM), were employed for statistical analysis purposes (Ullman et al., 2003, and Markus, 2007).

Results

The results are outlined below:

1 General Characteristics of the Sample

The mean age of the sample students was 10.5 years and 54.90% were female. Most of the students (91.20%) lived at home with their parents, whose education was mostly at a bachelor's degree level (74.10%) and whose work was as government officials (56.73%). The average ages of fathers and mothers were 41.09 and 39.64 years, respectively. It was also revealed that the sample students came from families in which the annual

income of fathers and mothers averaged 1,000,000 baht and 500,000 baht, respectively.

2 Direct Effects of Variables in the Model

2.1 Environmental Education (EE) and Environmental Management (EM) directly affected Inspiration of Public Mind (IPM) significantly ($P \leq 0.01$), the effects of which being 0.65 and 0.49, respectively. Moreover, Environmental Education (EE) and Environmental Management (EM) directly affected Green Behavior (GB) significantly ($P = 0.01$), the effects on Green Behavior being 0.20 and 0.32, respectively. In addition, Environmental Education (EE) and Environmental Management (EM) affected Green Behavior (GB) indirectly and significantly ($P = 0.01$), the indirect effects being 0.36 and 0.27, respectively.

2.2 Inspiration of Public Mind (IPM) directly affected Green Behavior (GB) significantly ($P = 0.053$), the effect being 0.56.

The effects of IPM, as an endogenous variable, EM and EE on GB totaled 92 percent, with IPM being the most effective variable. The result can be demonstrated mathematically in equation (1) below:

$$GB = 0.56 * IPM + 0.20 * EM + 0.32 * EE \dots (1)$$
$$R^2 = 0.92$$

Moreover, the exogenous variables of Environmental Management (EM) and Environmental Education (EE) were able to explain the variation in Inspiration of Public Mind (IPM) for 78.0 percent, with EE having the most effect on IPM as demonstrated in equation (2) below:

$$IPM = 0.49 * EM + 0.65 \dots (2)$$
$$R^2 = 0.78$$

2.3 The Chi-Square value/df of 1.796 was significant ($P \leq 0.05$). Therefore, the hypothetical model of research was congruent with the empirical data. Moreover, the Goodness of Fit Index (GFI) and the Adjusted Goodness of Fit Index (AGFI) were 0.95 and 0.92, respectively ($GFI > 0.90$ and $AGFI > 0.90$), whereas RMSEA and RMR were 0.045 and 0.013 ($RMSEA$ and $RMR < 0.05$), with a critical number of 256.11, which was more than 200. It indicated that the model was congruent with the empirical data (Ullman et al., 2003).

The results of analysis of the causal relationship model and analysis of path effect are presented in Figure 1 and Table 1.

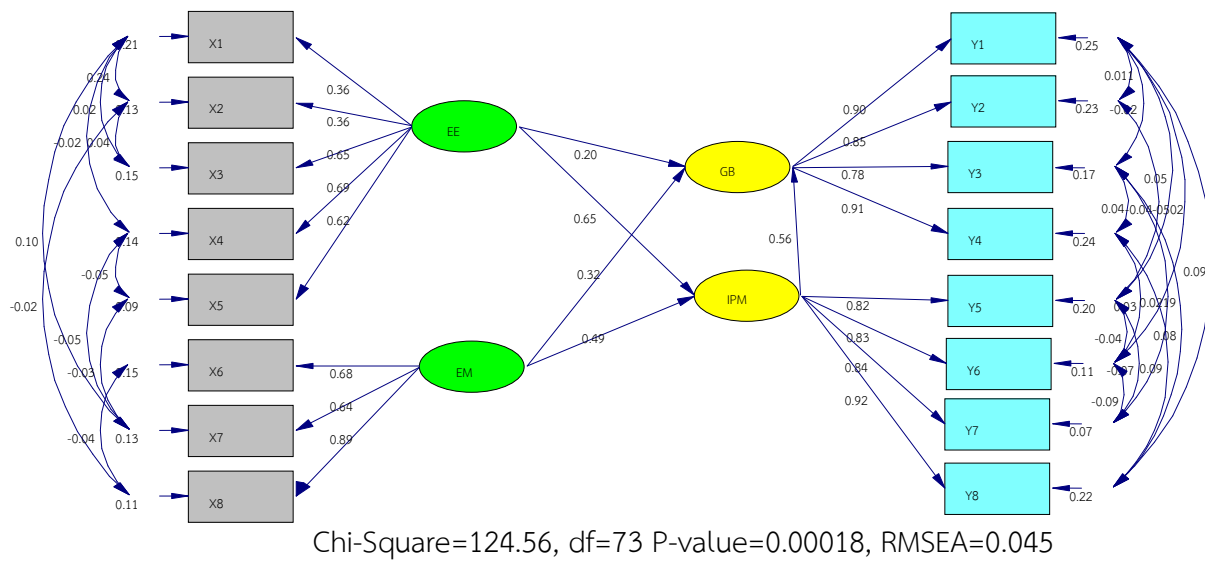


Figure 1: Causal Relationship Model among EE, EM, IPM and GB.

Table 1 Direct, Indirect and Total Effects of EE and EM Affecting GB through IPM

Causal variables	Result variables					
	IPM			GB		
	Total Effect	Indirect Effect	Direct Effect	Total Effect	Indirect Effect	Direct Effect
EE	0.65**	-	0.65**	0.56**	0.36**	0.20**
EM	0.49**	-	0.49**	0.59**	0.27**	0.32**
IPM	-	-	-	0.56**	-	0.56**
$\chi^2 = 124.56; df = 73$		CN = 256.11		$\chi^2 / df = 1.706$		

Discussion

EE directly affected IPM and GB significantly ($P < 0.01$), and the observed variables, i.e., Environmental Awareness (X3), Environmental Attitude (X2), Environmental Responsibility (X5), Environmental Public Mind (X4), and Knowledge and Understanding (X1), on the one hand, were highly correlated, with EE, on the other. The results were consistent with the studies by Thiengkamol and her colleagues (Office of the United Nations Higher Commissioner for Human Rights, 2012; Thiengkamol, 2012d; Thiengkamol, 2011i; Thiengkamol, 2012g; Thiengkamol, 2012h; Pimdee et al., 2012a; Phinnarach, et al., 2012a; Kotchakote et al., 2013a).

It was also demonstrated that EM directly influenced IPM and GB significantly ($P \leq 0.01$). Moreover, observed variables, i.e., Energy Conservation (X6), Waste Management (X7), and Tree

Conservation (X8) could significantly predict EM. Studies conducted by Thiengkamol and her colleagues (Office of the United Nations Higher Commissioner for Human Rights, 2012; Thiengkamol, 2012d; Thiengkamol, 2011i; Thiengkamol, 2012g; Thiengkamol, 2012h; Pimdee et al., 2012a; Phinnarach, et al., 2012a; Kotchakote et al., 2013a) had revealed similar results.

However, it could be concluded that EE and EM could influence GB through IPM. Therefore, by verification, using Chi-square and related statistical techniques, it could be concluded with some degree of certainty that the proposed model of EE and EM influencing GM through IPM was supported by empirical data.

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Thai Business English Students' Receptive Vocabulary Size and Its Relationship to the Use of Vocabulary Learning Strategies

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Abstract

This research investigated business English students' receptive vocabulary size and their use of vocabulary learning strategies. The study also aimed to examine the relationship between the students' receptive vocabulary size and their vocabulary learning strategies. The units of analysis were 59 second-year business English students who were attending a university in Trang Province, Thailand. Two research instruments were utilized i.e. an English-Thai receptive vocabulary size test and a questionnaire regarding vocabulary learning strategies. Findings revealed that the students' average receptive vocabulary size was approximately 4,897 words, which was insufficient for effective listening. The students used the vocabulary learning strategies at a moderate level. Determination strategies were the type most frequently employed by the students. Furthermore, 11 out of 39 vocabulary learning strategies were highly employed by them to acquire vocabulary. The achievers with a high vocabulary size employed two strategies contributing to their receptive vocabulary size while their counterparts with a low vocabulary size used only one such strategy. The students' receptive vocabulary size was positively and significantly ($p < 0.05$) correlated with vocabulary learning strategies ($r_s = .241-.470$).

Key words: Receptive vocabulary size, vocabulary learning strategies, Thai business English students

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Introduction

In this age of globalization, English has been considered a lingua franca for international communication. This international communicative tool has played an essential role in several contexts, including those pertaining to business and education (Crystal, 2003). Therefore, Thai students, especially those in the business field, need to have sufficient English proficiency to effectively conduct business in global markets.

For foreign language learners, listening skill has been recognized as a basic language skill and one of the most significant skills needed to master other skills, particularly speaking. If one understands and recognizes spoken utterances, one can interact naturally and effectively in spoken communication (Nunan and Miller, 1995). Consequently, listening plays an important role as a tool for English communication.

According to Mecartty (2000), one of the factors which causes learners' ineffective listening comprehension is a lack of vocabulary knowledge. Sufficient vocabulary knowledge, particularly receptive vocabulary knowledge (receptive vocabulary size [RVS]), the type required for understanding a word when heard, will lead to effective listening comprehension (Nation, 2006). For

spoken discourse, Nation (2006) also pointed out that a level of 6,000 to 7,000 words was an adequate RVS for effective listening. However, Nirattisai and Chiramanee (2014) found that the RVS of Thai university students was below 6,000 words, which was insufficient to comprehend effectively. Anandapong (2011) also found that Thai business English students had a problem understanding when encountering unfamiliar words.

To enlarge learners' RVS for effective listening, researchers have attempted to find out ways to develop learners' vocabulary knowledge. According to Nation (2001), vocabulary learning strategies (VLSs) are powerful tools used to enhance vocabulary knowledge. In fact, helping learners improve their VLSs has been recognized as one of the effective approaches to enlarge their repertoire of vocabulary (Cunningsworth, 1995). The main advantage of using VLSs is that learners can monitor their learning. Thus, students can be more responsible for their vocabulary learning by using their own strategies to acquire vocabulary (Nation, 2001; Scharle and Szabó, 2000).

As discussed above, it is useful and valuable to investigate the RVS of second-year university business English students who have problems in listening

comprehension. This group of students is required to spend a year in Malaysia as part of their curriculum. Thus, a large RVS and effective VLSs are fundamental to their success. Thus, this study was designed to explore their VLSs and to examine the relationship between their RVS and their VLSs. The results of the study can help both business English students and teachers become aware of the importance of RVS and the use of VLSs. Furthermore, it is beneficial for business English programs to design suitable learning activities to develop their students' RVS, thus enhancing the students' listening skill.

Research Objectives

This research served three main purposes as follows: (1) to investigate the RVS of second-year business English students, (2) to explore the students' frequently employed VLSs, and (3) to examine the relationship between the students' RVS and their VLSs.

Literature Review

Vocabulary Size

In second language (L2) learning, it has long been recognized that vocabulary size, or knowledge, is a crucial communicative tool. Learners need to have sufficient vocabulary to convey meaning in a foreign language (Krashen and Terrel, 1983). According to Nation (2006), adequate

vocabulary size can assist L2 learners to comprehend and use spoken and written language effectively. Fan (2003) also confirmed that L2 learners' lack of sufficient vocabulary causes ineffective language performance.

Receptive Vocabulary Size

Receptive vocabulary size refers to word knowledge frequently employed in listening and reading (Nation, 2005; Schmitt, 2010). Nation (1990) clearly proposed an explanation of word knowledge which has been widely accepted by many researchers, namely that receptive vocabulary knowledge involves knowing: (1) a word form—being able to recognize a word when it is heard or read, (2) a word position—knowing grammatical patterns and collocation knowledge, (3) a word function—knowing word frequency and appropriateness, and (4) a word meaning—being able to recall a word by means of other words which have the closest meaning.

Language Learning Strategies

Language learning strategies are the actions which language learners use in L2 acquisition to achieve their language learning goals. Learners use language learning strategies as tools to enhance the enjoyment of their language learning, resulting in more self-

direction and more beneficial outcomes, with new vocabulary acquired more easily and more rapidly.

Vocabulary Learning Strategies

Vocabulary learning strategies are a subset of language learning strategies (Nation, 2001). Many researchers, such as Sokmen (1997) and Cameron (2001), have proposed definitions for VLSs. According to Sokmen (1997), VLSs are defined as language learners' actions employed to assist them in understanding a word's meaning. They are also described as the actions which language learners perform in order to help themselves comprehend and memorize new words (Cameron, 2001).

Classification of Vocabulary Learning Strategies

Vocabulary learning strategies have been classified differently by various researchers, such as Gu and Johnson (1996), Schmitt and McCarthy (1997), and Nation (2001). According to Nation (2001), VLSs are classified into three general classes: planning, sources, and process. Moreover, Schmitt and McCarthy (1997) proposed a classification of VLSs, which has become widely accepted by scholars in the field of vocabulary acquisition, e.g., Hamzah et al. (2009), and Kalajahi and Pourshahian (2012). Schmitt's taxonomy is comprised of five main

VLSs: (1) *memory strategies*—associating a newly-acquired word with previous knowledge, (2) *cognitive strategies*—similar to memory strategies but focusing on repetition and the use of mechanical means, (3) *metacognitive strategies*—learning and decision-making processes involving planning, controlling, and evaluating effective ways of learning, (4) *determination strategies*—those strategies employed by individuals to understand a word's meaning without asking other people, and (5) *social strategies*—ways to study a new word by consulting or interacting with other people (Schmitt and McCarthy, 1997).

Research Methodology

Units of Analysis

The units of analysis of this research were 59 second-year business English students who were attending a university in Trang Province, Thailand.

Research Instruments

An English-Thai Receptive Vocabulary Size Test

An English-Thai RVS test was employed to measure students' RVS. This test was adapted from a vocabulary size test in English, the multiple-choice version proposed by Nation and Beglar (2007), which was later translated into Thai. This test consists of 130 items, divided into 13 separate one-thousand

word-family levels. Each level has 10 items. The English-Thai version of the test has the same features as the English version, except for the options used in the multiple-choice answers (alternatives). Based on Nirattisai and Chiramanee (2014), a fifth alternative answer, “I don’t know,” was added to the test to prevent guessing. In this test, the students had to select the closest meaning to the key word used in the question. Based on Nation (2008), each correct definition was awarded one point, for a total of 130 possible points. The total score attained by each of the students was multiplied by 100 to calculate the RVS. An example, item 6 from the first thousand-word level, is as follows:

6. admissible: That is not admissible.
- a. สามารถเชื่อถือได้
 - b. อนุญาต
 - c. สามารถบรรยายได้
 - d. เห็นชอบ
 - e. ไม่ทราบคำตอบ

Questionnaire Regarding Vocabulary Learning Strategies

A questionnaire was used as a tool to explore the students’ use of VLSs. It was mainly adapted based on Schmitt and McCarthy (1997), and Nirattisai and Chiramanee (2014). The 39 items used in this questionnaire were VLSs consisting

of five categories: (1) *memory* strategies (MEM), e.g., the process of saying new words aloud when studying, (2) *cognitive* strategies (COG), e.g., learning words through verbal repetition, (3) *metacognitive* strategies (MET), e.g., watching English movies or English television programs, (4) *determination* strategies (DET), e.g., guessing the meaning of words from written context, and (5) *social* strategies (SOC), e.g., asking classmates for the meaning of words. A six-point scale from 0 (never employed) to 5 (most frequently employed) was provided so that the students could rate the frequency of VLSs used. The reliability coefficient of the questionnaire, by means of Cronbach’s alpha, was 0.96.

Data Collection

The RVS test was first administered to 59 second-year business English students, followed by their completion of the questionnaire regarding the VLSs.

Findings and Discussion

Receptive Vocabulary Size

Table 1 shows that the students’ average RVS was approximately 4,897 words (SD=892). The largest group (42%) of students had a receptive vocabulary level of 4,000 words. The highest receptive vocabulary level attained, which only 3% of the students could achieve, was 7,000

words. The lowest receptive vocabulary level, a level which 2% of the students had not surpassed, was 2,000 words.

The 59 students were divided into a high group and a low group, based on the criterion that knowledge of 6,000 words was sufficient for effective listening (Nation, 2006). Thus, five students with vocabularies of more than 6,000 words were classified as the high group, and 54 students with vocabularies lower than 6,000 words were classified as the low group. Therefore, most of the students failed to have a sufficient vocabulary size for effective listening. This finding was consistent with Nirattisai and Chiramanee (2014), who found that Thai university students' RVS was inadequate for effective listening.

The averages of the RVS of the high and low groups were 6,720 words (SD=460), and 4,728 words (SD=715), respectively (Table 1). Two of the five students in the high group had a receptive vocabulary level of 7,000 words while the other three had a level of 6,000 words. The largest segment (46%) of the low group had acquired a receptive vocabulary level of 4,000 words, with one student in the low group having a receptive vocabulary level of only 2,000 words.

As mentioned above, the findings showed that the RVS of most of the students was below the adequate vocabulary size for effective listening. Therefore, 92% of the students would have listening problems while only 8% of the students would be able to listen effectively

Table 1: Second year business English students' receptive vocabulary size

Vocabulary size (words)	Number (%) of students		
	High Group n1 = 5	Low Group n2 = 54	All students N = 59
8000-13999	-	-	-
7000-7999	2 (40%)	-	2 (3%)
6000-6999	3 (60%)	-	3 (5%)
5000-5999	-	21 (39%)	21 (36%)
4000-4999	-	25 (46%)	25 (42%)
3000-3999	-	7 (13%)	7 (12 %)
2000-2999	-	1 (2%)	1 (2%)
Below 2000	-	-	-
\bar{X}	6720	4728	4897
SD	460	715	892

Vocabulary Learning Strategies

Table 2 illustrates that all 59 students moderately employed the overall VLSs, with a mean score of 3.28 (SD=0.60).

With regard to the individual strategy categories, the students employed most frequently the DET (\bar{X} =3.37, SD=0.79), followed by the MET (\bar{X} =3.32, SD=0.73), the SOC (\bar{X} =3.29, SD=0.75), the COG (\bar{X} =3.29, SD=0.63), and the MEM (\bar{X} =3.18, SD=0.69), respectively.

These findings were in line with previous studies by Komol and Sripetpun

(2011), and Nirattisai and Chiramanee (2014), which found that Thai university students used the DET most frequently.

Among the 39 VLSs, 11 strategies were highly employed by the students. These included one MEM, two COG, two MET, four DET, and two SOC. The strategy that was employed the most among the students was *listening to English songs or English news* (\bar{X} =4.12, SD=0.95), as shown in Table 3.

After studying each group of vocabulary achievers, the findings revealed that those in the high group highly employed the nine learning strategies from the four categories which

are listed in Table 4. The strategies of *listening to English songs or English news*, *looking up words in an English-Thai dictionary*, and *guessing the meaning of words from written context* were the strategies employed the most by the high achievers ($\bar{X}=4.40$).

In the low group, on the other hand, 13 VLSs were highly employed to enlarge vocabulary knowledge in the

following categories: two MEM, two COG, two MET, four DET, and three SOC (Table 5).

The low achievers most frequently used the strategy of *listening to English songs or English news* in the MET category ($\bar{X}=4.09$, $SD=0.98$), as shown in Table 5.

Table 2: Frequently employed vocabulary learning Strategies

Categories of vocabulary learning strategies	\bar{X}	SD	Rank	Level of use
Memory	3.18	0.69	4	Moderate
Cognitive	3.29	0.63	3	Moderate
Metacognitive	3.32	0.73	2	Moderate
Determination	3.37	0.79	1	Moderate
Social	3.29	0.75	3	Moderate
Overall strategies	3.28	0.60		Moderate

Table 3: Most frequently employed vocabulary learning strategies by all students

Categories of Vocabulary Learning Strategies	Vocabulary Learning Strategies	\bar{X}	SD
Memory	Saying new words aloud when studying	3.88	1.12
	Learning words through verbal repetition	3.76	1.01
Cognitive	Taking notes of the newly-learned words in class	3.51	1.09
	Listening to English songs or English news	4.12	0.95
Metacognitive	Watching English movies or English TV programs	3.95	0.97
	Looking up words in an English-Thai dictionary	4.02	0.97
Determination	Guessing the meaning of words from textual context	3.64	1.01
	Looking up words in an English-English dictionary	3.58	1.30
	Looking up words in an Thai-English dictionary	3.53	1.22
	Asking classmates for meaning	3.64	1.23
Social	Asking teacher for a sentence including the new word	3.53	1.22

Table 4: Most frequently employed strategies by the high vocabulary achievers

Categories of Vocabulary Learning Strategies	Vocabulary Learning Strategies	\bar{X}	SD
Memory	Saying new words aloud when studying	3.87	1.12
	Studying word with pictorial representation of its meaning	3.56	1.02
Cognitive	Learning words through verbal repetition	3.76	1.11
	Taking notes of the newly-learned words in class	3.50	1.11
Metacognitive	Listening to English songs / English news	4.09	0.98
	Watching English movies / English TV programs	3.93	0.99
Determination	Looking up words in an English-Thai dictionary	3.98	1.00
	Looking up words in an English-English dictionary	3.70	1.27
	Guessing the meaning of words from textual context	3.57	1.00
	Looking up words in a Thai-English dictionary	3.57	1.25
Social	Asking classmates for meaning	3.72	1.17
	Asking teacher for a sentence including the new word	3.61	1.20
	Asking teacher for an L1 translation	3.50	0.95

Table 5: Most frequently employed strategies by the low vocabulary achievers

Categories of Vocabulary Learning Strategies	Vocabulary Learning Strategies	\bar{X}	S.D.
Memory	Paraphrasing the word's meaning	4.00	0.71
	Saying new words aloud when studying	4.00	1.22
Cognitive	Learning words through verbal repetition	3.80	1.01
	Taking notes of the newly-learned words in class	3.60	0.89
Metacognitive	Listening to English songs or English news	4.40	0.55
	Watching English movies or English TV programs	4.20	0.84
	Using English websites	3.80	0.84
Determination	Looking up words in an English-Thai dictionary	4.40	0.55
	Guessing the meaning of words from textual context	4.40	0.98

Relationship between the Receptive Vocabulary Size and the Vocabulary Learning Strategies

There was a significantly positive and low correlation between the participants' RVS and their use of MET ($r=.259$, $p<.05$). It could be inferred that the students who employed more MET to acquire receptive vocabulary would have a higher RVS, as shown in Table 6.

Of the 39 VLSs, four had a significantly positive and moderate correlation with the participants' RVS, i.e., *paraphrasing the word's meaning* was correlated most highly with the participants' RVS ($r=.470$, $p<.01$),

followed by *using online exercises to test vocabulary knowledge*, *remembering the word from its part of speech*, and *using spaced-word practice* ($r=.393$, $p<.01$; $r=.310$, $p<.01$; and $r=.306$, $p<.01$, respectively), as shown in Table 7.

Furthermore, five VLSs were significantly correlated at a low level with the participants' RVS: *guessing the meaning of words from written context* ($r=.285$, $p<.05$), followed by *using cognates in study*, *reading English magazines or English newspapers*, *studying the spelling of a word*, and *grouping words together to study them* ($r=.257$, $p<.05$; $r=.252$, $p<.05$; $r=.245$,

$p < .05$; and $r = .241$, $p < .01$, respectively). The finding that *guessing the meaning of words from written context* was significantly correlated with the students' RVS was in line with Fan (2003), who found that the guessing strategy was beneficial for acquiring English words.

The findings also showed that the achievers in the high group highly employed two strategies which significantly contributed to their RVS: *paraphrasing the word's meaning* and

guessing the meaning of words from written context (Tables 4 and 7). Therefore, this result could indicate that those with more frequent use of *paraphrasing the word's meaning* and *guessing the meaning of words from written context* would have a higher RVS. In the low group, only one strategy which was significantly correlated with the RVS, *guessing the meaning of words from written context*, was highly employed (Tables 5 and 7).

Table 6: Pearson's correlation coefficient between Vocabulary learning strategies and students' receptive vocabulary size

Categories of Vocabulary Learning strategy	r	p-value
Metacognitive	.259	.02
Overall	.114	.19

Table 7: Pearson's correlation coefficient between vocabulary learning strategies and to students' receptive vocabulary size

Categories of Vocabulary Learning Strategies	Vocabulary Learning Strategies	r	p-value
Memory	Paraphrasing the word's meaning	.470	.000
	Remembering from its part of speech	.310	.008
	Using cognates in study	.257	.025
	Studying the spelling of a word	.245	.031
	Grouping words together to study them	.241	.033
	Reading English magazines / English newspaper	.252	.027
Metacognitive	Using online exercise to test vocabulary knowledge	.393	.001
	Using spaced word practice	.306	.009
Determination	Guessing the meaning of words from textual context	.285	.014

The research findings demonstrate the following:

1. The students' average RVS was approximately 4,897 words, which is insufficient for effective listening (Nation, 2006). The largest group of students (42%) had a receptive vocabulary level of 4,000 words. This reflects the fact that the majority of students' RVS was at the low level, which is inadequate for effective listening. Thus, these students encounter problems with listening.

2. Students in this research employed the overall VLSs at the moderate level. The DET were the most frequently employed. Furthermore, 11 out

of the 39 VLSs were highly employed to acquire vocabulary. The achievers from the high group highly employed two VLSs which were significantly correlated with their RVS: *paraphrasing the word's meaning* and *guessing the meaning of words from written context* while the achievers from the low group highly employed only one VLS, i.e., *guessing the meaning of words from written context*. According to Schmitt and McCarthy (1997), *paraphrasing the word's meaning* was one VLS that language learners employed. They also stated that students employed this MEM strategy by linking new words with English words already known. Moreover,

the result that the strategy of *guessing the meaning of words from written context* significantly contributed to students' RVS was consistent with Fan (2003), who found that the guessing strategy was an effective means to acquire new words. This was because written context could help students discover unknown word meaning (Nation, 2001; Schmitt and McCarthy, 1997).

3. There was a significantly positive correlation between students' RVS and their use of MET at a low level. Four out of the 39 VLSs had a significantly moderate and positive correlation with RVS. Moreover, five out of the 39 VLSs were significantly correlated with the subjects' RVS at a low level. This finding reflects the fact that those students who used more of the five VLSs mentioned in Table 7 would have a higher RVS. This finding was in agreement with Fan (2003), who stated that language learners who frequently

employed more VLSs would be more successful in vocabulary learning because they could expand the size of their vocabulary.

Recommendations for Further Study

This study aimed to investigate RVS and VLSs and to examine the relationship between the two. The study was conducted with second-year university business English students, limited to a particular group of business English students at a single university. Further studies should be conducted with other groups of business English students of different backgrounds and with differences in RVS. To obtain in-depth information about the students' use of VLSs, further studies could include other research instruments, such as detailed interviews and observation of the students' daily use of VLSs.

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Causal Relationship between Smartphone Usage Behavior and Carbon Emission

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Abstract

The main purpose of this research was to study the causal relationship between smartphone usage behavior and carbon emission. The sample consisted of 400 students of Mahasarakham Rajabhat University during the second semester of the 2016 academic year. By means of structural equation modeling, it was revealed that behavioral usage of smartphones (BIS) was significantly influenced by factors of acquiring smartphones (FAS) and attitudes toward carbon emission of smartphone usage (ATE) for 45 percent. Moreover, both usage patterns of smartphones (UPS) and FAS influenced ATE significantly for 52 percent.

Key words: Receptive vocabulary size, vocabulary learning strategies, Thai business English students

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INTROAUCION

Communication is important to human beings. Humans utilize communication in transmitting information and in order to be aware of current situations and changes in the world. Nowadays, communication technology is constantly evolving with the application of a number of communication devices, making communication borderless and highly effective. This is particularly the case with smartphones, which have become an integral part of everyday life, and the use of smartphones greatly affects the lifestyle of users. According to a survey in India, conducted by Ericsson (Ericsson, 2012), it was found that more than 80 percent of smartphone users were immersed with the information they gained from their smartphones to the extent that they spent less time with their families and acquaintances. In addition, more than a third of them admitted that they often forgot that there were people around when they were using their smartphones. This has caused widespread concern that if smartphones are developed to be more capable and more convenient to use, they may cause problems with regard to interpersonal interaction as well as keeping people excluded from their surroundings. This survey also dealt with differences in the way information was

consumed by male and female smartphone users. It was revealed that males used map applications more frequently than females while considerably more females relied on chat applications and messaging services. In particular, female users spent 50 percent more hours playing games than male users (Mongkhonvanit, 2013).

The development of computer technology, electronic appliances, and devices, especially smartphones, has been a cause for concern in waste management as well as in recycling, in terms of the need to reduce environmental impact (Cleanriversstl, 2015) and the need to develop environmentally-friendly information technology products of “Green IT” (Khampachua, 2009).

Research Objectives

This research investigated the extent to which the use of smartphones could affect the environment, especially by producing carbon particles. More specifically, it aimed to build a causal model involving the factors of acquiring smartphones (PAS), usage patterns of smartphones (UPS), attitudes toward carbon emissions of smartphone usage (ATE), and behavioral usage of smartphones (BIS).

Literature Review

1. Carbon Footprint

Carbon footprint refers to the amount of greenhouse gases emitted by any product throughout the Life Cycle Assessment (LCA). This is calculated in the form of a carbon dioxide equivalent to the carbon footprint label that will be placed on products. This is to inform consumers that the Life Cycle Assessment of products will cause an impact on the environment. An LCA for carbon footprint, or CF, can be calculated to show the amount of carbon dioxide that occurs from the start to the end of the life of products or services. Any products which are low in carbon, compared to similar products, will be considered to be more effective and cause less impact related to greenhouse gases. In Thailand, the MTEC (the National Metal and Materials Technology Center), under the NSTDA (the Ministry of Science and Technology), has attempted to create a National Life Cycle Inventory Database which can be used for many products. There is also usage of Carbon Footprint Pilot Products in order to inform the public about the quantity of greenhouse gas emissions throughout the life cycle of those products. It is expected that carbon footprinting will help consumers in making purchase decisions and encourage entrepreneurs to make more

eco-friendly technologies as well as increase competitiveness in the world market. There is a demand for imported products marked with a carbon footprint (Mungkung, et al., 2010).

Thailand's Greenhouse Gas Management Organization (Public Organization, 2016) defines the "carbon footprint of an organization" as the amount of greenhouse gases emitted by an organization's activities, such as combustion, fuel consumption, and electrical consumption.

2. Impacts of Information Technology

The impacts of information technology could be broken down into positive impacts and negative impacts (Information Technology Management, 2014).

2.1 Positive Impacts

1) Information technology improves the quality of human life and urban society with the development of telecommunication systems as well as convenient appliances for home use.

2) Information technology promotes social equality and opportunity distribution as it is spreading everywhere, even in rural areas.

3) There is use of information technology in teaching and learning in schools.

4) Much natural resource management, such as forest maintenance, needs the use of information technology.

5) Military operations also use information technology. Modern weapons as well as protection and surveillance systems rely on computers and control systems.

6) Information technology is used in management and in operations as well as in providing services to customers so that they can make purchases more conveniently.

7) Information technology is involved throughout everyday life in all walks of life.

2.2 Negative Impacts

1) Advances in information technology have resulted in big changes. People who cannot tolerate change will tend to get anxious and become stressed due to a fear that computers and information technology could cause them to be unemployed.

2) Information technology constitutes cultural reception and exchange, e.g., changes in the way people dress and changes in consumption.

3) Information technology can ruin the morality of society, and this tends to be quite significant, particularly for young people.

4) The use of information technology could result in people's lack of social participation and the likelihood

of them staying at home or remaining at work.

5) Violations of personal freedom exist, caused by the dissemination of personal information or images, or both, to the public.

6) Information technology creates a social gap, with the poor being less likely to benefit.

7) Network crimes related to information technology could occur.

8) Information technology could cause health problems, e.g., staring at a computer screen for a long time has led to negative effects, such as eye disorders, vertigo, and mental illnesses.

3. Green Information Technology in the Present and in the Future

Green Information Technology (Green IT) has been developed to support and facilitate the efforts of its users to save money and energy. (Sureerattanan, 2010).

Since 2005, Dell has produced desktops that were 81 percent smaller than the mini-tower type, used up to as much as 70 percent less energy, and were encased with reusable materials. This has helped to save 2.2 billion US dollars and has reduced carbon dioxide emissions by 22.4 million tons. In addition, Dell has enacted policies to recycle computer devices worldwide. Michael Dell, Chairman and CEO of Dell, presented the idea that within ten years,

Green IT would not only reduce the impact of climate variability but it would also strengthen industry around the world (Kachintorn, 2008).

Green IT is a management approach and an alternative designed to optimize management of power, reduce energy consumption and greenhouse gas emissions as well as reduce electronic waste. The ultimate goals are that all electronic devices must be reused, must not have any toxic components, and must be more efficient by requiring less power. The government issued the Energy Development and Promotion Act of 1992 and the 20-year Ministry of Energy Strategy (2011-2030) to promote the creation of alternative energy, including the adoption of green technology concepts for energy sustainability. At present, it is implemented by governmental and private sectors.

4. Evaluation of the Impact throughout the Life Cycle of Smartphone Production

Watokung (2016) mentioned that the smartphone, as a communicative

device, had become the fifth necessity of modern human life. The smartphone was introduced after the launch of the iPhone, by Apple, which has since resulted in a revolution in communication. Smartphones have begun to replace older mobile phones, and they can perform very similarly to a computer. They could even be called a small computer.

It has been accepted that during the past few years, smartphone manufacturers have changed from being mobile phone manufacturers. The examples are Samsung, LG, China's Huawei, and Oppo. The competitive landscape of the smartphone market has become the battle of two regions, East and West.

Gartner, a leading US research and consulting company, collected data relevant to global smartphone manufacturers with sales growth in 2015 and in the first half of 2016. During that time, global smartphone sales figures rose to 344 million units. Table 1 represents the smartphone market shares in 2015 and 2016.

Table 1. Worldwide Smartphone Sales to End Users by Vendors in 2016 (Thousands of Units)

Company	2016 Units	2016 Market Share (%)	2015 Units	2015 (Market Share (%))
Samsung	76,743.5	22.3	72,72.5	21.8
Apple	44,395.0	12.9	48,085.5	14.6
Huawei	30,670.7	8.9	26,454.4	8.0
Oppo	18,489.6	5.4	8,073.8	2.4
Xiaomi	15,530.7	4.5	15,464.5	4.7
Others	158,530.3	46.0	160,162.1	48.5
Total	344,359.7	100.0	330,312.9	100.0

Source: Gartner (2016)

Gartner also found that the sales figures of Apple fell in several regions around the world—in the United States, Europe, China, and the Asia Pacific region. Except for the Eurasia region, Central Africa, and Eastern Europe, its sales have continued to grow. The matter to be pointed out is that Chinese smartphone manufacturers have risen to the top five in sales, with brands such as Huawei, Oppo, and Xiaomi, becoming more popular. This is due to the added functions, such as image stabilization and quick-charging technology. Each brand has conducted a carbon footprint assessment in order to evaluate the environmental impact throughout the life cycle of the smartphones as follows:

1) Samsung

Samsung, a Korean company, made a life cycle assessment of its smartphone products in 2016. The highest carbon emission rate found in the pre-

manufacturing process was 52.6 percent, followed by the distribution process, or transportation process, at 23.9 percent, and the smartphone use which had a carbon emission rate of 15.7 percent.

2) Apple

Apple, an American company, made a life cycle assessment of its smartphone products in 2015. The highest carbon emission rate found in the manufacturing process was 77 percent, followed by the product using rate of 17 percent, and the transportation process rate of 4 percent.

3) Huawei

Huawei, a Chinese company, made a life cycle assessment of its smartphone products in 2016. The highest carbon emission rate found in the usage process was at 9.48 percent, followed by the manufacturing and assembly process with 9.19 percent, and the transportation process with a rate of 0.28 percent.

Based on the Life Cycle Assessment reports of these three smartphone manufacturers, it can be seen that the

highest carbon emission process is during manufacturing, followed by usage and transportation.

Conceptual Framework

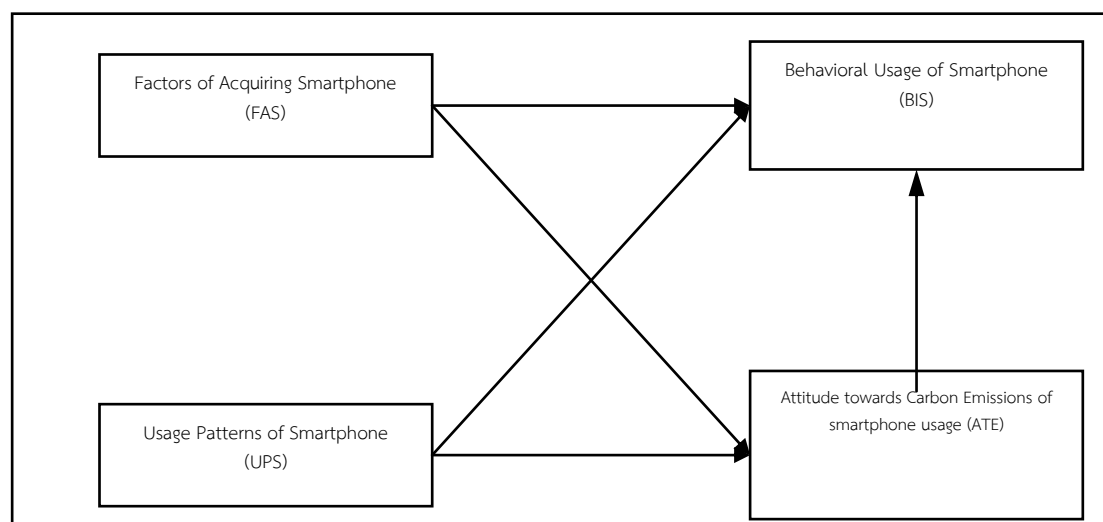


Figure 1. Research Framework of Causal Relationships among FAS, UPS, ATE and BIS.

Table 2. Definition of Latent Variables

Variable	Definition
FAS	Factors of Acquiring Smartphone
UPS	Usage Patterns of Smartphone
ATE	Attitude towards Carbon Emissions of Smartphone Users.
BIS	Behavioral Usage of Smartphone

Methodology

1. Population and Sample

The population totaled 7,501 undergraduate students in the regular program at Mahasarakham Rajabhat University during the second semester of the 2016 academic year (The Registrar, 2017).

The sample of 400 students was selected by multistage random sampling technique, calculated with Yamane's formula, yielding the confidence co-efficiency of 95 percent (Yamane, 1973).

2. Research Tools

2.1 The questionnaire was composed of five sections, i.e., the demographic

pertaining factors of acquiring smartphone, smartphone usage patterns, attitude towards carbon emissions of smartphone users, and behavioral usage of smartphone.

2.2 Assessment of Research Tools

The assessment procedure was as follows:

1) Reviewing the basic principles and the research related to smartphone buying factors, smartphone usage patterns, attitude towards carbon emissions, and behavioural usage of smartphone.

2) Setting and writing definitions of terms and attributes, using features from other research and various sources.

3) Creating the questionnaire as follows:

3.1 Smartphone purchase factors = 30 items

3.2 Smartphone usage pattern = 35 items

3.3 Attitude towards carbon emissions = 15 items

3.4 Behavioral usage of smartphone = 25 items

4) Submitting the updated questionnaire to experts for content validation, structural integrity, language accuracy, and the appropriateness of the content in order to find the IOC—Index of Objective Congruence (Rovinelli and Hambleton, 1977). Questions that had a consistency index between 0.6-1.00 were selected for use.

5) Administering the updated questionnaire with 50 undergraduate students of Sripatum University, who were not the actual sample, to find reliability, using the alpha coefficient (α -Coefficient), according to Cronbach's method. The Cronbach's alphas of the questionnaire are shown in Table 3.

Table 3. Cronbach's Alphas of the Questionnaire on FAS, UPS, ATE and BIS.

Questions	Cronbach's Alpha
Factor of Acquiring Smartphone (FAS)	0.796
Usage Pattern of Smartphones (UPS)	0.662
Attitude towards Carbon Emissions (ATE)	0.889
Behavioral Usage of Smartphone (BIS)	0.874
Total	0.907

3. Data Collection

The researchers collected data using the questionnaire, completed by the undergraduate students of Mahasarakham Rajabhat University, as follows:

3.1 The researcher and the research assistant distributed the questionnaires directly, allowing the respondents a period of one week.

3.2 The researcher and the research assistant examined the returned questionnaires and the completeness of the questionnaires. Also, the data was categorized so that they could be analyzed purposefully.

3.3 The data was then analyzed statistically.

4. Data Analysis

4.1 Descriptive statistical analysis such as frequency distribution, percent, mean, and standard deviation were used for descriptive purposes.

4. The LISREL Program for Windows Version 8.3 was used for hypothesis testing

and causal relationship. (Joreskog and Thillo, 1972; Joreskog and Sorborn, 1981).

Results of the Research

1. Demographic Features

The majority of the sample used was women (71.00 percent). Most of the students in the sample were first-year undergraduate students (31.75 percent), followed by third-year undergraduate students (27.25 percent)—most of whom were students from the Faculty of Education (24.50 percent)—followed by students from the Faculty of Science and Technology (19.25 percent). In addition, the respondents were between 18 and 24, with the average age of 20.48 (SD = 1.29). The details are shown in Table 4.

Table 4. Demographic Features

Demographic Features	Numbers	Percent
	N	%
Gender		
Male	116	29.00
Female	284	71.00
Total	400	100.00
Age Min. 18 years old, Max. 24 years old, Average (\bar{X})= 20.48 SD = 1.29		
Class		
Year 1	115	28.75
Year 2	102	25.50
Year 3	95	23.75
Year 4	76	19.00
Year 5 (5 - year curriculum)	12	3.00
Total	400	100.00

Table 4. (continued)

Demographic Features	Numbers	Percent
	N	%
Faculty		
Faculty of Education	58	14.50
Faculty of Science and Technology	57	14.25
Faculty of Management Science	57	14.25
Faculty of Agricultural Technology	57	14.25
Faculty of Humanities and Social Sciences	57	14.75
Faculty of Information Technology	57	14.25
Faculty of Law and Government	57	14.25
Total	400	100.00

Table 5. Direct Effect (DE), Indirect Effect (IE) and Total Effect (TF) among FAS, UPD, ATS and BIS.

Causes	Effects					
	ATE			BIS		
	TE	IE	DE	TE	IE	DE
FAS	-0.09 (0.08)	-	-0.09 (0.08)	0.13** (0.035)	0.03 (0.045)	0.10** (0.051)
UPS	0.74* (0.085)	-	0.74* (0.85)	0.51** (0.056)	0.21** (0.058)	0.30** (0.064)
ATE	-	-	-	0.28** (0.041)	-	0.28** (0.041)
$\chi^2 = 162.19$; $df = 96$; $CN=245.15$			$P = 0.00000$		$\chi^2 / df = 1.690$	
GFI = 0.95 ; AGFI = 0.92			RMSEA = 0.045		RMR = 0.040	

From Table 5, it was found that the Linear Structural Relationship of the proposed model was in accordance with the empirical data, since chi-square values divided by degrees of freedom (χ^2 / df)

was less than 5 ($\chi^2 / df = 2.11$), Goodness of Fit Index (GFI) and the Adjusted Goodness of Fit Index (AGFI), being 0.95 and 0.91, respectively. Moreover, Critical N (CN) that equaled 245.15, which was higher than

200, indicating that the model was consistent with the empirical data.

Figure 2. depicts causal relationship among the latent variables as represented by their respective observable indicators.

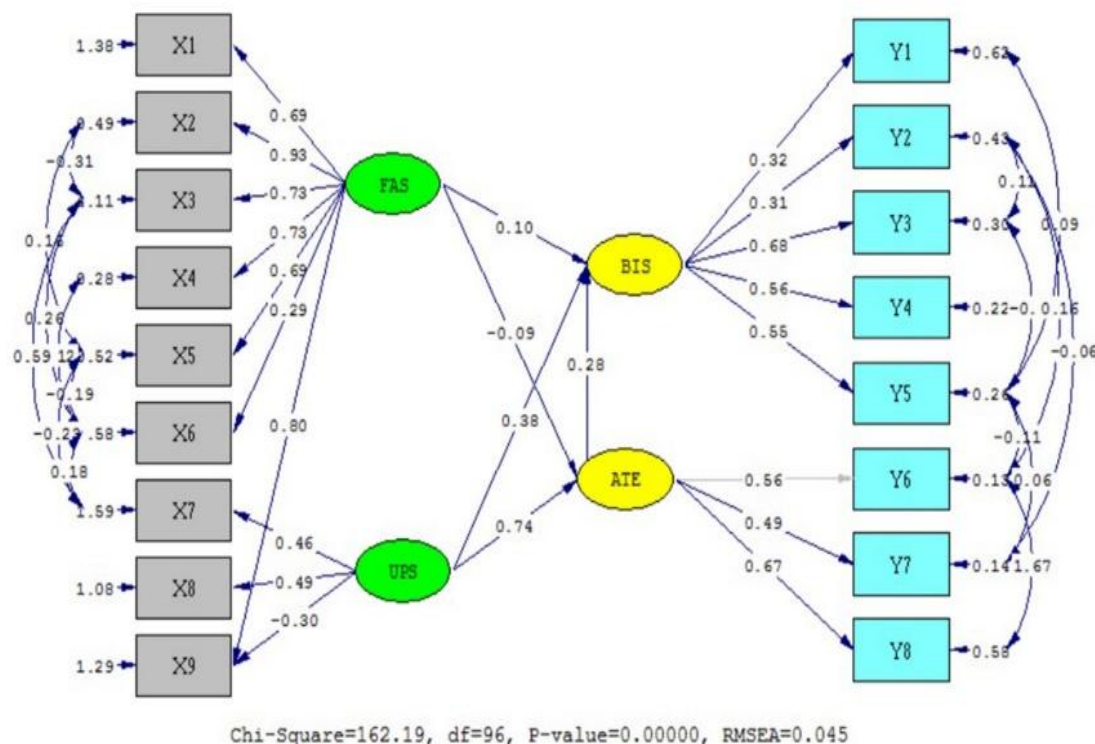


Figure 2. The Causal Relationship among FAS, UPS, ATE and BIS.

From Figure 2, the results of the causal analysis were as follows:

1. Direct influence of FAS on ATE was not statistically significant, whereas its direct influence on BIS was not statistically significant either. But its indirect influence on BIS was statistically significant at 0.01, with the effect value being 0.28.

2. Direct influence of UPS on ATE was statistically significant level at 0.05, with the effect value being 0.74. In

addition, UPS directly influenced BIS was not statistically significant at 0.05. It also had an indirect influence on BIS, with the effect value being 0.28.

3. ATE had a direct influence on BIS statistically significant at 0.01, with the effect value being 0.28.

Equation (1) demonstrates that BIS was significantly dependent upon ATE, FAS and UPS at $p = 0.05$. all the independent variables accounted for 45 percent variance in BIS.

$$\text{BIS} = 0.28*\text{ATE} + 0.10*\text{FAS} + 0.30*\text{UPS}..(1)$$
$$R^2 = 0.45$$

The structural equation in which ATE was the dependent variable whereas UPS and FAS were independent variables is presented below:

$$\text{ATE} = -0.09*\text{UPS} + 0.74*\text{FAS} \dots\dots\dots(2)$$
$$R^2 = 0.52$$

Equation (2) reveals that ATE was significantly dependent upon UPS and FAS at $P \leq 0.05$, and both of which accounted for 52 percent variance in ATE.

Discussion

The results of the study were in accordance with the results of the study by Sangkaew (2016), who studied the environmental conservation knowledge and the environmental education affecting conservation behavior of lower secondary school students and their inspiration for public mind. The research found that the inspiration for public mind had the greatest influence on the ecological and environmental conservation behavior at 0.78, followed by the environmental education and the ecological and environmental conservation knowledge at 0.29 and 0.27, respectively. In addition, the results of this study were consistent with the results of the study by Jumrearnsan, et

al., (2012) who studied the structural relationship between psychological factors and the environment. The study was aimed at undergraduate students of Mahasarakham University. The results showed that the factors that influenced environmental conservation behavior to reduce global warming the most was environmental education, followed by the inspiration for public consciousness, situational consciousness, and original consciousness respectively. These four components could explain the variance of environmental conservation behavior to reduce global warming at 84.00 percent.

Recommendations

Smartphone usage is likely to increase, and smartphones will continue to play a role in almost every human activity, which can also lead to higher carbon emissions. Therefore, the effort to have smartphone usage behavior towards environmental sustainability should be seriously taken into consideration. There should be encouragement to enhance knowledge on natural conservation, using the media, An attempt should be made through all channels of mass media to reach all levels of users to strengthen the knowledge and awareness of both direct and indirect impacts of smartphones on

the environment. This will lead to the prevention and resolution of the current problems and those that could arise in the future.

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Risk Communication on Climate Change in Agriculture

Charuvan Kasemsap¹

Abstract

The research aimed to study the risk communication on climate change, perception and awareness of risk in agriculture, based on empirical data in Bangnampriao district, Chachernsao province, Thailand. The data was collected using focus group and questionnaire survey. Results showed that effective risk information on climate change was insufficient. Furthermore, there was a lack of appropriate personal media and material media to integrate scientific knowledge with lifestyle of community. However, the personal media such as friends and relatives had potential influence on climate change adaptation for 36.52 percent. The material media that contained climate change information in the community were pamphlet, poster, and comic. Risk perception and risk awareness were important to ensure effective risk management.

Key words: Risk communication, climate change, agriculture

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Introduction

Climate change refers to any systematic change in the long-term statistics of climate elements (such as temperature, precipitation, or winds) sustained over several decades or longer time periods (American Meteorological Society, 2017). It was mentioned in the Intergovernmental Panel on Climate Change (IPCC) report that increased evaporation combined with regional changes in precipitation characteristics had the potential to affect the intensity of floods and droughts. The South East Asia region was vulnerable to climate change, including sea level rise, shift of weather pattern and more frequent occurrence of floods and droughts (Intergovernmental Panel on Climate Change, 2007).

According to the World Health Organization (WHO), risk communication is a “process which aims to help stakeholders define risks, identify hazards, assess vulnerabilities and promote community resilience” (World Health Organization, 2017). Emotions were determinants in risk perception (Sabine, R., 2012). The Experience in climate change, as a problem, affected risk awareness of people. Lower psychological distance was associated

with high level of concern and preparedness to take action on climate change (Alexa, S. et al, 2012).

The content of media and communication mode were the challenge of effectively climate change communication (Benson Owuor Ochieng Consultant, 2009). The visualization content of risk, uncertainties and risk management should be related to the context of community (Paul, M. K. et al, 2008). However, the press did not pay role to convey agricultural information to the farmers (Rehman, F., 2011). The activity media in group learning process could stimulate the systematic thinking, critical thinking, awareness, and change attitude (Janot, M. de S, et.al., 2012). The community-based participation of different stakeholders could be effective to change attitude and behavior (Randy, R. et al, 2009). The perception of climate change risk was related to the public engagement in climate change communication (Nick, P., 2012). Risk perception was influenced by demographic factors (e.g. age, gender) and past experience as shown in Figure 1. Perceived risk was thought to be individual likelihood adaptation (Erin, M., 2012).

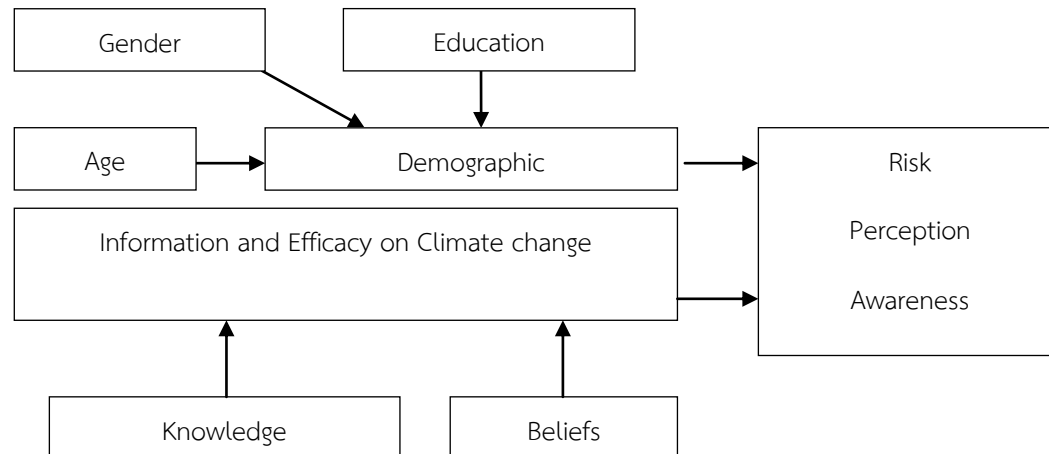


Figure 1 : A causal diagram on climate change risk perception

Source : Paul, M. K. et al, 2008

Furthermore, the provincial agencies had limited capacity to support the community in dealing with the impacts of climate change (The European Union, 2013). The local government structures played a key role in continuous supporting communities in building capacity for adverse consequences of climate change (Betty, H. M., 2009).

Thailand has faced with water resources problems, including drought and flood. Increasing climate change was expected to aggravate vulnerabilities on agricultural areas such as rice field, orchard, and fish farming in Bangnampriao District, Chachemsao Province (Charuvan, K. and Suppakorn, C., 2015). The simulation indicated that the rainfall during wet season

(May – October) contributed to a rise in climate change whereas that in dry season (November –April) led to decline. In addition, the sea level rise along inner Thailand gulf, affecting saline intrusion in this area through Bangpakong River, was likely to intensify. Adaptation strategies were needed to be put in place in order to enhance the resilience of the agriculture (Charuvan, K., 2015). Most of adaptive measures were under the concept of “sufficiency economy” (Ngigi S. N., 2009).

Research Objective

The objective of this study was to study the risk communication on climate change in agriculture in Bangnampriao district, which is located in the eastern sub-region of Thailand as shown in Figure 2.

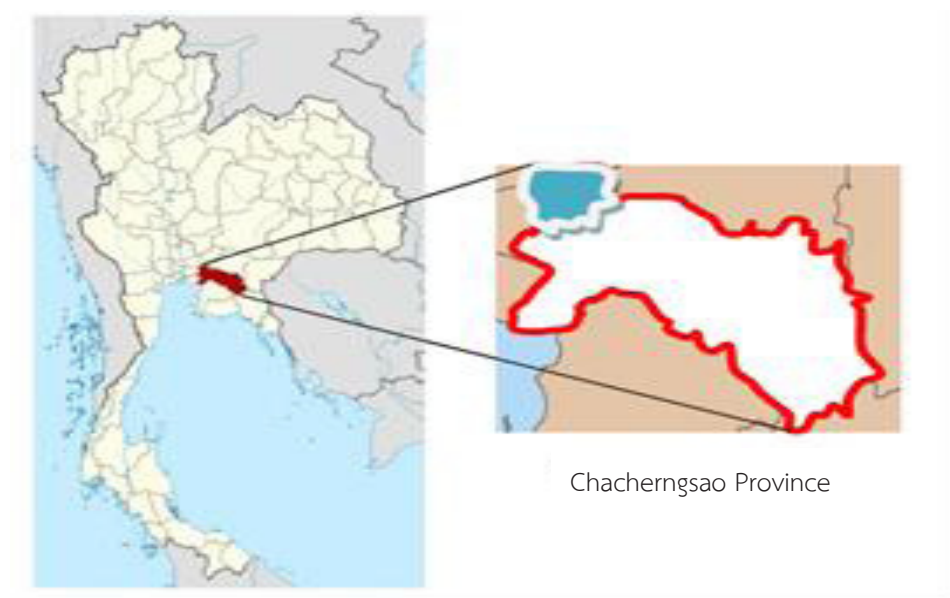


Figure 2 : Location of Bangnampriao district in Chacherngsao Province.

Methodology

Firstly, the role of the media in risk communication on climate change in Thailand was investigated by means of media analysis. Quantitative and qualitative methodologies were used to identify communication mode of climate change and content of climate change.

Secondly, data collection by questionnaire was conducted. The questionnaire was divided into three parts. The first part dealt with personal information of respondents, including age, gender, and occupation. The second part was on climate change perception. The third part dealt with climate change awareness on flood, drought, and saline intrusion.

Results and Discussion

1. Media analysis on climate change

It was revealed that there was confusion in the understanding of the meaning of climate variability, and climate change in the mass media. The meaning of climate variability and extreme climate, which were defined as the way climate fluctuates yearly above or below a long-term average value and the frequent and intense larger weather events, respectively. This leads to natural disasters such as heavy rain, flood, and drought. The forecasted weather from Meteorological Department was used for management planning in disaster risk reduction, while the climate change variability, which was defined as

a change in the statistical distribution of weather patterns when that change lasts for an extended period of time (i.e., decades to millions of years). Climate change was the phenomenon global warming derived from continuous greenhouse gas emission whereas climate variability was the yearly variable of weather. Therefore, climate change can cause impacts in the next 30-50 years while climate variability can cause the natural disaster from extreme climate. Furthermore, the meaning of climate change mitigation strategies, which is the actions that either reduce the emission of greenhouse gas or enhance carbon sinks, differs from that of adaptation strategies, which refers to the efforts to reduce the severity of climate change impacts.

The print media, including the agricultural magazine, agricultural journal, newspapers, and pamphlets as well as radio and television programs, were poor in content and also in number. Furthermore, many people were still more familiar with traditional media, which were closer to their local cultures than the modern forms of media. It was observed that the print media were not playing their proper role in the dissemination of agricultural information among farmers. Risk messages which were not heard, not believed, led to no

actions. A content analysis of the newspaper coverage from website www.iqnewsclip.com by using the keywords of climate change in Thailand during 2011–2013 was conducted. As shown in Figure 3, it was found that the total climate change news exhibited in the context of Thailand decreased significantly in 2013. It was evident that there were 719 pieces of climate variability news (33.36%) while climate change news contained 798 pieces of mitigation (37.03%), 388 pieces of climate change (18.00%) and 250 pieces of climate change adaptation (11.60%). Therefore, the climate change adaptation news was not the main content in newspaper. In addition, it was exhibited that the climate change adaptation news consisted of 224 pieces (89.60%), articles 14 pieces (5.60%), and pictorial news 12 pieces (4.80%). The content of climate change adaptation articles was the correct information for only 8 pieces (57.14%). Hence, the practical news of climate change adaptation was only 0.37 percent of overall news. This led to limited-transfer efficiency to agricultural community. Therefore, print media such as mass media were not playing a proper role to convey the agricultural information to the farmers (Rehman, F., 2011).

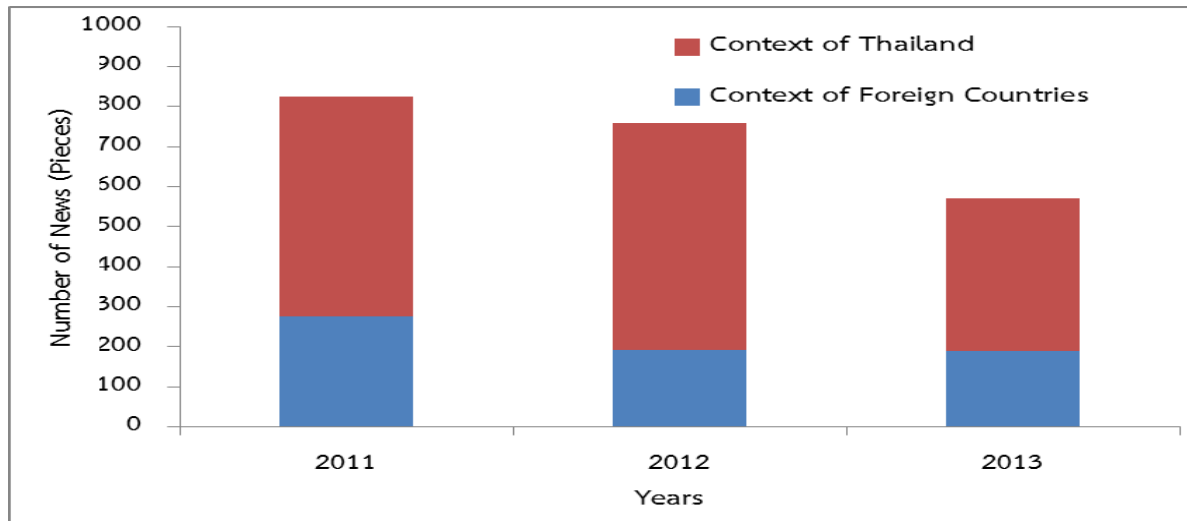


Figure 3 : Climate change covering on the press

Analysis of 21 articles related to climate change during 2011-2013 from website www.scholar.google.com revealed that there were 5 articles on climate variability (23.80%) while there were 9 articles on climate change news (37.03%), 6 articles on mitigation, and 1 articles on climate change adaptation (4.76%). The accessibility to articles was difficult due to the limited distribution. The academic language was also hard to understand because it was not related to the context of community.

Moreover, analysis of 17 articles related to climate change during 2011-2013 from website www.elibrary.trf.or.th (The Thailand Research Fund) and www.tnrr.in.th (Thai National Research Repository) showed that there was 1 article on climate variability news (5.88%), 4 climate change news (23.52%),

8 articles on mitigation (47.06%) and 4 articles on climate change adaptation (23.52). The accessibility to articles was difficult due to the limited distribution. The academic language was hard to understand because it was not related to the context of community.

Furthermore, analysis of information from website www.google.com by using the keywords of climate change, revealed that the movies related to climate change were *The Water World*, *The Day After tomorrow*, and *The Inconvenient Truth*, etc. The content of the movies was mostly concerned with climate change. The accessibility to movies was difficult due to the limited availability of playing equipment, and the language was not related to the context of community.

Finally, analysis of information from website www.google.com by using the keywords of climate change, showed that the percentages of Thais music related to climate change and mitigation were around 60 and 40, respectively. The accessibility to music was also difficult due to limited number of playing equipment.

2. Description of research sample.

Among 150 respondents, 53% were female and 47% male. Number of respondents in the age range 41-50 years were the largest (38%), followed by age 51-60 (30%), 31-40 (13%), 61-70 (13%), 71-80 (3%), 21-30 (2%), and <20 (2%). The median age was 49.3 years. Number of respondents having education lower than Junior High school were the largest (70%) followed by Junior High school (13%), Bachelor Degree (3%), Diploma (2%), and Master Degree (0%). Number of respondents having occupation as farmers were the largest (82%) followed by labourers (7%), aquaculturalists (6%), and vegetable growers (5%).

3. Perception of climate change in the media

Among 150 respondents, television (43.54%) was mentioned to be the most frequently reported mass media from which people obtained information about climate change, followed by radio (7.30%), internet (3.09%), and Newspaper/magazine (1.40%) (Table1). The data also show that the local personal media such as friend/relative (36.52%), followed by local officer (7.02%) and provincial officer (0.84%) had potential influence on community climate change adaptation. The results of the present study are consistent with those of Fariha, R. et al (2011) who found that the most effective forms of print media for livestock production technology were magazines, followed by books, newspapers and posters. While on flood disaster in 2011 in Thailand, television was found to be the most effective channel for disseminating flood information (58%) (Neelima, A. M. et al, 2016).

Table 1 : Climate change perception in the media

Media	Percent	Score
Television	43.54	4.67 (High)
Radio	7.30	1.99 (Low)
Internet	3.09	1.35 (Low)
Newspaper/Magazine	1.40	1.70 (Low)
Poster	0.28	1.52 (Low)
Pamphlet	0.00	1.51 (Low)
Provincial officer	0.84	1.91 (Low)
Local officer	7.02	2.77 (Medium)
Friend/Relative	36.52	4.66 (High)

Note: 1.00 –2.33 Low; 2.34-3.67 Medium; 3.68–5.00 High.

4. Climate change awareness

The awareness of negative effects of flood, i.e, damage and lower income, were (95-100 percent) while those on positive effects i.e., abundant aquatic

animals, fertile soil and useful fertilizer were moderate (42-61 percent) as shown in Figure 4. However, climate change adaptive measure such as rice cultivation avoidance and re-sit cultivate were high (54–75 percent.)

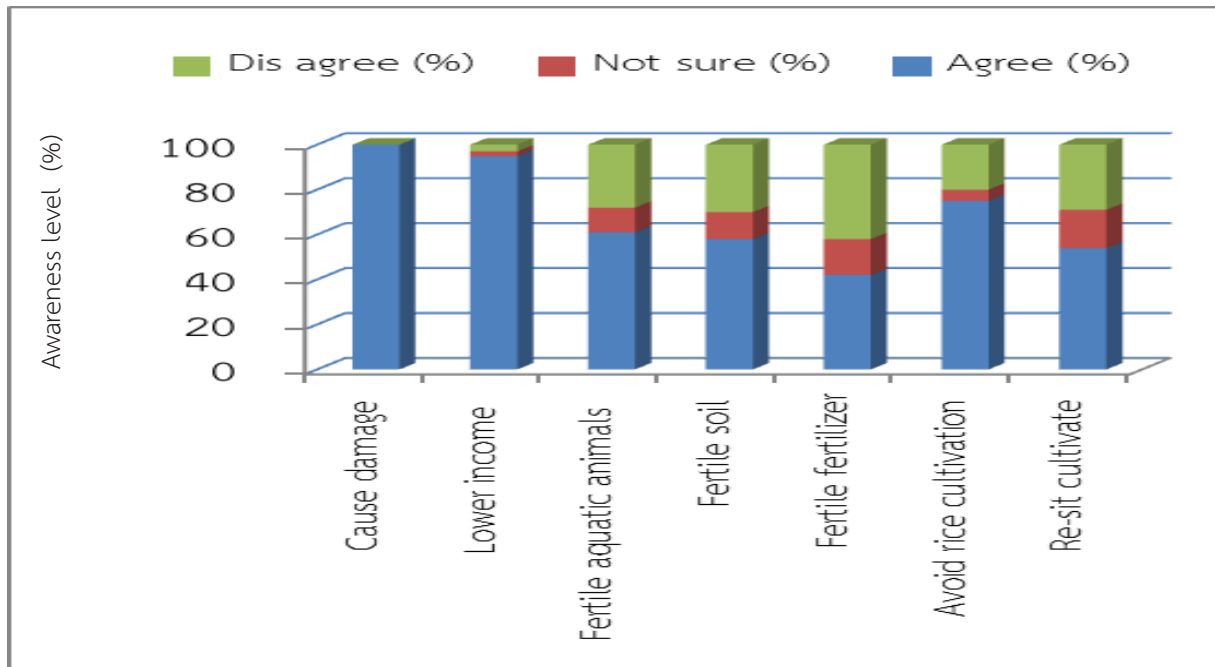


Figure 4: Flood risk awareness

The awareness of negative effects of drought i.e., damage and lower income was high (96-99 percent) as shown in Figure 5. While climate change

adaptive measure i.e rice cultivation avoidance, unable to cultivate other plants and re-sit cultivate were quite high (62–84 percent).

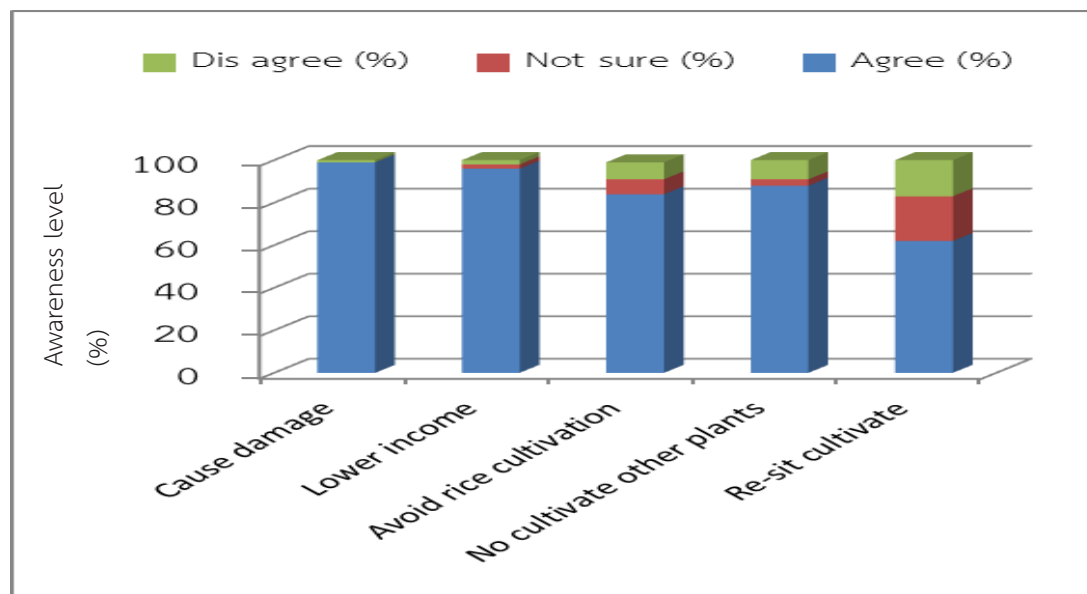


Figure 5 : Drought risk awareness



Risk perception was influenced by demographic factors (e.g. age, gender) and past experience (Paul, M. K. et al, 2008). Risk awareness was strongly influenced by personal experience such as location and history. Perceived risk was thought to be individual likelihood adaptation (Erin, M., 2012). However, personal exposure to adverse consequences of climate change increased fear but decreased perception of risks because of familiarity.

Concluding Remarks

Even though newspaper could be easily accessed, the numbers of climate change adaptation news or articles were just approximately 0.37 percent. Furthermore, the number of media that contained climate change adaptation information such as journal, academic report were not only limited but also confusing, particularly the concepts of climate variability and climate change. Therefore it is advisable that the concepts should be properly conveyed.

The accessibility of media such as movies and songs was difficult due to the limited number of playing equipment. The content of climate change adaptation in newspaper, journal, academic report, and electronic media was significant but the language used was academic writing and difficult to understand due to low literacy and

different context of community. However the local personal media such as friends and relatives have potential influence on community climate change adaptation. They could distribute the information through the printed media such as pamphlet and poster containing information about climate risk and adaptation in the context of community. The results also revealed that percentage of climate risk awareness especially negative effects of climate change was highest (95-100%). The local administrative organizations, therefore, should stimulate learning process and awareness in the topic of climate change adaptation in community.

By means of the National Board on Climate Change Policy in the Ministry of Natural Resources and Environment, climate change adaptation has to be systematically integrated into the strategic development plans of governments at different administrative levels to ensure participation and support of stakeholders such as personal media, especially the representatives from Department of Local Administration (DLA), Department of Water Resource, Department of Irrigation, Department of Agriculture, Department of Environment Quality Promotion, and the Community Development.

Climate risk awareness in vulnerable communities could be improved through both formal and non-formal media. Community engagement through community-based organizations (CBOs), to identify problems, define solutions and formulate action plans could increase awareness and involvement so that vulnerable people, especially experienced people, could make decisions about their response to a severe risk with their family and in the

context of community climate. The perception of climate change as local risk was related to the public engagement in climate change communication (Nick, P., 2012).

Acknowledgments

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Article Review

MacCallum, Robert C. and Austin, Jame T. (2000). “Applications of Structural Equation Modeling in Psychological Research”, *Annu.Rev.Psychol.* 51: 201-226.

Nathabhol Khanthachai¹

I

Structural Equation Modeling (SEM) represents an extension of general linear modeling (GLM) procedures that include analysis of variance (ANOVA) and multiple regression analysis (MRA). The primary advantage of SEM is that it can be used to look into the relationships among latent variables that are indicated by multiple observable variables. SEM also deals with a confirmatory factor analysis or hypothesis testing approach in which Latent Variables (LVs) are verified against Measured Variables (MVs) as well as causal pattern among LVs.

SEM is applicable to both experimental and non-experimental research, as well as cross-sectional and longitudinal data. With the development of software for statistical analysis in the social sciences, e. g, LISREL and AMOS, applications of SEM have proceeded rapidly since the 1970s. And yet the ease of access and application of such a complex and sophisticated techniques has given rise to a number of problems and chronic misuses and oversights in practice.

II

In their article: “Applications of Structural Equation Modeling”, MacCallum and Austin began with an overview of SEM then proceeded to literature review on previous reviews of applications and current review. The authors summarized uses of SEM in psychological research i.e., cross sectional and longitudinal designs and

measurement studies, and experimental studies.

The authors outlined various problematic issues in applications of SEM which were of global concerns and problems involving details of analysis, interpretation, and presentation of results. As far as generalizability of findings was concerned, it seemed to the

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authors that much of the applied SEM reviewed was characterized by inadequate understanding or acknowledgment of the limitations of single studies. In more specific terms, results were usually interpreted as if substantial generalizability could be made. Researchers using SEM did not, in most cases, recognize that the results were subject to sampling or selection effects with respect to at least three aspects of a study: individuals, measures, and occasions.

Confirmatory bias was another problematic issue in the application of SEM. The researchers using SEM were quite susceptible to have prejudice in favour of the model being evaluated in that there were overly positive evaluation of model fit and a routine reluctance to consider alternative explanation of data.

Moreover, reviews by the authors showed that directional effects, or causal relationships, were routinely studied using cross-sectional designs. The issue of concern here by the authors was the time lag between a cause and an effect. Thus, it might be problematic to infer causality of directional influence in cross-sectional studies.

Furthermore, the authors were concerned about the issues on model specification, design and analysis. A full LV model specifies relationships of the indicators to the LVs as well as

relationships of the LVs to each other. However, 25% of the studies reviewed used path analysis model, with no LVs. i.e., only one indicator for each variable. This approach could result in estimates of effects that were highly biased due to the influence of error. Regarding research design, about 18% of the studies reviewed used samples of fewer than 100 individuals. The authors argued that SEM analyses of small samples were almost certainly problematic. Model specification and evaluation by means of confirmatory and model generation strategies were highly restrictive, potentially misleading and easily abused. Therefore, such data-driven model modifications might lack validity. About 50% of the published applications fitted models to correlation matrices rather than covariance matrices which were preferable. As far as interpretation of results was concerned, researchers did not seem adequately sensitive to the fundamental reality that there was no true model.

Finally, the authors encountered many difficulties associated with presentation of information about models, methods, analysis and results. For example, in about 50% reporting of parameter estimates was incomplete in that there was omission of non-significant estimates, unique variance, and/ or residual variances, and criteria

for evaluating values of fit indexes were

III

In their article titled “Applications of Structural Equation Modeling in Psychological Research” MacCallum and Austin, both of whom were attached to Department of Psychology at Ohio University, have outlined the variety of research designs and substantive issues to which SEM can be applied productively. Readers of this article can certainly benefit from their presentation as an overview on what the SEM is and what it can be used for in research in not only psychology but also in other fields in the social sciences.

As a matter of fact, the more useful part of the article is on

IV

SEM is a highly versatile statistical technique that can be applied in research in social sciences. And yet there are problematic aspects of applications of SEM. These range from problems of perspective, design and strategy to mechanical aspects of model specification, data analysis, interpretation, and presentation as outlined by MacCallum and Austin in their article

not clearly stated.

problematic issues in applications of SEM. As mentioned above, the problematic issues raised by the authors are worthwhile for researchers who are contemplating application of SEM in their research so that they are aware of them.

The most useful part of the article is the part that provides suggestions or solutions to the problematic issues in the applications of SEM. It is also a must for researchers who contemplating application of SEM in their research to follow as closely as possible. Failure to do so would lead to a quantitative research that is poor in quality.

mentioned above. It is fortunate that they also have suggested ways and means to tackle those shortcomings to a large extent. Therefore, it is advisable that researchers who want to apply SEM in their research are aware of the problems and follow the suggestions to avoid them so that SEM is applied productively.



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- Content**
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 - Methodology
 - Research Results

Conclusion and Recommendation.

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Appendix (if any)

Example 2 : Academic Article

Introduction : Objective

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Examble 3:
Referecnes

1. Beek,Thorsten and Demirguc-Kurt,Asli (2549). “Small and Medium Enterprises: Access to Finance as a Growth Constraint.” **Journal of Banking and Finance.** Volume 30, 2931-2943.
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- 1.....(Beek,Thorsten and Demirguc-Kurt, 2549)
- 2.....(Hughes,2540:161-162)

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