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3. To stimulate and support education at the university level

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Editorial Note

The Interdisciplinary Research Review (IRR) was established with academic cooperation by the Nakhon Pathom Rajabhat University, The Royal Society of Thailand Committee of Interdisciplinary Research and Development, and Rajabhat University (Western Group). This Issue, Volume 14 Number 5 (September – October 2019). This issue contains of ten research articles in diverse fields: (1) A conceptual framework of project-based learning by analyzing of VARK (2) A conceptual framework of a flipped classroom by project-based learning by analyzing of students on David Kolbs learning styles (3) Detection of shrimp feed with computer vision (4) Determinants of cognitive impairment among adults 50 years and older in Thailand (5) Effects of basic life support training program on knowledge, perceived self-efficacy, and basic life support performance of village health volunteers (6) Green office, its features and importance for sustainable environmental management: A comparative review in search for similarities and differences (7) Indicators of active ageing for sustainable development: A comparative insights of ageing elderlies from Chiang Mai (highland) and Nakhon Pathom (lowland) Provinces, Thailand (8) No-fault patient compensation for medical malpractice in Thailand: option or not? (9) Sensitivity analysis and validation of socio-eco-efficiency score (SEES) on companies doing business in Thailand and (10) Enhancing intercultural communication for Muslim tourists in South Korea.

The Editorial Board of the IRR encourages anyone to submit articles for evaluation and review. The processes of submission, review and publication of articles are described on the journal's website, https://www.tci-thaijo.org/index.php/jtir. The Editorial Board and Committees of the IRR sincerely thank all peer reviewers who have sacrificed their time to help us produce a better journal, and also wish to thank all teachers, researchers and other academicians for submitting their valuable research to this journal. Finally, we thank readers of our journal who help to spread the knowledge and benefits gained to others. With your feedback and suggestions, we will strive to improve the quality and relevance of the IRR.

Yongyudh Vajaradul
Editor
Interdisciplinary Research Review

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A conceptual framework of project-based learning by analyzing of VARK

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Abstract

This research aims to study for 1) Synthesizing and creating a framework of project-based by analyzing through VARK theory 2) Evaluating the appropriateness of a framework of project-based by analyzing through VARK theory in order to shape a protocol of improving the content management for bachelor degree students majoring in Computer Education of Nakhon Pathom Rajabhat University. The research will proceed in 6 stages; 1) Literature reviewing on related theory and journals 2) Synthesizing and creating protocol learning style 3) Setting up the expert in focused field 4) Crafting a questionnaire regarding to the comment of an expert on the appropriateness of the learning style designed. 5) Evaluating the appropriateness of the learning style designed of the sample group. 6) Summarizing the result of focused group discussion from experts. According to result of PjBL-A-VARK had found that there are 3 sections out of 6 modules as following, Data Input 1) VARK Analyzing Module 2) VARK Classification Module The process by 3 procedures 3) Student Learning Style Database Module 4) Interface Module 5) Content Module and the section of result which is 6) Examiner module. The experts had certified the appropriateness evaluation result stated that the conceptual framework synthesized possess the high level at 4.62±0.50 and supported to conduct as the protocol of the classroom content management for bachelor degree students majoring in Computer Education of Thai western Rajabhat Universities.

Keywords: Learning style, project-based learning, analyzing of VARK
Article history: Received 27 April 2019, Accepted 18 October 2019

1. Introduction

Nowadays in Thailand's education system had reformed into a new structure of emphasizing the student center as to create an ecstatic atmosphere of learning as well as to share and equality of education access. According to education media, communication and technology enhance the learning ability and allowed a wide spread of knowledge source throughout the Kingdom of Thailand which is in line with National Education Act: 1999 and the additional (volume no. 2) 2002 chapter 4, policy of education management section 22 had announced that "Education must adhere to the principle that all students are able to learn and develop themselves and consider students to be the most important. The educational management process must encourage students to develop naturally and fully according to their potential by considering the differences between individuals." [1]

Students' acquisition of knowledge had been considered as to strengthen more effectiveness of learning efficiency which will concern with the individual learning style linked to VARK (VARK Learning Style) that had been developed by Neil D. Fleming in 1992. [2] The apparatus of the evaluation of individual aptitude-oriented learning style of students is conducted on the concept of that everyone can learn according to knowledge and academic sights. The concept will allow the students to learn in their individual comfort aptitude learning style. [3] Known as VARK that evaluates the learning style from their individual comfort aptitude learning style. This is divided into 4 categories; 1) Visual: V, Learners' aptitude on visual (2) Aural: A, Learners' aptitude on aural 3) Read/Write: R, Learners' aptitude on reading and 4) Kinesthetic: K, [2] Learners' aptitude on doing. These 4 categories are applicable to improve the classroom management quality by focusing on individual learning aptitude to design techniques and learning activity. [4] The most effective learning style is learning by doing that is totally differ from listening to lecture from lecturer which found the most tiresome and lack of appetite for learners. [5] The project-based learning is to support students learning by doing that intensively

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work in a peer group. Project based awarded student to work in a process and gain more creativeness and skilled experience as well as to be eager to establish their new quest and conduct a conceptual project by their own. [6]

Asserting the theory and basic information, researcher had conducted a conceptual framework of project-based learning by analyzing theory by VARK, in order to improve Teaching and learning is consistent with quality management education strategies. [7] as well as to encourage students to develop their full potential according to their individual learning aptitude.

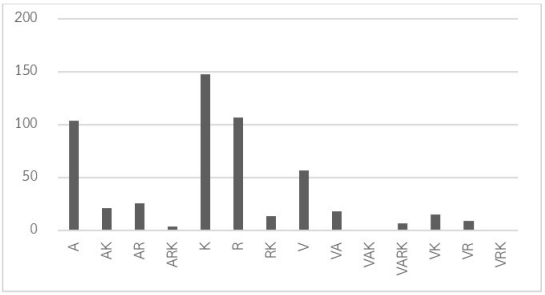

Figure 1: Result from an evaluation form of learners' aptitude relies on VARK learning style of bachelor degree students majoring in Computer Education of Thai western Rajabhat Universities.

2. Objective

2.1 To Synthesize and create a framework of project-based by analyzing through VARK theory.

2.2 To evaluate the appropriateness of a framework of project-based by analyzing through VARK theory. For equation.

3. Methods

The steps to synthesize and create a framework of project-based by analyzing through VARK's theory are as follows.

3.1 Literature reviewing on related theory and journals found categories in bachelor degree students majoring in Computer Education of Thai western Rajabhat Universities and project-based learning as shown below.

3.1.1 The concept or theory of learning style of VARK had been improved by Neil D. Fleming in 1992 [8] is the tool to evaluate learners' aptitude of learning style known as VARK that evaluates the learning style from their individual comfort aptitude learning style [8]. This is divided into 4 categories.

1) Visual (V) is the group of learners that can learn what they have seen by their visual experience especially picture and slide of a presentation.

2) Aural (A) is the group of learners that can learn what they have heard by their aural experience especially listening to lecture, audio record and discussing in a team.

3) Read/Write (R) is the group of learners that can learn what they have read and written by their skilled experience especially their literature reviews.

4) Kinesthetic (K) is the group of learners that can learn what they have experienced especially through simulations and apparatuses.

As a result of research on project-based by analyzing through VARK theory of bachelor degree students majoring in Computer Education of Thai western Rajabhat Universities can be seen in Figure 1 that samples at 533 students reacted the evaluation form by VARK concept. Thai version 16 items, question improved by [9] translated by [10]

According to Figure 1 Result from an evaluation form of learners' aptitude relies on VARK learning style of bachelor degree students majoring in Education Computer of Thai western Rajabhat Universities revealed that as follows.

1. There are 416 students who hold only one learning aptitude which delegate to
   1) V: 57 students
   2) A: 104 students
   3) R: 107 students
   4) K: 148 students.
2. There are 94 students attained two learning aptitudes that are as follows
   1) AK: 21 students
   2) AR: 26 students
   3) RK: 14 students
   4) VA: 18 students
   5) VK: 15 students
   6) VR: 9 students.
3. There are 6 students attained three learning aptitudes are
   1) ARK: 4 students
   2) VAK: 1 student
   3) VRK: 1 student.
4. There are 7 students who attained four learning aptitudes.

3.1.2 The learning of PjBL (Project-Based Learning) is one of the learning styles that accelerates eagerness of doing by learning that supports knowledge, solving problem skill and achieved the project. Thus, this project provides creativeness, a presentation from their peer group work as well as to advocate the 21st-century skill that the learners study by themselves before expanding of their understanding, their experience on later stage on their own dominant.

The comments of computer experts regarding structure of learners' aptitude rely on VARK learning style of bachelor degree students majoring in Education Computer of Thai western Rajabhat Universities can be seen in Table 1.

Table 1. The comments of computer experts regarding to learners' aptitude rely on VARK learning style of bachelor degree students majoring in Education Computer of Thai western Rajabhat Universities.

No	Evalution Items	N	$\bar{x}$	S.D.	Appropriateness Level
1	Project based on learners aptitude of V	51	4.80	0.53	Highest
2	Project based on learners aptitude of A	51	4.57	0.64	Highest
3	Project based on learners aptitude of R	51	4.78	0.58	Highest
4	Project based on learners aptitude of K	51	4.86	0.35	Highest

According to Table 1 The comments of computer experts regarding to learners' aptitude relies on VARK learning style of bachelor degree students majoring in Education Computer of Thai western Rajabhat Universities found that the appropriateness from experts comments are

1) project based on learners aptitude of V is at the highest level at = 4.80, S.D.= 0.53

2) project based on learners aptitude of A is at the highest level at = 4.57, S.D.= 0.64

3) project based on learners aptitude of R is at the highest level at = 4.78, S.D.= 0.58 and

4) project based on learners aptitude of K is in the highest level at = 4.86, S.D.= 0.35.

3.2 Synthesizing and creating a classroom management

3.2.1 The result of project-based by analyzing through VARK theory and the experts comment regarding bachelor degree students majoring in Computer Education of Thai western Rajabhat Universities that conducted and finally created a conceptual framework through project-based in Figure 2.

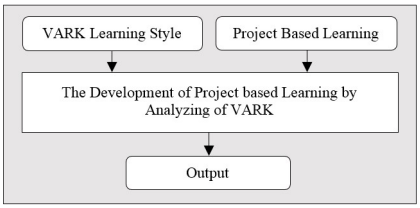

Figure 2: Basic conceptual framework

3.2.2 Applying conceptual framework from analyzing through VARK theory

3.2.3 Implementing comments from experts of appropriateness on a conceptual framework "A conceptual framework of project-based learning by analyzing theory by VARK"

3.2.4 Revising classroom management refers to experts' comments and summarizing into learning style.

3.3 Setting up an expert group and sample which had been divided into 2 groups.

3.3.1 The expert group

3.3.1.1 Group no. 1 is a group of 10 doctoral experts in computer and classroom management field with a minimum 5 years of education experience to comment on a conceptual framework by doing focused group discussion.

3.3.1.2 Group no. 2 is a group of 51 doctoral experts in computer and classroom management field to comment on the appropriateness of learning style of bachelor degree students majoring in Computer Education of Thai western Rajabhat Universities by simple sample random.

3.3.1.3 Group no. 3 is a group of 5 doctorial experts with educator and teaching research experience in computer and classroom management field to comment on the appropriateness of protocol designed from the conceptual framework by specific methods.

3.3.2 Sample group

3.3.2.1 Sample group of 532 students of bachelor degree students majoring in Computer Education of Thai western Rajabhat Universities by simple sample random.

3.4 Create an evaluation form to certify the appropriateness of learning style by experts according to the analyzing on the theory of VARK which can be divided into 2 steps.

3.4.1 Step 1: the comment on the appropriateness of learning style by experts according to the analyzing on the theory of VARK" which contains as following items questioned on the module as following;

1) Primary Holistic of conceptual framework

2) Learning style aptitude tester module

3) Categorized sampling group module

4) Data collection on learning style aptitude module

5) Project-based learning module

6) Interface module

7) Content module

8) Project assessment module

9) Holistic appropriateness of PjBL-A-VARK and

10) Authentic presentation appropriateness of PjBL-A-VARK.

3.4.2 Step 2: recommendations and further suggestions that support learning style by analyzing on the theory of VARK.

3.5 Evaluating the appropriateness of conceptual framework learning style of group discussion by 10 computer experts that are experts in computer education, technology education, and Information technology field to acquire a developed apparatus for research.

3.6 Summarizing the learning style concern on rec-

ommendation from experts discussion by analyzing average $\bar{x}$ and standard deviation (S.D.) from question section no. 1 obtained and improving the classroom learning style refer to experts comment on question section no. 2.

4. Result and Discussion

4.1 The project-based learning by VARK's concept or known as PjBL-A-VARK-Model can be seen as shown on Figure 3 PjBL-A-VARK-Model

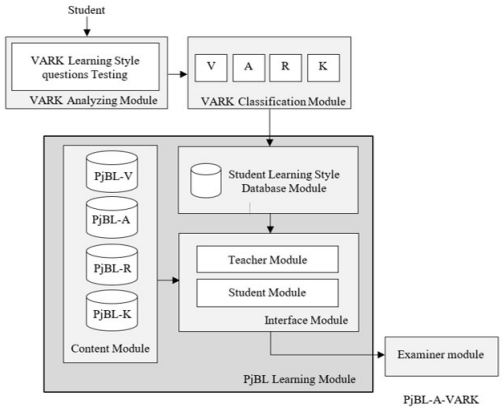

Figure 3: PjBL-A-VARK Model According to picture no.1 Project-based learning style from analyzing learners' aptitude with VARK concept found 3 sections that are Input, Process, and Output as the following detail.conceptual framework.

4.1.1 Input contains

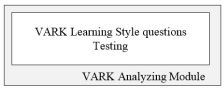

Figure 4: VARK Analyzing Module

4.1.1.1 VARK Analyzing Module in Thai Version with 16 questions with 4 multiple choices that inquire students learning aptitude in 4 types; V, A, R, and K

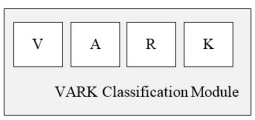

Figure 5: VARK Classification Module

4.1.1.2 VARK Classification Module set up student sample group then analyze from the question asked regarding their learning aptitude in terms of particular learning style as to authorize educator to categories students which learning style they belong; V, A, R, and K.

4.1.2 Process contains

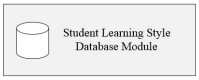

Figure 6: Student Learning Style Database Module

4.1.2.1 Student Learning Style Database Module had been applied after treatment.

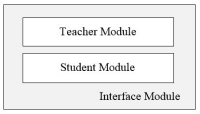

Figure 7: Interface Module

4.1.2.2 Interface Module is the key section that correlates the program, educator, learners, VARK Classification Module, content module, and project assessment module.

Figure 8: Content Module

4.1.2.3 PjBL Content Module compiles a relevant learning style to learners in V, A, R, and K. contains

1) Preparing before the project
2) Plan the project
3) Implementation of the project
4) Summary of the project implementation
5) Presenting the Project
6) Evaluation

4.1.3 Output contains

Figure 9: Examiner module

4.1.3.1 The Examiner module is to assess the project that produces from project-based learning by means of VARK.

Table 2. The result of PjBL-A-VARK Model assessment.

No	Evalution Items	$\bar{x}$	S.D.	No. of Experts		%
				Agree	Disagree	
1	Appropriateness of primary holistic conceptual framework	4.6	0.52	10	-	100
2	Appropriateness of VARK Analyzing Module	4.8	0.42	10	-	100
3	Appropriateness of VARK Classification Module	4.8	0.42	10	-	100
4	Appropriateness of Student Learning Style Database Module	4.6	0.52	10	-	100
5	Appropriateness of Interface Module	4.7	0.48	10	-	100
6	Appropriateness of Content Module	4.7	0.48	10	-	100
7	Appropriateness of Examiner Module	4.5	0.53	10	-	100
8	Appropriateness of PjBL-A-VARK's holistic	4.5	0.53	10	-	100
9	Appropriateness of PjBL-A-VARK's appliance	4.5	0.53	10	-	100

4.2 The result of 10 expert's assessment on analyzing learners' learning style of VARK by the procedure of group discussion had been stated in Table 2.

According to Table 2 as the result of 10 experts certified the project-based learning style from analyzing learners' aptitude with VARK as following

1) Appropriateness of primary holistic conceptual framework

2) Appropriateness of VARK Analyzing Module

3) Appropriateness of VARK Classification Module

4) Appropriateness of Student Learning Style Database Module

5) Appropriateness of Interface Module

6) Appropriateness of Content Module

7) Appropriateness of Examiner Module

8) Appropriateness of PjBL-A-VARK's holistic

9) Appropriateness of PjBL-A-VARK's appliance

Stated that this protocol obtained a high level of appropriateness at = 4.63 and S.D. = 0.49. Furthermore, the experts had endorsed the protocol framework at 100%.

5. Conclusions

5.1 The comments of experts to this protocol framework refer to VARK had been elicited to

1) Appropriateness of primary holistic conceptual framework obtained the highest level at = 4.6 and S.D. = 0.52

2) Appropriateness of VARK Analyzing Module obtained the highest level at = 4.8 and S.D. = 0.42

3) Appropriateness of VARK Classification Module obtained the highest level at = 4.8 and S.D. = 0.42 that logical linked with [4] cited their research that the empirical improvement by categorizing learners into their belong aptitude along with to manage a process and techniques in a particular learning style produced an efficient learning outcome.

4) Appropriateness of Student Learning Style Database Module obtained the highest level at = 4.6 and S.D. = 0.52

5) Appropriateness of Interface Module obtained the highest level at = 4.7 and S.D. = 0.48

6) Appropriateness of Content Module obtained the highest level at = 4.7 and S.D. = 0.48. As a result, this conclusion related to the concept of [11] announced that the project-based learning is the stratagem of learning by firsthand experience and conduct the total process until learners achieved and gain the knowledge as well as to be able to generate and declare their project.

7) Appropriateness of Examiner Module obtained the highest level at = 4.5 and S.D. = 0.53

8) Appropriateness of PjBL-A-VARK's holistic obtained the highest level at = 4.5 and S.D. = 0.53

9) Appropriateness of PjBL-A-VARKs appliance obtained the highest level at = 4.5 and S.D. = 0.53. These numbers guaranteed that this protocol is applicable to learners' learning aptitude and learners are motivated to learn by themselves as to conduct the project that needs a multiskilling to complete.

5.2 Summarizing the agreements of experts focus discussion on analyzing learning style to be suited to learner' aptitude through project-based relies on VARK or as known in learning style of PjBL-A-VARK Model, the result had been agreed among experts as following;

1) Input Module consisted of VARK Analyzing Module that examines the learning aptitude of learners from questionnaire and categorizing learners into their learning style as VARK Classification Module

2) Process Module is to conduct in project-based learning style that determined student Learning Style Database Module. This is to manage data collection of learners' learning style and asserts to subject and Content Module that content contains

2.1) Appropriateness of project-based to learners' learning aptitude as Visual

2.2) Appropriateness of project-based to learners' learning aptitude as Aural

2.3) Appropriateness of project-based to learners' learning aptitude as Read/Write

2.4) Appropriateness of project-based to learners' learning aptitude as Kinesthetic. The attendance of process appropriateness of project-based on learners' learning aptitude roles an interface module is a

key section that correlates the program, educator and learners.

3) Output module abides Examiner module which derived analysis results from learning based on the project-based learning model that facilitates project collection and assessment.

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A conceptual framework of a flipped classroom by project-based learning by analyzing of student's on David Kolb's learning styles

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Abstract

This research is focused on 1. Synthesizing a framework of a Flipped Class Room by Project-Based Learning by Analyzing of Student's on David Kolb's Learning Styles. 2. Experts' evaluation on the flipped classroom approach through project-based learning by David Kolb's to craft a learning model. This research compiled into 5 phases; 1) Surveying problems and reviewing literature 2) Synthesizing a framework of learning style 3) Determining the relevant groups 4) Presenting the conceptual framework 5) Reviewing, revising and summarizing the result.

From research result, it is found that 1) the obtained flipped classroom approach through project-based learning by relying on the analysis result of David Kolb's learning theory which is known as FC-PjBL-Kolb's. This model consists of Input and Output Process while modules are as following; 1) Input 1.1) Student 1.2) Kolb's Testing 1.3 Kolb's classifying Module 1.4 Teacher 2. Process 2.1 Online learning Module 2.2 Content database 2.3 Kolb's Flipped and PjBL Learning Module 3. Output 3.1 Evaluation Module 3.2 Rubric Evaluation 3.3 Examiner Module 3.4 Project DB Module 2) Evaluation result from 10 experts is at the excellent level with4.66 ± 0.49 also in the conclusion as well as this model had been approved by 10 experts to the development on further phase.

Keywords: Flipped classroom, project-based learning, David Kolb's learning styles

Article history: Received 23 April 2019, Accepted 18 October 2019

1. Introduction

There are varieties of teaching and learning processes that link to several factors and learners play an important role as a factor will differ from the process of learning design which related to their aptitudes and awareness that promotes the achievement of learners' the most benefit. Learning and teaching in higher education focus on providing students with three knowledge skills, cognitive, affective and psychomotor domain which helps them to develop into a skilled career. The development of high human resources can encourage and support the growth of a country.[1] As a result, class management must be aware of these factors. Hence, the majority of classroom managements still operate as a content-oriented and provide a vague learning outcome for the individual learner which affects long term learning in a particular subject. Thus, the flipped classroom is one of the solutions that ease problems from learning. The flipped classroom is a reverse learning style by letting the learners to study by themselves before expanding their understanding of their experience on later stage on their own powerful skills which associates with the 21st Century Skills. [2] Research result has found that 100% of 96 students from Computer Education subject of Nakhon Pathom Rajabhat University revealed that flipped classroom with a content presented in video treatment satisfied them at the highest level as the following points, 1) Students are able to review their lesson by watching video 2) Students comment that the video attracted them to learn 3) Students are able to review their lesson by watching video anytime they prefer 4) Since proceeding the only lecture in class leads students to be bored, the video magnets them back to the lesson and 5) Solving problem due to students are lack of readiness which goes along with the research of Pimprapa [3] She cited that students are interested and satisfied in learning through social media that copes with flipped classroom which they are able to explore through surfing internet. This escalates their motivation and to enjoy doing group work. Furthermore Denduang S, Rodhetbhai C, and Keeratiburana Y. [4] research claimed that e-books are not only interesting but also convenient to read anywhere. They can save a lot of money and time. People can learn from them by using computers, tablets, or any kind of electronic devices such as smartphones. The electronic books are considered as an educational innovation, which is widely accepted by educators.

An interview of University lecturers found that there are several obstacles that emerge from the difference of ability, learning aptitude and classroom management. These mentioned difficulties are not new on the other hand, researchers are on the searching for tools to be used for solving these problems that concerns with their age and context. So, the group of high competency tends to respond better than another side of group referring to quote of Kolb "teachers critically evaluate the learning provision typically available to students, and to develop more appropriate learning opportunities and educators should ensure that activities are designed and carried out in ways that offer each learner the chance to engage in the manner that suits them best and everyone responds to and needs the stimulus of all types of learning styles to one extent or another - it's a matter of using emphasis that fits best with the given situation and a person's learning style preferences." 4 styles 1) Diverging (feeling and watching - CE/RO) 2) Assimilating (watching and thinking - AC/RO) 3) Converging (doing and thinking - AC/AE) and 4) Accommodating or Executive (doing and feeling - CE/AE) [5].

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According Figure 1, result of surveying about learning style refers to David Kolb's theory of 1,446 students in bachelor degree from computer group of Thailand western region Universities (Nakhon Pathom Rajabhat University,

Kanchanaburi Rajabhat University, Muban Chombueng Rajabhat University and Phetchaburi Rajabhat University) found that each university possesses individual learning style while the minority of data owns variety and single learning style. However, the dominant learning style in this survey is Convergers as shown in Figure 2.

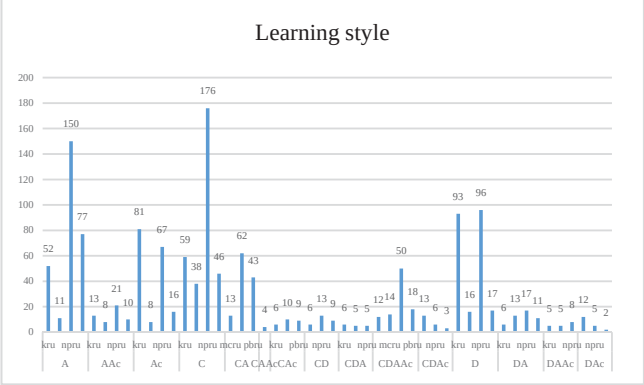

Figure 1. Survey result of computer major bachelor degree of Thailand western region Universities

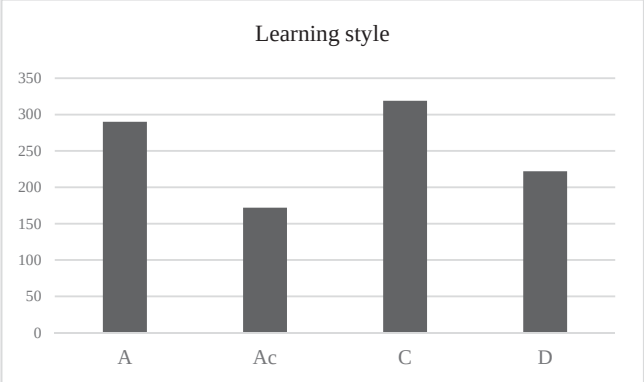

Figure 2. Survey result of computer major bachelor degree of Thailand western region Universities refer to David Kolb's theory

For previous information provided reflects the different style of learning of learners as Phanika Duangkamol and Monchai [6] revealed that the different of learning style concerning to learners aptitude will assist educators to manage a proper class and will motivate learners to engage and construct their highest ability of learning outcome.

The project based had been approached in the research since the diversity of learning styles affixation that contributes learners in utmost dimension. Due to activities in the project based are systematically processed, procedure on study and research on a particular topic and finding out the solution themselves. Project Central Learning style is a process students' learning, collaborate, inquire, search, analyze, evaluate and create among peer activity and cooperating to cope the obstacles and to accomplish the systematic thinking as well as learning outcomes crafted them to collaborate with cooperatives and linked with a National Education Plan that emphasized on collaboration skill, teamwork and leadership skill. As an exploration result of Sumalee [7] revealed that after the sample group that had been treated, project based online with database system that based on the multiple intelligence analysis result, they acquired a higher competency. The reason of the higher competency shown is because they had the experience through collaborating, enquiring, searching, analyzing, evaluating and creating new knowledge from each unit of learning by their own selves.

Thus, the previous mentioned education innovations and limitations lead researcher to conduct a research that appends engaging project-based learning by analyzing of student's on David Kolb's learning styles in order to support and furthers the principle process of learning.

2. Objectives

1. Synthesize a framework of a Flipped Class Room by Project-Based Learning by Analyzing of Student's on David Kolb's Learning Styles.

2. To be certified by experts' evaluation on flipped classroom approach through project-based learning by analyzing of student's learning style refer to David Kolb's theory.

3. Methods

1. Conceptual framework

1.1 Originated from surveying and studying due to obstacles and literature reviews, researcher commences the FC-PjBL-Kolb's process of developing style as shown in Figure 3.

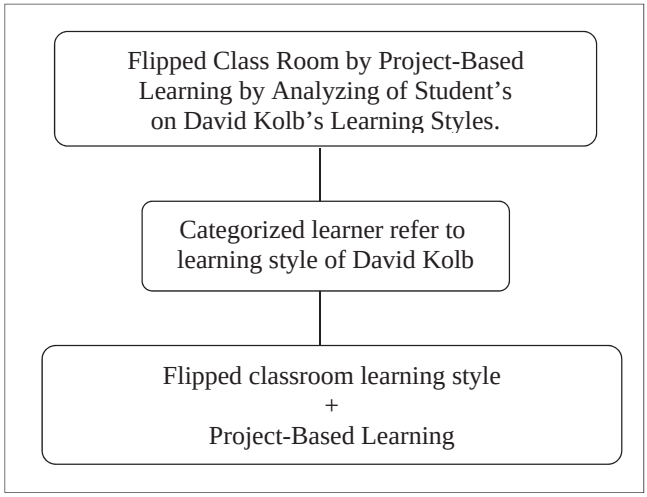

Figure 3. Conceptual framework of FC-PjBL-Kolb's

1.2 Flipped classroom management is shifting from traditional style that expanding learners experience source of knowledge by studying before educators' hand through the designed technological tools organized. Then the learning process will be conducted in the classroom by educator lead into a problem solving scenario and learners will cooperate in class and build more interaction between educators and learners which associates to flipped classroom contributes enhance

thinking skill [8]. According to shown that flipped classroom is a Mastery Learning that consists of 4elements in a systematic cycle as following Table 1 [9].

Table 1. Elements of flipped classrooms

Elements of flipped classroom	Learning activities	Responsibilities
1.Experiential Engagement	-Game -Simulation -Interaction media -Experimental -Various Art Range	Educator
2. Concept Exploration	- Lecturing on video - Podcasts - Website - Online media chat	
3. Meaning Making	- Online education board - Examination - Social media - Online discussion boards	Learner
4. Demonstration & Application	- Conduct a project - Presentation process from conducting	

1.3 Individual learning style refer to David Kolb concept following table no.2

Table 2. David Kolb learning style concept

Learning style	Learning characteristics	Individual aptitude
1. Divergers	- Brainstorm - Interested in the diversity of cultures - Prefer to work in a group - Open-minded, listen to opinions and reflections - Expertise in arts - Understand human fundamental and liberal arts	Meaning
2. Assimilators	- Able to understand the concepts of high abstract theory - Fond of thinking, analyzing, searching for results - Avoid practice as an action	Concepts
3. Convergers	- Administrable - Reviewing appropriateness before taking action - Technical preferred	Skills
4. Executive	- Adaptable and prompt to response to new scenarios - Desire to learn trial and error - Risk taker - Do not like listening to lectures	Adaptation

1.4 Project based learning style is one of the most selected outstanding styles. The researcher adapted from LAC theory in developing classroom management for the following detail; LAC theory stages are concerned on project based which is divided into 7 steps as following

1) Problem Discrimination Step, this is to do brainstorm and create 1 project by experiencing through their exchanging ideas and handle with other opinions.

2) Primary Diagnose Step that allows the peer to draft down their concept together on a pieces of paper.

3) Eliciting and Planning Step by flowchart and members of the team will follow the plan of each responsibilities.

4) Subject Research Step, learners are searching for information that links to their ability.

5) Drafting and Progressing Step is to comply as arranged.

6) Presentation Step is to display on system.

7) Evaluation Step by experts in this line.

2. Research Methodology

2.1 The researcher synthesized a flipped classroom with Project-Based Learning by Analyzing of Student's on David Kolb's Learning Styles as Table no.3 following phases.

Table 3. Research Methodology

Steps	Procedure	Result
1st step Problem Discrimination Step	- Interview higher education educators regarding to classroom management obstacles. - Proceed the literature review - Learners' learning style - Education Act National Education Plan 2017-2036 - Teaching and learning styles in the 21st century - Education innovation - Program and tools to develop - Learners' learning style survey	- Current problem of teaching and learning management - David Kolb's Learning Styles - A flipped classroom theory - Project-Based Learning theory - Result of learner's learning style
2nd step Synthesizing conceptual framework of learners' learning style	Draft a conceptual framework refers to previous literature review; this can be framed into 3 majors. (1 A flipped classroom (2Identify learners by David Kolb learning style and (3Manage a project based and certify the project by experts comment.	- A flipped classroom with Project-Based Learning by Analyzing of Student's on David Kolb's Learning Styles

Steps	Procedure	Result
3rd step Determine the relevant expert	The researcher sets up a team of 10 experts in line of Computer Doctoral degree and experience in education field for at least 3 years to evaluate the classroom management.	A group of expert at 10 then divide into; - Classroom management expert at 4 person - Education Innovation expert at 2 person - Information Technology expert at 2 person - Communication expert at 2 person
4th step Conceptual Framework Presentation	Set up a focus group discussion	The researcher proposed the conceptual framework using the group discussion. In order to gain an advice, improve and evaluate the appropriateness of the conceptual framework.
5th step Improve, adapt and summarize results	The researcher conducted the correction and improvement of the conceptual framework according to group discussion.	Present a conceptual framework that has been revised by experts under the consideration on evaluating the appropriateness of the conceptual framework.

4. Results and discussion

4.1. A flipped Class Room by Project-Based Learning by Analyzing of Student's on David Kolb's Learning Styles following Figure 4.

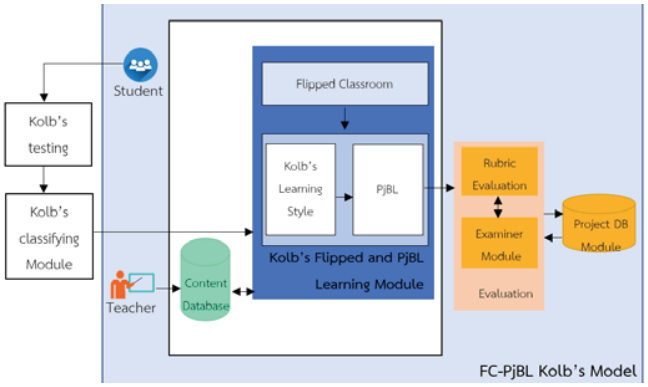

Figure 4. A flipped Class Room Management by Project-Based Learning by Analyzing of Student's on David Kolb's Learning Styles.

According to the draft of a conceptual framework of a flipped Class Room Management by Project-Based Learning by Analyzing of Student's on David Kolb's Learning Styles are Input Process and Output; there are 3 modules.

1. Input

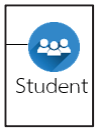

Figure 5. Student Input

1.1 Students are to act as a data collector of themselves that are

1) Students identity, students ID, name, surname, E-mail, and telephone number.

2) Data from respondents according to David Kolb's.

3) Learning data

4) Score data

which had processed

1) Learners apply to access this program as to complete general information that provided students ID, name, surname, E-mail, and telephone number.

2) Conduct Kolb's Testing in order to find the learner's learning style with 32 questions according to David Kolb.

3) Pending on the announcement of learning style of themselves and peer group.

4) Beginning of the chapter of learning style that related to their learning style.

Figure 6. Kolb's Testing

1.2 Kolb's Testing consisted of 32 items as categorized below.

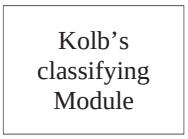

Figure 7. Kolb's classifying Module

1.3 Kolb's classifying Module is an eliciting the types of learners' learning according to David Kolb theory that had 4 types, 1) Divergers 2) Assimilators 3) Converger and 4) Executive. They operate in the module from 1) Collecting scores from questionnaires at 32 items, then calculate into average score of learnings style obtained. While some learners might have more than 1 style will acquire a consideration of lecturer that can be operated in 2 ways.

Figure 8. Teacher Input

1.4 Teacher as a manager of

1) setting a content
2) setting a pretest and posttest in between chapter
3) manage learners into project-based oriented
4) determining the topic and procedure of the work
5) recording learners project
6) reporting the score of learners
7) Experts management
8) Design an assessment design for experts.

2. Process

2.1 Online learning Module is concerning on chapters that are adding up some more content, pretest, posttest and mid-test refer to David Kolb learning style as well as to manage to project-based on PjBL foundation. All mentioned are available online.

Figure 9. Content database

2.2 Content database is an accumulation data from content by an educator focus on content appropriateness, pre-test, post-east and mid-test or an extra activity assigned.

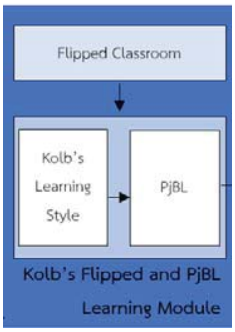

Figure 10. Kolb's Flipped and PjBL Learning Module

2.3 Kolb's Flipped and PjBL Learning Module is the part that stated that leaners learning style by David Kolb theory that had 4 types,

1) Divergers
2) Assimilators
3) Convergers
4) Executive

and coordinated with project based for 7 steps. This is separated in flipped classroom is Outclass and in class compiled from 4 significant units

1) Enhancing tactical experience
2) Research on the conceptual idea
3) Conducting a meaningful knowledge
4) Demonstrating and applying

within combining to 7 processes of project based classroom management that refers to LAC concept following Table 4.

Table 4. Combining to 7 process of project based class room management refer to LAC concept

A flipped classroom management	A flipped classroom element	Project based learning style Procedure
Out class	1. Enhancing tactical experience 2. Doing researching or conceptualization 3. Creating meaningful knowledge.	1. Identify problems or issues 2. Primary diagnosis 3. Subject researching 4. Presentation 5. Evaluation
In class	4. Demonstration and application	6. Planning and determining 7. Drafting and developing

3. Output

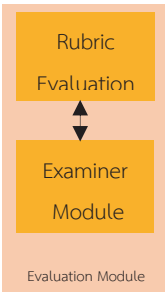

Figure 11. Evaluation Module

3.1 Evaluation Module is applied from Rubric Score by experts.

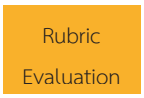

Figure 12. Rubric Evaluation

3.2 Rubric Evaluation is certified by experts' determination that found in 3 sections;

1) Holistic Rubric is identifying from the overall comprehend and achievement of each project.
2) Analytic Rubric that considered in parts of each project
3) Attitude Rubric for example team work, communication which are all examine in a particular sections.

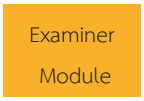

Figure 13. Examiner Module

3.3 Examiner Module is an evaluation of project that obtained from online learning which evaluates from the

authentic documents and experts are scoring in revealed form to allow learners to notice.

4.2 The result of a flipped classroom by project-based learning by analyzing on David Kolb's Learning Styles had been certified by 10 experts shown in Table 5.

Table 5 The result of certifying the learning style by 10 experts.

Question items	Average	S.D.
.1Holistic of conceptual framework	4.80	0.42
2. Appropriateness of student management	4.80	0.42
3. Appropriateness of Kolb's testing in learning style partition	4.80	0.42
4. Appropriateness of Kolb's classifying Module that eliciting the learner	4.80	0.42
5. Appropriateness of Teacher / Educator that lead the classroom management	4.70	0.48
6. Appropriateness of Online learning Module that concerns on classroom management	4.80	0.42
7. Appropriateness of content database of data accumulation	4.60	0.52
8. Appropriateness of Kolb's Flipped and PjBL Learning Module that management through work based learning	4.60	0.52
9. Appropriateness of Evaluation Module that determines the project by experts	4.60	0.52
10. Appropriateness of Rubric Evaluation that concern on experts on educators' evaluation	4.50	0.53
11. Appropriateness of Examiner Module that examines project	4.50	0.53
12. Appropriateness of Project DB Module that recorded the data from learners to expert	4.70	0.48
13. Appropriateness of content management in of a flipped classroom by project-based	4.60	0.70
14. Appropriateness of learning activity refer to FC-PjBL-Kolb's	4.60	0.52
15. Appropriateness of Holistic of conceptual framework according to FC-PjBL-Kolb's	4.60	0.52
16. Appropriateness of learning style of FC-PjBL-Kolb's application	4.60	0.52
Total	**4.66**	**0.49**

According to Table 5, the result of 16 items certified by 10 experts approved at the highest level at average 4.66 and standard deviation is 0.49 and furthermore the experts suggested to improve and apply in an authentic field.

5. Conclusions

1. The researcher conducted a synthesizing flipped classroom by project-based learning by analyzing on David Kolb's learning style with an abbreviation of FC-PjBL-Kolb's that consisted of Input Process and Output. There are significant modules as following

1. Input
   1.1) Student
   1.2) Kolb's Testing
   1.3) Kolb's classifying Module
   1.4) Teacher
2. Process
   2.1) Online learning Module
   2.2) Content database
   2.3) Kolb's Flipped and PjBL Learning Module
3. Output
   3.1) Evaluation Module
   3.2) Rubric Evaluation
   3.3) Examiner Module
   3.4) Project DB Module

2. The result of a flipped classroom by project-based learning by analyzing on David Kolb's certified by 10 experts approved at the highest level at an average 4.66 and standard deviation is 0.49 and furthermore the experts suggested to improve and to apply in an authentic field.

Thus, the result of a flipped classroom by project-based learning by analyzing on David Kolb's learning style supports researcher to continue and enhance this finding to sample group and this will contribute a maximum benefit to teaching and learning.

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Detection of shrimp feed with computer vision

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Abstract

In smart shrimp farming system development, while many works have been focusing on developing an effective water quality monitoring system, little attention has been paid on an automated feeding system. Ideally, an efficient feeding system should not only be able to feed automatically, but also should be able to determine and adjust the suitable amount of food at each feed. This is to save the cost from overfeeding and labor usage, as well as to achieve high shrimp growth rate. This paper proposed a simple and low-cost shrimp food pellet detection algorithm that utilized the technique of 2D-histogram and color space analysis to detect the amount of unconsumed feed left on the feeding tray. The result provided useful information on how to adjust the amount of food in the next feed. The algorithm was developed using color segmentation on three different color spaces: HSL, LAB, and YCrCb. Experimental results confirmed that the proposed algorithm can effectively determine the amount of food pellets on the feeding tray.

Keywords: Shrimp food detection, shrimp farming, feeding tray, aquaculture
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1. Introduction

With an increasing demand for aquaculture products, together with the extreme climate change and natural resource deterioration, aquatic farming technology that can introduce efficiency and productivity is currently in high demand. Smart and precision aquaculture is a promising solution as it can provide efficient resource usage and management, leading to higher quality aquaculture products at a lower cost and less labor usage. Among all aquaculture products, farmed shrimp is strongly demanded in the global market. As a result, various smart shrimp farming systems have recently been proposed and deployed around the world. Since water quality is one of the most critical factors in determining the health of the shrimps, many works such as in [1–4] focus on developing a smart and efficient water quality monitoring and controlling system. Little work has been done in the area of intelligent feeding system. Efficient feeding is an essential part of the smart farming system. According to the study in [6], it is shown that higher feeding frequency results in a better growth rate for white leg shrimps. Unfortunately, manual feeding at high frequency is not feasible without an automatic feeding system.

Commercial automatic feeders that are currently and widely used in shrimp farms can only dispense a pre-determined specific portion of food. The determination of the amount of each feed is still performed manually by checking the amount of leftovers on the feeding tray. Accordingly, the amount of food in the next feed can be adjusted. To prevent overfeeding as well as underfeeding, feeding tray must be manually examined frequently. To reduce the time and labor usage in checking the feeding tray, an automated system should be developed. Recently, the work in [5] proposes a smart underwater surveillance system for shrimp farming that not only monitors water quality but is also able to provide underwater observation and smart feeding control, using AI (Artificial Intelligence) technologies. However, little detail has been provided on the development of smart feeding unit. In this work, we attempted to detect the amount of unconsumed food that remains on the feeding tray by using the color segmentation technique. Specifically, five different color spaces (RGB, HSL, HSV, LAB, and YCrCb) were studied and evaluated. The detection algorithm was later developed based on the three color spaces (HSL, LAB, and YCrCb).

The remainder of this paper is organized as follows. Section 2 describes the design of an automated feeding system and proposes the shrimp food pellet detec-

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(a) The proposed system without casing.

(b) The proposed system with casing.

(c) A top view of the feeding tray equipped with four digital cameras for image acquisition.

Figure 1: The proposed shrimp feed detection system.

tion algorithm. Next, section 3 shows and discuss the experiment setup and results. We then conclude our work in section 4.

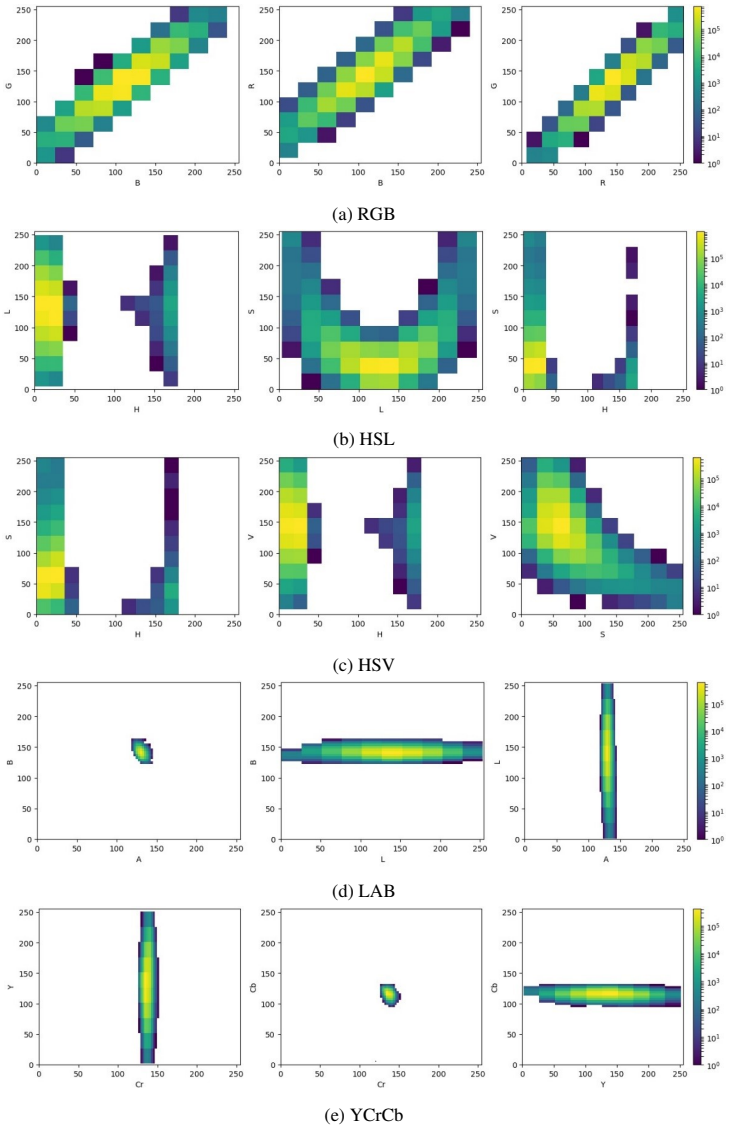
2. Proposed Design

2.1. Hardware design

The amount of food consumed by shrimps was usually determined manually by using the amount of leftover food on the feeding tray. Specifically, the feeding tray was left underwater before the feed. After the feed, the feeding tray was checked periodically; approximately at every hour. Based on the obtained information on leftovers, the adjustment to increase/decrease the amount of feed could then be determined. The proposed system, as shown in Fig. 1, imitated the manual use of a feeding tray. In details, the feeding tray used in this system is a blue-color net with a square shape and steel framing. The dimension of the feeding tray was 63 cm $\times$ 63 cm. There was a motor that controls the position of the feeding tray. The feeding tray could be moved up above the pond so that images of the feeding tray can be taken. Once the images had been acquired, the feeding tray could then be placed back into the pond for the next cycle. In order to reduce glare and noise caused by water reflection, as well as to ensure suitable brightness of the taken images, a case was installed with a 9W white-light LED bulb for lighting propose (as shown in Fig. 1(b)). Moreover, the feeding tray was divided into four-grid regions, each of which had a low-cost 2M pixel digital camera (OKER model: 177) installed, as shown in Fig. 1(c). During the image capturing process, the feeding tray was placed at approximately 45 cm away from the cameras. A Raspberry-Pi 3 Model B+ was used as a controller.

2.2. Shrimp food detection algorithm

After acquiring the image of the feeding tray, the amount of leftovers on the feeding tray was determined by first identifying each of the image pixels whether it was a food pixel or a non-food pixel. Next, the total number of food pixel was converted to the amount of leftovers. In this study, a pixel color was



(a) RGB

(b) HSL

(c) HSV

(d) LAB

(e) YCrCb

Figure 2: 2D-density plots showing the relationship of each component in RGB, HSL, HSV, LAB and YCrCb color spaces.

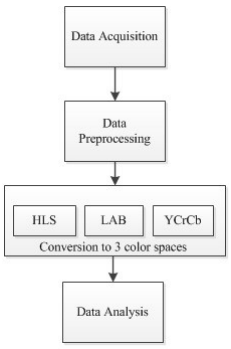


Figure 3: Processes in detecting the amount of food on the feeding tray.

used as a parameter to identify a food pixel using a technique of image segmentation on different color spaces. This was simply a technique of segmenting of an object from an image based on color. In order to develop the detection algorithm, five different color spaces were studied and evaluated on soaked shrimp food samples. These included RGB (Red, Green, Blue), HSL (Hue, Saturation, Lightness), HSV (Hue, Saturation, Value), LAB (Lightness, Red/Green value, Blue/Yellow value), and YCrCb (Luminance or Luma component obtained from RGB after gamma correction, R-Y, B-Y). Shrimp pellets samples, that were soaked in the water for the duration of 30, 60, 120, 180, 240 minutes, were examined in this work. All the food images wereacquired under the controlled environment using the hardware designed discussed in Section 2.1. A total of 300 images (60 images from each of the different soaking durations) of food pallet were used in determining the proper thresholds on each of the interesting color spaces. Fig. 2 shows the density distribution of food pixels color component in each of the color spaces.

Fig. 2(a) shows the pixel color distribution in RGB color space. Notably, all components (R, G and B) took a value between 0-255, indicating that any sin-

Table 1. Components from different color spaces used for detecting a shrimp food pixel.

Color space	The component in the color space used	Range
RBG	-	-
HLS	(H) Hue	$0 \leq H \leq 60$ or $109 \leq H \leq 180$
HSV	-	
LAB	(A) Red/Green, (B) Blue/Yellow	$110 \leq A \leq 148$ and $120 \leq B \leq 170$
YCrCb	(Cr) R-Y, (Cb) B-Y	$118 \leq Cr \leq 150$ and $90 \leq Cb \leq 135$

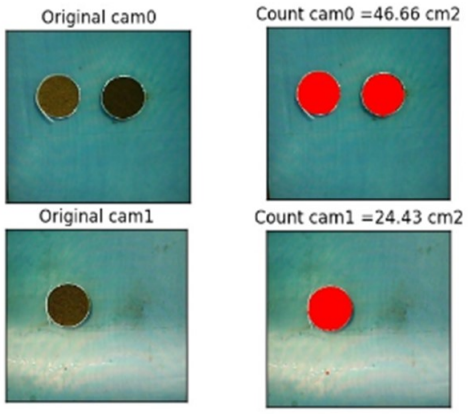


Figure 4: Detecting the amount of food pellets on the feeding tray in a laboratory.

gle component in RGB color space alone could not be easily used in identifying the food pixel. However, there were strong linear relationships between R and G, R and B and G and B components. Meaning that, any two components could simultaneously be used to identify a food pixel but the calculation would be more complex than using just a single component. Since a Raspberry Pi contained limited available computation resources, keeping the detection algorithm simple was also one of the main priorities. As a result, RGB was considered unsuitable color space for the task. For HSL color space shown in Fig. 2(b), only Hue component could be used in detecting the food pixel. The range of Hue that was used in the detection algorithm is $0 \leq H \leq 60$ or $109 \leq H \leq 180$. Similarly to the HSL, HSV shown in Fig. 2(c) indicates that only Hue component can be used in the detection algorithm. Because Hue was accounted for HLS color space, all components from HSV were not used in the detection algorithm. LAB and YCrCb color spaces, shown in Fig. 2(d) and (e), show much more compact density plots than the previously discussed color spaces, especially on the component A and B for LAB, and component Cr and Cb for YCrCb. The compact density plot was highly preferred when determining the detection algorithm. These two color spaces could certainly be used in the detection algorithm in the following ranges $110 \leq A \leq 148$, $120 \leq B \leq 170$, $118 \leq Cr \leq 150$, $90 \leq Cb \leq 135$. Table 1 summarizes all the components from different color spaces and their ranges used to form the threshold that identifies a food pixel. Eq. (1) is the proposed threshold for food pixel recognition.

$$\begin{aligned} &((0 \leq H \leq 60) \text{ or } (109 \leq H \leq 180)) \text{ and} \\ &(110 \leq A \leq 148) \text{ and } (120 \leq B \leq 170) \text{ and} \\ &(118 \leq Cr \leq 150) \text{ and } (90 \leq Cb \leq 135) \end{aligned} \quad (1)$$

3. Experimental Setup and Results

According to Fig. 3, there are four steps involving in detecting the amount of leftovers on the feeding tray. The first step, data acquisition, was to collect four 377×377 pixel image data, each of which corresponded to each of the grid regions on the feeding tray. These image data were then preprocessed by removing the steel frame part in the image. This was to reduce the false detection caused by a rusty and muddy part that might have similar characteristics to that of a food pixel. In the third step, each image data was converted into three different color spaces: HSL, LAB, and YCrCb. Each pixel would then be determined whether it is a food pixel or non-food pixel, using Eq. (1). Finally, all the food pixels were combined and converted into the total leftovers on the feeding tray.

Fig. 4 shows some of the results obtained in the laboratory. The two images on the left are the images of shrimp food samples that was soaked in water for 30, 60, and 120 minutes. Each of which was arranged in

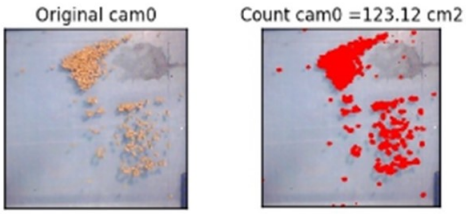


Figure 5: Food detection obtained from the field experiment.

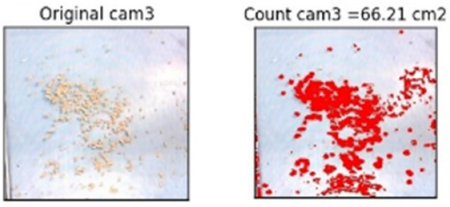


Figure 6: False-positive detections caused by the rusty part of the steel frame.

a circular-shape container with a radius of 2.7 cm, resulting in the total area of 45.8 cm^2 and 22.9 cm^2 of food, respectively. The images on the right shows that our proposed algorithm could detect the food with the total area of 46.66 cm^2 and 24.43 cm^2, respectively. Fig. 5 shows the result obtained from the experiment site after the system had been deployed and used continuously for ten days. It was evident that even with the stain and the shadow of shrimp pellets, our detection algorithm could differentiate between food and non-food pixel effectively. However, it is worth mentioning that if there was any pixel with similar color distributions to the food pellets (e.g., stain or a rusty part of the steel frame of the feeding tray), the number of false-positive detection would increase, as can be seen in Fig. 6.

4. Conclusions

We proposed the automatic shrimp food detection system which can be integrated with a shrimp smart farm system. The information about the amount of leftovers on the feeding tray was used to determine the adjustment of the amount of the next feed. Five different color spaces (RGB, HSL, HSV, LAB, and YCrCb) were examined using color segmentation technique. The proposed shrimp food detection algorithm was then developed by on three different color spaces: HSL, LAB, and YCrCb. The results of experiments both in the lab and on the field reveal that food pixel could be recognized effectively using the proposed algorithm. However, the error increased when there was a presence of objects that had similar color and lightness distribution to the shrimp food pellets.

For the future work, the size, shape and food pellet texture should also be taken into account as parameters to develop a more accurate detection algorithm. Furthermore, various techniques in machine learning are also interesting and worth exploring.

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Determinants of cognitive impairment among adults 50 years and older in Thailand

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Abstract

One of the major causes of disability and dependency in older people worldwide is dementia. However, few studies have been conducted on determinants of cognitive impairment among people 50 years and older. The purpose of this study was to describe the prevalence and explain determinants of cognitive impairment among adults aged 50 years and older in Thailand.A cross-sectional study was conducted from September 2015 to March 2016. The participants was randomly selected from sixteen districts, fourteen provinces across four regions of Thailand. A total of 3021 completed questionnaires were used for analysis. Cognitive impairment was measured by the Montreal Cognitive Assessment (MoCA) and established questionnaire from the study of Global Ageing 2014 (SAGE). The prevalence of cognitive impairment was 23.20%. Four variables were associated with cognitive impairment as aged 65 years and older, female, without spouse, and low frequency of social interaction attended. Multiple logistic regression revealed that aged 65 years and older (AOR: 1.61, 95% CI: 1.35-1.93), female (AOR: 1.41, 95% CI: 1.16–1.70), completed primary school and lower (AOR: 0.73, 95% CI: 0.55-0.96), and low frequency of social interaction attended (AOR: 1.25, 95% CI: 0.98-1.60) were found to be significant predictor of cognitive impairment among adults aged 50 years and older. Annual screening for cognitive impairment of adults aged 50 years and older should be done. Provide health promotion in risk group and care for older cases with impaired cognitive function to achieve well-being in their lives.

Keywords: Cognitive impairment, older, Thailand

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1. Introduction

The prevalence of age-related health and increasingly aging of global population will be important public health concerns [1]. One of the major causes of disability and dependency in older people worldwide is dementia [2]. The prevalence of dementia is expected to increase by about 74.7 million in 2030 and 131.5 million by 2050. Majority are in low and middle income especially in Asia-Pacific region [3]. In this region, people with dementia will increase from 23 million in 2015 to almost 71 million in 2050 which more than half of worldwide [4].

Dementia is a syndrome of irreversible cognitive decline and too severe to support daily functioning [5]. Cognitive impairment and mild cognitive impairment have cognitive deficit less severe than dementia and daily functioning is normal. After diagnosis, up to 50% of Mild Cognitive Impairment (MCI) developed to dementia within five years [6]. Alzheimer's disease is the most common type about 50–70% of dementia [7, 8]. The other types include vascular dementia, dementia with Lewy bodies [3]. Being with dementia affect individuals, their caregivers and society. For people with dementia, there is increased risk of functional dependence and poor quality of life [9]. For caregivers, they suffered of emotional stress, depression and health problem in family and caregivers themselves [10–12]. For society, health services costs and informal costs of unpaid caregiving for dementia are growing too high. Total estimated cost of dementia care worldwide is US$ 818 billion in 2015, it will be rising to US$ 1 trillion in 2018 and US$ 2 trillion in 2030 [3]. High income countries has the highest proportion of direct costs on social care (community and residential care) while low income countries rely on informal care (unpaid care by family) more than others. Furthermore, no current treatment can cure or stop progression of dementia even many new therapies are still in various stages of clinical trials and investigations [13].

In Thailand, the health survey 2014 reported that 8.1% of people aged over 60 years had dementia. People over 80 years old had highest prevalence of demen-

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tia with 22.6 % [14]. The population census in Thailand 2010 has shown 12% of aging population and estimated to reach to 17% in 2020 from which at least 300,000 people have dementia [15]. The findings from Thai elderly report in 2013 has highlighted that 63% of Thai cohort has at least one chronic disease to comorbidity of dementia [16]. A study in Thailand revealed that people with dementia have difficulties to perform their basic activities of daily living [17]. Limited national strategies to support those people to maintain their quality of life [4].

Due to functional impairment of memory processing speed and executive functions of those people, only few are seeking treatment [5, 18]. Early recognition of cognitive impairment is beneficial to help patients, care givers and doctors to determine comorbidities and reversible causes of cognitive impairment, discuss initiation of therapy and planning of appropriate advance care [19]. In addition, early identification enables older people, their families and friends to appropriately adjust and prepare for future risks [19, 20]. Moreover, early detection could improve prognosis and decrease morbidity [5]. Simultaneously address modifiable risk factors may be is the most effective strategy [21, 22]. The aims of this cross-sectional survey were to identify prevalence of cognitive impairment and associated factors among adults aged 50 years and older in Thailand; to understand current situation for policy making and to make implementation plan for the promotion of modifiable factors to reduce of cognitive impairment in the populations.

2. Methodology

2.1. Study design and sample

A household cross-sectional study was conducted for Thai adults aged 50 years and older from September 2015 to March 2016. A total of 3,977 participants were randomly selected from 16 districts in 14 provinces across four regions of Thailand. The study population was comprised of adults aged 50 years and older who had been living in the selected districts at least 6 months. They were willing and responsive to the study. Multi-stage cluster sampling was applied to select the villages in 14 provinces representing all regions. Community leader and health staff in each village were approached to request collaboration and selection of participants. Simple random sampling was employed to enroll eligible adults 50 years and older in the household.

2.2. Measurement

The established questionnaire from the study of Global Ageing 2014 (SAGE) [23] and used the Montreal Cognitive Assessment (MoCA) translated from English language version into Thai in March 15 2007 by Solasinee Hemrungrojn [24, 25]. The questionnaire consisted of five parts: 1) introduction 2) cognitive functions 3) demographic factors 4) health staterelate factors 5) social factors. It was revised for validity and reliability by the research team. MoCA was used to evaluate cognitive function score. The participants were asked with eight questions in different domains: visuospatial skills/executive functions, naming, memory, attention, language, abstraction, delayed recall, orientation. A maximum score of 30, one point was added for an individual who has less than 12 years of education. Cognitive functions were classified as being: severe dementia (total scores 4 and below), moderate dementia (5–15 scores), mild dementia (16–21 scores), preclinical (22–25 scores), and normal (total scores 26 and above). For statistical purpose cognitive function was divided into two groups: group I normal (normal to mild dementia) and group II cognitive impairment (moderate to severe dementia).

2.3. Data and collection procedures

The data were collected by trained research assistants through a face-to-face interview using questionnaire. Two research assistants per study site were recruited from selected sixteen districts. They were trained to ensure competency to fill in the questionnaire and to get the appropriate anthropometric measurements. Two-day workshop was organized to train assistants about the questionnaire and ethical issues. An electronic form was developed for data entering from all 16 study sites via on-line application (http://ageingbackend.damasac.com). The proposal was approved by the ethical committee of Mahidol University, COA. NO. 2014/266.3009. No individual level identifiers were included in any public data set and no individual identifiers were sent to the authors.

2.4. Data analysis

The statistical tests were analyzed using SPSS version 21.0 for Windows. Descriptive analysis was conducted to calculate mean, standard deviation (SD), minimum and maximum, numbers and percentage to identify the prevalence of cognitive impairment and each independent variable among adults aged 50 years and older in the selected communities. Then, bivariate analysis was applied to identify associations between each independent variable and cognitive impairment. Finally, multiple logistic regression analysis was used to identify the significant predictors related to cognitive impairment among adults aged 50 years and older in Thailand. All variables statistically significant at p-value < 0.25 in bivariate analyzes were included in the multiple logistic regression.

3. Results

A total of 3,977 participants were interviewed, 956 were excluded due to missing data on key variables.

Table 1. Distribution of respondents by cognitive functioning among adults aged 50 years and older ($n = 3,021$)

Variable	All		Male		Female	
	Number	Percentage	Number	Percentage	Number	Percentage
Cognitive function						
Normal	632	20.90	218	19.70	414	21.60
Preclinical	621	20.60	237	21.50	384	20.00
Mild dementia	1067	35.30	430	38.90	637	33.20
Moderate dementia	653	21.60	201	18.20	452	23.60
Severe dementia	48	1.60	18	1.60	30	1.60
Cognitive function categories						
Group I Normal	2,320	76.80	885	80.20	1,435	74.80
Group II Impairment	701	23.20	219	19.85	482	25.20

In total 3,021 completed questionnaires were used for the analysis. Adults aged 50 years and older who have cognitive function have been illustrated in the Table 1. One-third (35.30%) were mild dementia and they are the biggest sub-group in the classification. The prevalence of cognitive impairment among adults aged 50 years and older was 23.20%, higher in women than men (25.20% and 19.80%).

Demographic characteristics of the sample are shown in Table 2. One-third (38.70%) were aged between 50 to 59 years. The median age was 63 years old (Mean 63.58, SD.9.23). The findings indicated that two-third (63.50%) were females. Over two-third (67.40%) were currently married, and two-third (63.30%) completed primary school and lower as the highest education level. The numbers and percentages of health state in Table 2 showed that hypertension rate was 13.00% and depression rate was 13.00%. One third (33.10%) were obese (BMI $\geq$ 25 kg/m^2). Proportion of respondents smoking tobacco were 10.60%, alcohol consumption 11.30%, high physical activity 8.80% and high exercise 5.60%.

Cognitive impairment in bivariate analysis was described in Table 3. Four factors were found to be significantly associated with cognitive impairment: aged 65 years and older, female, without spouse, and low frequency of social interaction (p-value < 0.05).

Multiple logistic regression showed that factors with strong evidence with p-value < 0.05 which aged 65 years and older (Adjusted OR 1.61; 95% CI=1.35–1.93), female (Adjusted OR 1.41; 95% CI=1.16–1.70), completed primary school and lower (Adjusted OR 0.73; 95% CI=0.55–0.96) and low frequency of social interaction (Adjusted OR, 1.25; 95% CI=0.98–1.60) were found to be significant predictors of cognitive impairment among adult aged 50 years and older as shown in table 4.

4. Discussion

This study showed that four factors were found to be significantly associated with cognitive impairment: aged 65 years and older, female, without spouse, and low frequency of social interaction attended. The prevalence of cognitive impairment among adults aged 50 years and older in the communities of Thailand was 23.20% (male 19.8%, female 25.2%). When compared with other countries, the result was close to Japan 21.50% (21.3% of male and 21.8% of female) [26]. In contrast, our finding was higher than Malaysia where prevalence of cognitive impairment was 11.0% [27].

Demographic factors, age was positively associated with cognitive impairment. The respondents aged 65 years and older were 1.60 (OR: 1.60, 95% CI: 1.35–1.89) times more likely to have cognitive impairment than those who were younger. Many studies reported that cognitive impairment was strongly associated with age [28–30]. Age was the greatest risk factor for Alzheimer's disease [4, 31, 32] and cognitive impairment [33]. Female respondents were 1.36 (OR: 1.36, 95% CI: 1.13–1.63) times more likely to develop cognitive impairment than males. Similar to studies, conducted in rural areas of northern China in which the odds of cognitive impairment were significantly higher among women [29, 34]. The prevalence of cognitive impairment was 1.8-fold higher in women than men among people aged 80 years and older [29], and 2.3-fold higher in women than men among people aged 60 years and older [34]. In contrast, some studies found that gender was not in association with cognitive impairment [28, 30]. Multiple logistic regression found that gender was a significant predictor of cognitive impairment among female adults aged 50 years and older. One reason could be the loss of estrogen in menopause may cause high prevalence of cognitive impairment in women [35, 36].

Respondents without spouse were 1.28 (OR: 1.28, 95% CI: 1.07–1.54) times which was more likely to develop cognitive impairment than those with spouse. Similar to the finding of other studies, without spouse was positively associated with cognitive impairment [37, 38]. Social interaction between couples could help avoid the disease. Solitary individuals who were less involved in social activities and had less opportunity to communicate may result in high risk of cog-

Table 2. Distribution of respondents' characteristics ($n = 3,021$)

Variables	Number	Percentage
Age in years		
50-59	1170	38.70
60-69	1105	36.60
≥ 70	746	24.70
(Mean = 63.58 SD = 9.23, Min = 50, Max = 97)		
Gender		
Male	1104	36.50
Female	1917	63.50
Marital status		
Never married	166	5.50
Currently married	2035	67.40
Cohabiting	100	3.30
Separated/Divorced	124	4.10
Widowed	596	19.7
Body mass index: ≥ 25 kg/m^2	999	33.10
Education level		
Never been to school	100	3.30
Less than primary school	511	16.90
Primary school	1912	63.30
Secondary school	181	6.00
High school and higher	162	5.40
Life style and disease		
Tobacco use: Yes	320	10.60
Alcohol consumption: Yes	342	11.30
Physical activity: Yes	267	8.80
Exercise: Yes	170	5.60
Depression: Yes	392	13.00
Hypertension: Yes	392	13.00
Social life		
Work with neighborhood to improved something: No	719	23.80
Social interaction: Low frequency	831	27.50
Social meeting attended: Low frequency	509	83.20

nitive impairment [38, 39]. Multiple logistic regression found that without spouse was not a significant predictor of cognitive impairment among adults aged 50 years and older in Thailand. Education level was not significantly associated with cognitive impairment 0.87 (OR: 0.87, 95% CI: 0.66–1.13) ($p = 0.296$). Multiple logistic regression found that education level was a significant predictor of cognitive impairment among adult aged 50 years and older in Thailand. Evidence from previous studies showed that low education level was risk factor for cognitive impairment [28–30]. Consistent with previous finding, older people with education levels of < 6 years compare to older people with education levels of 9 years or more, with a 3.8 fold increase in the illiterate group and a 1.7-fold increased with 1-5 years of education. People with higher education might adopt healthier lifestyles that are associated with good cognitive functioning [40].

Social factors consisted of three variables; worked with your neighborhood to improve something, social interaction attendance, and social meeting attended. Our finding indicated that respondent with low frequency of social interaction attendance were 0.76 (OR: 0.76, 95% CI: 0.62–0.92) time more likely to have cognitive impairment than those who have high frequency of social interaction attended. Multiple logistic regression found that low frequency of social interaction attended was a significant predictor of cognitive impairment among adults aged 50 years and older. Similar to other studies, the relationship between engagement in social activity and cognitive function showed that social engagement and active lifestyle improved cognitive function amongst ageing [41, 42]. Joining hobby groups such as playing Mahjong, chess and cards could prevent cognitive decline because it provides variety challenge, complex problem solving and mental training [43]. On the other hand, hypertension, depression, body mass index, tobacco use, alcohol consumption, high physical activity, high exercise, working with neighborhood to improve something and attending social meeting were not found to be associated with cognitive impairment.

Table 3. Association between cognitive impairment and independent variables

Independent variables	*n*	Cognitive functions			*p*-value
		Normal(%)	Impairment (%)	Crude OR (95% CI)	
Age					
≥65	1226	71.80	28.20	1.60 (1.35-1.89)	0.000
50 - 64	1795	80.20	19.80	1	
Gender					
Female	1917	74.90	25.10	1.36 (1.13-1.63)	0.001
Male	1104	80.20	19.80	1	
Marital status					
Without spouse	886	73.60	26.40	1.28 (1.07-1.54)	0.007
Spouse	2135	78.10	21.90	1	
Education					
Primary school completed and lower	2704	77.10	22.90	0.87 (0.66-1.13)	0.296
Higher than primary school completed	317	74.40	25.60	1	
Hypertension					
Yes	392	75.50	24.50	1.09 (0.85-1.39)	0.518
No	2629	77.00	23.00	1	
Depression					
Yes	392	73.20	26.80	1.25(0.98-1.59)	0.072
No	2,629	77.30	22.70	1	
Body mass index					
Obesity	999	78.40	21.60	0.87(0.73-1.05)	0.148
Non-obese	2,022	76.00	24.00	1	
Tobacco use					
Yes	320	75.90	24.10	1.06 (0.80-1.38)	0.701
No	2,701	76.90	23.10	1	
Alcohol consumption					
Yes	342	76.60	23.40	1.01 (0.78-1.32)	0.930
No	2,679	76.80	23.20	1	
High physical activity					
No	2,754	76.50	23.50	1.21 (0.89-1.65)	0.228
Yes	267	79.80	20.20	1	
High exercise					
No	2,851	76.70	23.30	1.13 (0.78-1.65)	0.519
Yes	170	78.80	21.20	1	
Work with neighborhood to improved well-being					
Low frequency	719	47.15	52.85	0.84 (0.68-1.03)	0.089
High frequency	2,302	44.62	55.38	1	
Social interaction attended					
Low frequency	831	80.30	19.70	0.76 (0.62-0.92)	0.005
High frequency	2,190	75.50	24.50	1	
Social meeting attended					
Low frequency	509	79.00	21.00	0.86 (0.68-1.08)	0.201
High frequency	2,575	76.40	23.60	1	

Study limitations

This study used the MoCA rather than gold standard measures (DSM V) to determine cognitive function that we were unable to diagnose dementia. Although, there might be measurement bias comparing MoCA with gold standard measures, but the high test-retest, reliability and validity of MoCA have been assessed among adults aged 50 years and older at community level of Thailand.

5. Conclusion

Findings of this study indicated cognitive impairment has become a serious public health problem. Annual screening for cognitive impairment in adults aged

Table 4. Full model of multiple regression analysis for predictors of cognitive impairment among adults aged 50 years and older

Independent variables	Adjusted OR	95 % CI		*p*-value
		Lower	Upper	
Age				
≥ 65	1.61	1.35	1.93	0.000
50 - 64	1			
Gender				
Female	1.41	1.16	1.70	0.000
Male	1			
Marital status				
Without spouse	1.09	0.90	1.32	0.364
Spouse	1			
Education				
Primary school completed and lower	0.73	0.55	0.96	0.023
Higher than primary school completed	1			
Hypertension				
Yes	1.08	0.84	1.39	0.566
No	1			
Body mass index				
Obesity	0.88	0.73	1.06	0.168
Non-obese	1			
Tobacco use				
Yes	1.08	0.79	1.48	0.617
No	1			
Alcohol consumption				
Yes	1.04	0.77	1.42	0.795
No	1			
High physical activity				
No	1.22	0.88	1.68	0.226
Yes	1			
High exercise				
No	1.09	0.74	1.62	0.653
Yes	1			
Depression				
Yes	1.25	0.98	1.60	0.073
No	1			
Social interaction				
Low frequency	1.25	0.98	1.60	0.005
High frequency	1			

50 years and older should be done. The health promotion interventions should focus to those female, who are 65 years and older, without spouse and low social interaction.

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Effects of basic life support training program on knowledge, perceived self-efficacy, and basic life support performance of village health volunteers

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Abstract

Out-of-hospital cardiac arrest is the leading cause of death worldwide. Performing basic life support immediately can decrease the mortality rate. The purpose of this quasi-experimental, one group pre-post-test design was to compare knowledge related to basic life support, perceived self-efficacy in a basic life support and basic life support performance among village health volunteers before and after participating in the basic life support training program which applied self-efficacy theory. The participants were 37 village health volunteers of Nong Ngu Luam sub-district, Nakhon Pathom Province. These volunteers met the inclusion criteria and were purposively selected into the study during September to October 2018. The participants received the basic life support training program including receiving classroom lectures related to basic life support and receiving training for promoting perceived self-efficacy via the following methods. These were through life role model, practical CPR training, verbal persuasion and identification of symptoms indicating conditions which need treatment. The knowledge related basic life support, perceived self-efficacy in basic life support, and basic life support performance were evaluated at baseline and immediately following the training. The data was analyzed using descriptive statistics and the paired samples t-test. Results showed that a mean score of knowledge related basic life support, perceived self-efficacy in basic life support performing, and basic life support performance after participated the program were significantly higher than before participating the program (p-value < 0.001). The results also revealed that all participants passed the minimum test criteria for basic life support performance. The results demonstrated that the basic life support training program is an effective program. It is therefore concluded that this program should be implemented in another similar contexts in the community in order to save the life of casualties who experience out-of-hospital cardiac arrest.

Keywords: Basic life support, village health volunteer, perceived self-efficacy, quasi-experimental study
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1. Introduction

Worldwide, an out-of-hospital cardiac arrest is the leading cause of death and neurological deficit [1] and also in Thailand [2]. During cardiac arrest, an immediate basic life support (BLS) provides perfusion and oxygenation to the tissues which resumed cardiopulmonary function. BLS composed of airway support, breathing support, and circulation support which not quite difficult to perform if an individual had trained. A recent study revealed that prompt delivery of basic life support by bystander increased over 2-fold of a probability of survival [3]. However, just only 3.6% of bystander performed BLS [4].

The recent study found that the majority of arrests occurred at home [1] then BLS performance of bystander is crucial. A village health volunteer is one of person who delivered caring for community residents at home and has quite big of numbers in Thailand. Moreover, the village health volunteers have more chance of a bystander of out-of-hospital cardiac arrest. An effective basic life support performance is essential for better patient survival, but whether this practice is helpful there is no evidence support that they have sufficiently trained. Even though adult people participated in BLS training, only half of them reported feeling confident about administering bystander BLS. [5].

Previous studies revealed that application of self-efficacy theory for cardiopulmonary resuscitation or basic life support training increased knowledge, perceived self-efficacy, and chest compression skill or performance of nursing student [6-7], and health care providers [8]. Unfortunately, the application for health

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volunteers training cannot be found. Therefore, the purpose of this study was to determine whether the basic life support training program, which designed based on Bandura's self-efficacy theory [9] was able to improve knowledge related BLS, perceived self-efficacy in BLS performing and BLS performance among village health volunteers.

2. Method and materials

2.1. Design

A quasi-experimental, one group pre-post-test design was employed in this study. All data were collected for two times: before and after joining the program.

O_1 ——X —— O_2 Experimental group

Figure 1: Research design

O_1 refers to evaluated the knowledge related BLS, perceived self-efficacy in BLS performing, and BLS performance at before intervention.

X refers to implementation the basic life support training activities for 180 minutes.

O_2 refers to evaluated the knowledge related BLS, perceived self-efficacy in BLS performing, and BLS performance at after intervention immediately.

2.2. Ethical Considerations

Participants were given verbal information explaining the purpose of the study, procedures, confidentiality and anonymity preserved. They were also informed about their right to withdraw from the study at any time without losing any benefits of their health care service.

2.3. Setting and sample

The study was conducted in the Nong Ngu Luam sub-district, Nakhon Pathom Province. This area has prevalence rate of chronic diseases and elderly higher than the average of the country [10] that might also lead higher chance of health volunteers to face out-of-hospital cardiac arrest. In addition, the research setting was ready for implementation the Basic life support training program regarding the MOU of Nursing practice area and being the setting of academic service of the Nursing faculty. Some of health volunteers had experienced of BLS training, however, it was a lecture based in classroom training. There was no CPR simulation man for all volunteers to practice which limited to evaluate their BLS performance. According to out-hospital-cardiac arrest, it was limited to ensure that health volunteers have enough self-efficacy to perform BLS if exposing with the event. The sample size was based on the calculation for paired sample t-test, an acceptable level of power of 0.80, the significant criterion of 0.05 and effect size of 0.5. It was determined to be 27 participants [11]. Ten participants were added regarding their requirement for participation the intervention. Finally, the 37 of village health volunteers were recruited from their communities.

2.4. Procedure and data collection

The participants who met the inclusion criteria were recruited in the study based on purposive sampling. The inclusion criteria were (a) a village health volunteer for at least one year, (b) a person living in the research setting, and (c) willing to participate during the entire study period. Exclusion criteria were (a) absent the training activities at least one activity, and (b) a person who did not stay in the research setting during the research period.

2.5. The basic life support training program

The program delivered aimed to increase the knowledge related BLS, perceived self-efficacy in BLS performing, and BLS performance among village health volunteers. The program of 180 minutes was developed based on literature review, and the 4 primary sources of information of Bandura's self-efficacy theory including (1) vicarious experiences, (2) enactive mastery experiences, (3) verbal persuasions, and (4) physiological and affective states [9]. The intervention was provided by the researcher and trained research assistants over 180 minutes. The first session consisted of giving BLS information via PowerPoint as a classroom lecture for 20 minutes. The second session, 160 minutes, was activities for promoting perceived self-efficacy through vicarious experiences via life modeling which applied in the program through BLS performing demonstration by using the CPR simulation man. Then, village health volunteers observed and learned symbolic modeling through the handbook that covered BLS topics. Also, promoting perceived self-efficacy through repetitions of successful accomplishments was employed. BLS was demonstrated and returned demonstration in a small group, 9-10 participants in each group with closed to coaching and real time feedback. Then, village health volunteers were persuaded verbally to achieve BLS performing successes and were encouraged to perform when they faced with an out-of-hospital cardiac arrest.

Finally, physiological and affective states were applied to reduce unconfidently states through the provision of anticipatory guidance regarding BLS problems and solutions to ensure that negative physiological and affective states did not undermine BLS self-efficacy. Also, physiological and affective states were applied to enhance participants' self-efficacy to trust their body that they were able to perform quality of BLS for an out-of-hospital cardiac arrest patient.

The content validity of the program and quality of all research instruments were examined by 3 experts,

nursing instructors. The research conceptual framework and contents of the program are listed in Figure II.

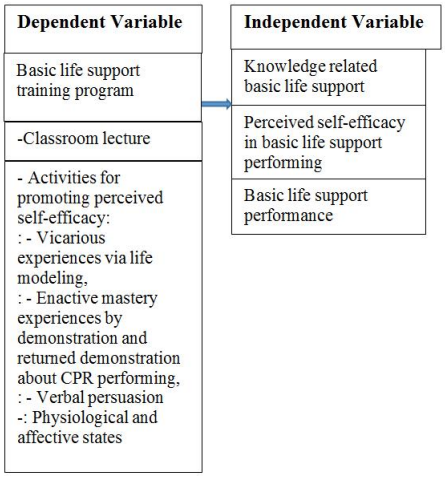

Figure 2: Research conceptual framework.

2.6. Instruments

There were four instruments for this study utilized including (1) demographic characteristics, (2) the knowledge related BLS questionnaire, (3) The perceived self-efficacy in BLS performing scale, and (4) the BLS performance checklist. All research instruments were assessed for content validity by 3 experts before data collection. The reliability was tested with 30 village health volunteers in other community which similar the research setting.

The demographic characteristics questionnaire: the questions focused on demographics of the participants such as age, gender, education level, experience in BLS training, and experience in BLS performing, and the year for working as village health volunteer.

The knowledge related BLS questionnaire was developed by the researcher from the literature review. The questionnaire consisted of 9 items, four multiple choices related to basic life support knowledge for an out-of-hospital cardiac arrest patient. Participants were required to respond to all of the items. The correct answer assigned 1 score whereas incorrect answer assigned 0 score. The higher scores indicated higher knowledge related BLS. The score was ranged from 0 – 9 in that score of 0.0 – 5.3 (0 – 59.9%) were interpreted as a poor level of knowledge related BLS, the score of 5.4 –7 .1 (60 – 79.9%) was interpreted as a moderate, and the score of 7.2 – 9.0 (80.0 – 100.0%) was interpreted as a high level [9]. The index of item-objective congruence (IOC) was 0.71. Tested for reliability, the Kuder-Richardson Formula 20 was 0.75.

The perceived self-efficacy scale was a 9-item Likert-style self-reports, was developed by the researcher from the literature review. These questionnaire required participants to respond to a series of statements focused on whatever they perceived self-efficacy and outcome expectation in BLS performing. Participants were required to respond to all of the items. The score ranged from 1 (not sure at all) to 5 (very confident), with higher scores indicating higher perceived self-efficacy in BLS. The score was ranged from 9 – 45 in that score of 9.0 – 26.9 (0 – 59.9%) were interpreted as a low level of perceived self-efficacy in BLS, the score of 27.0 – 35.9 (60 – 79.9%) was interpreted as a moderate level, and the score of 36.0 – 45.0 (80.0 – 100.0%) was interpreted as a high level [12]. The CVI of the scale was 0.71, and the coefficient of Cronbach's alpha reliability was 0.93.

The BLS performance checklist

The basic life support performance checklist assessed by structured observation of BLS performance by the researcher during return demonstration with CPR simulation man. It was a 10-item rating-style, was developed from the literature review which based up on the 2015 AHA Guidelines for CPR and ECC [13]. These questionnaire were series of statements focused on whatever they performed BLS correctly regarding to situational and patient assessment, patient positioning, hand position and posture, compression rate, depth, recoil, and duty cycle. The score assigned by 0 (not done), 1 (partial completion), and 2 (absolutely completion), with higher scores indicating higher BLS performance. The total scores were ranged from 0 – 20. The score interpretations were 2 aspects of determination for quality of performance and pass criteria of safety BLS performing. The quality of performance, the score of 0.0-11.9 (0 – 59.9%) were interpreted as a low level of BLS performance, the score of 12.0 – 15.9 (60 – 79.9%) was interpreted as a moderate level, and the score of 16.0 – 20.0 (80.0 – 100.0%) was interpreted as a high level [12]. For the safety BLS performing determination, the score of 0 – 15.9 (0.0 – 79.9%) were interpreted as fail or not pass the criteria, the score of 16 – 20 (80 – 100.0%) was interpreted as pass criteria [12]. The CVI of the scale was 0.67, and the coefficient of Cronbach's alpha reliability was 0.94.

3. Results

3.1. Demographic characteristics of participants

Approximately 89% of the participants were women. Their age range was 32 – 62 with a mean age of 49.37 ± 9.36 years. Around half of the participant (48.7%) aged between 50 – 59 years old. Two of third completed primary school. One third had experience in BLS training before. Almost of them (91.8%) did not experience in BLS performing. The rage of being health volunteer was 1 – 32 years, and mean of 11.46 (SD=9.52) years as shown in Table 1.

Table 1. Demographic characteristics of participants

Demographic	Frequency	Percentage
Gender		
: Male	4	10.8
: Female	33	89.2
Age (Year)		
: 30-39	10	27.0
: 40-49	3	8.1
: 50-59	18	48.7
: 60+	6	16.2
: Range = 32-62 Years		
: Mean ± SD. = 49.37 ± 9.36 Years		
Education level		
:Primary school	26	70.3
: Secondary school	11	29.7
Experience in BLS training		
: No	26	70.3
: Yes	11	29.7
Experience in BLS Performing		
: No	34	91.8
: Yes	3	8.2
Year of village health volunteer		
: Range = 1-32 Years		
: Mean ± SD. = 11.46 ± 9.52 Years		

3.2. The results of the implementation of a basic life support training program for village health volunteers

To test the effectiveness of the program, the Kolmogorov-Smirnov Z test was employed to test the normality of all variables, knowledge related BLS, perceived self-efficacy in BLS performing and BLS performance. The results revealed all variables were non-significant indicating that all variables were normally distributed. Therefore, paired sample t-test was used to test the knowledge related BLS, perceived self-efficacy in BLS performing and BLS performance at before and after immediate implementations.

3.3. The knowledge related BLS

Before the program implementation, the mean score of knowledge related BLS was 4.70 (SD = 1.91), which was interpreted as a poor level. Moreover, around two-thirds (67.6%) had the knowledge related BLS at a poor level. After the program implementation immediately, the mean score was 7.22 (SD = 2.10), which was interpreted as the moderate level. In addition, almost of participants (86.5%) had knowledge related BLS at a moderate to high level. However, 13.5% of the participants had the knowledge at the poor level as presented in Table 2.

3.4. The perceived self-efficacy in BLS performing

Before the program implementation, the mean score of perceived self-efficacy in BLS performing was 26.87 (SD = 8.17), which was interpreted as the low level. Moreover, most of them (86.5%) had the perceived self-efficacy in BLS performing at the moderate and low level. After the program implementation immediately, the mean score was 39.05 (SD = 5.51), which was interpreted as the high level. In addition, none of participants had perceived self-efficacy in BLS performing at a low level as presented in Table 2.

3.5. The BLS performance

Before the program implementation, the mean score of BLS performance was 14.05 (SD = 4.95), which was interpreted as a moderate level. However, around one-third (35.1%) of the participants had the BLS performance score at a low level. After the program implementation immediately, the mean score was 20.00 (SD = 0.00), which was interpreted as the high level. In addition, all of participants (100.0%) had BLS performance score at a high level as presented in Table 2.

3.6. Comparison of knowledge related BLS, perceived self-efficacy in BLS performing, and BLS performance before and after implementations

Paired sample t-test was used to analyze the mean scores of the knowledge related BLS, perceived self-efficacy in BLS performing, and the BLS performance at before and after the program implementation. The results showed that the knowledge related BLS mean scores at after implementation were a significantly higher than before implementation (t = -5.65; df = 36; p-value < 0.001).

The results also revealed that the perceived self-efficacy in BLS performing at after implementation was significantly higher than before the implementation (t = -9.06; df = 36; p-value < 0.001), as showed in Table 3.

The results showed that the BLS performance at after implementation was significantly higher than before the implementation (t = -7.31; df = 36; p-value ¡ 0.001), as showed in Table 3.

Finally, after the program implementation, the result revealed that all participants were passed the criteria for BLS performance as showed in Table 4.

4. Discussion

This study revealed that the effect of BLS training program could improve several outcomes such as knowledge related BLS, perceived self-efficacy in BLS performing, and BLS performance that are discussed below.

The knowledge related BLS: The finding of this study showed that the knowledge related BLS scores after intervention was significantly higher than before the intervention. The knowledge related BLS and skills were important for village health volunteers to perform BLS if they faced with cardiac arrest event. The results of this study could be explained

Table 2. Descriptive scores of the knowledge related BLS and perceived self-efficacy (n = 37)

Variables	Mean (SD.)	Interpretation	Frequency (Percentage)		
			Low/Poor	Moderate	High/good
-knowledge related BLS					
: Before	4.70	Poor	25	8	4
	(1.91)		(67.6)	(21.6)	(10.8)
: After	7.22	Moderate	5	17	15
	(2.10)		(13.5)	(46.0)	(40.5)
-perceived self-efficacy					
: Before	26.87	Low	17	15	5
	(8.17)		(46.0)	(40.5)	13.5)
: After	39.05	High	0	11	26
	(5.51)		(0.0)	(29.7)	(70.3)
- BLS performance					
: Before	14.05	Moderate	13	24	0
	(4.95)		(35.1)	(64.9)	(0.0)
: After	20.00	High	0	0	37
	(0.00)		(0.0)	(0.0)	(100.0)

Table 3. Comparison of knowledge related BLS and perceived self-efficacy before and after implementations (n = 37)

Variables	Mean(SD.)	t-test	df.	p-value
-knowledge related BLS				
: Before	4.70(1.91)	-5.65	36	<0.001
: After	7.22(2.10)			
-perceived self-efficacy				
: Before	26.87(8.17)	-9.06	36	<0.001
: After	39.05(5.51)			
- BLS performance				
: Before	14.05 (4.95)	-7.31	36	<0.001
: After	20.00 (0.00)			

that the BLS training program for village health volunteers (Figure 2) including the necessary BLS information for village health volunteers may have increased knowledge related BLS of them. The PowerPoint, handout, and handbook were useful for the village health volunteers to understand more easily. This finding was congruent with the previous study that found that the lecture-based and basic life support training package, included can enhance knowledge related to BLS of teachers in Iran [14]. However, the results found that 13.5% of the participants in this study still had the knowledge related BLS at the low level. The results found that the majority of them were aged over 55 years old. These can be inferred that the 20-minutes classroom lecture for transferring the knowledge to the village health volunteers was not effective.

The perceived self-efficacy in BLS: the perceived self-efficacy in BLS score of the participants at after the training was significantly higher than before the training. This led to the conclusion that the BLS training program had a positive effect on the perceived self-efficacy in BLS of village health volunteers. Perceived self-efficacy in BLS performing had a direct influence on performance accomplishments of BLS practice. The significance of perceived self-efficacy in BLS has demonstrated frequently to be predictive of BLS performing outcomes. Perceived self-efficacy in BLS performing was influenced by 4 main sources of information including enactive mastery experiences, vicarious experiences, verbal persuasion, and physiological and affective states. As such, the intervention of this study was devised based on self-efficacy theory and was expected to increase village health volunteers' confidence in their ability to practice BLS by adjusting 4 main sources of self-efficacy information in the Program. The results found in this study was congruent with the recent studies as a teacher who trained BLS had a higher statistical significance of the self-efficacy score in basic resuscitation than those who had not trained [15].

This finding was in congruence with the previous study that found no significant correlation between self-efficacy of BLS and the correct percentage of chest compression of nursing student [7].

The BLS performance: the results revealed that the BLS performance of the participants passed the criteria of the safety BLS performing which was guided by the 2015 AHA Guidelines for CPR and ECC [13]. This study found that before the participation in the basic life support training program around one-third (35.1%) of the participants had the BLS performance at a low level but finally all of participants could achieve a quality of BLS performing. These can be described that the techniques given during the brief instructions on BLS training regarding hand position, compression rate, and depth according to the current guidelines given and real-time feedback by a researcher and research assistants were successful. The real-time feedback and motivation could make

Table 4. Comparison of Basic Life Support Performance before and after implementations (n = 37)

Basic life support performance	Pass		Fail	
	Frequency	Percentage	Frequency	Percentage
Before	-	-	-	-
After	37	100.0	0	0.0

participants adjust their practice into the correct practicing; also repeated again and again if they could not perform correctly made them more skillful of BLS performance. This finding was congruent with the previous study that found a very brief training supported by hands-on instructor-led advice and visual feedback, laypeople was able to perform good-quality cardiopulmonary resuscitation [16].

Conclusion

The finding showed that the basic life support training program was an effective program for improving knowledge related BLS, perceived self-efficacy in BLS performing, and BLS performance. It is therefore concluded that this training program should be implemented in other similar contexts in the community in order to save the life of casualties who experience out-of-hospital cardiac arrest. Future research is needed to explore more about teaching technique for delivery knowledge to an adult and a sustainability of the program related to measure the outcome at the 6, 8 or 12 months after the program implementation. Based on the major finding, it was recommended that an application should be pushed policy change to the curriculum training of a village health volunteer which more concise with increasing knowledge, self-efficacy, and BLS performing.

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Green office, its features and importance for sustainable environmental management: A comparative review in search for similarities and differences

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Abstract

In the recent decades, there is a growing importance of green office, a practical environmental management system for the offices, as it is an environmental service for offices with the main goal of bringing an environment, which is good for the health, for conservation of energy, diminishing emission of carbon dioxide in the atmosphere and the ecological footprint of the offices.

This article aimed to describe the purpose and principles of green office, features of green office as green building, steps to set up a green office and analysis of the green offices in some countries as Singapore, Hong Kong, Finland, UK, USA and Thailand so as to find out the similarities and differences in its practice, features and aims and objectives of the green offices. The article was carried out through review of available literatures in books, journals and internet sources.

The article concluded that green office in the work places can be promoted through behavioral changes and efficient office management practices, by reducing the consumption of natural resources, promoting sustainable lifestyles through enhanced employee environmental awareness.

Keywords: Green office, workplace, human factors, environmental management
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1. Introduction

The concept of green office was first defined, developed and managed by an organization in Finland. According to this organization, green office is a practical step or measures to solve the impact of daily office activities to the environment. Therefore, it is an environmental management program for the offices, which can be applicable to all kinds of organizations, large or small, public or private, having the ultimate aim of reducing the carbon dioxide emission, greenhouse gas emission and its footprint ecologically [1]. The U.S. Environmental Agency defined green office as a structure that is environmentally responsible with limited use of available resources. As a result, it can be said that green offices are built to have efficient energy system, thereby incorporating recycled content. Its ultimate goal is creation of an environment which is healthy to live in for mankind and all living beings along with conservation of energy and reduction in pollution. With green office, offices' impact on the environment will be reduced, achieved savings economically and at the same time will lessen the burden on the environment, which will help to retard the effect of climate change in the environment.

2. Abbreviations

IEQ - Indoor Environment Quality
IAQ - Indoor Air Quality
IPCC - Intergovernmental Panel on Climate Change
EPA – Environmental Protection Agency
SEC- Singapore Environment council
CDL- City Developments Limited
WEEE- Waste Electrical and Electronic Equipment
CFLs- Compact Fluorescent Light bulbs
DEQP- Department of Environmental Quality Promotion
FSC – Forest Stewardship Council
PEFC - Programme for the Endorsement of Forest Certification

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3. Methods and Objectives

The article was carried out through review of available literatures in books, journals and internet sources with objectives as:
- to describe the purpose and principles of green office, features of green office as green building, steps to set up a green office
- to highlight climate change and the growing importance of green office
- to analyze through review of the green offices in some countries as Singapore, Hong Kong, Finland, UK, USA and Thailand
- to find out the similarities and differences in Green offices of the above mentioned countries.

3.1. Purpose of Green Office

There are many ways for the consumption of energy and among them, offices and its daily operations consume a lot of energy and therefore a sustainable solution lies in the organization of offices' management. This led to the creation of green office, which aims to motivate staff in an office to work in an environmentally friendly way with regard to daily office activities and to perform office tasks economically by means of environmental education. Green office management aims to bring awareness to the office staffs about the benefits of following green office standard. This will help to bring benefit to both the parties, that is, office and the environment [1]. The following are the purposes of green office standard as:
- Reduction in the consumption of natural resources by making the office to be environmentally efficient
- Promotion of the sustainable environmental practices in office by training and educating the employees so as to improve environmental awareness
- Bringing awareness on the effect of climate change and counter measures steps necessary to mitigate it with activities or practices such as energy saving measures and use of renewable energy sources [2, 3]

3.2. Green Office's principles and features

The following are the main basic principles of the Green Office initiatives as:
- To bring all round improvement in the working atmosphere and environment of the concerned organization
- To reduce the negative impact caused by office on the environment such as using office resources efficiently
- To motivate and inspire employees to practice environmentally good habits [4]

The following gives the main features of green office as:
- *Green office and reduction in energy consumption*
Following the green office's activities such as switching off unnecessary light will lead to less consumption of energy.
- *Green office and reduction in transportation*
Most business also requires some traveling, but sustainable organizations having green office aims to avoid unnecessary travel by bringing an alternative solution such as through technological innovation in communication: telephone, email, Skype, video conferencing and other forms of internet communications. This will save time, travel expenses as well as the reduction of carbon emission thereby helping to improve environmental situation.
- *Green office and reduction in paper consumption*
As paper is made from wood, the mass scale production of paper needs the destruction of the forest, thereby resulting to massive ecological impacts such as endangered species, water resources, climate and people. Reduction in its use saves its impact on the ecology.
- *Green office and reduction in water consumption*
Water footprint of human consumption has been exceeding at an increasing rate beyond the sustainable levels globally. As a result, steps should be taken care of to save water through the practice of green office at workplace.
- *Green office and reducing waste generation*
Another feature of green office is to reduce the generation of waste products in the office in order to save natural resources and minimized the effect of environmental pollution. Attempts were made by activities and management of green office to bring down the quantity of waste generation and because of it, the amount of waste generation per employee in the Green Offices decreased substantially by 17.5% in 2010 according to information received from 39 offices [4].

3.3. Climate change and the growing importance of Green Office

Climate changes have large impacts on the Earth's environmental system such as the rising temperature, chaotic and unpredictable weather condition, disintegration of wild animals, rising sea levels, occurrence of flood, drought, famine, deforestation, which are factors responsible to bring threat to the life of human beings, animals and other living beings [4]. The most recent report of the Intergovernmental Panel on Climate Change (IPCC) concludes that human beings are responsible for climate change. Therefore, climate changes can be mitigated through changing in ways of human behavior in the daily life style and at work. Hence lies the importance of having green office in the work places through sustainable behavioral changes and practices in the daily office work sphere. To achieve it, the first step is to launch green building [5].

Green Building

Nowadays, every country is demanding to push green building policy for a sustainable development due the present changes in the environment. Therefore, the main motive of green building is to bring multiple benefits as environmental, economic and social [6]. This made many designers, innovators, engineers and experts to bring solution through their design,

idea, technology and innovation aiming to make building construction which is energy efficient [7, 8 and 9]. Studies have found a preference bias for "environmentally friendly" or "green" artifacts and buildings. For example, indoor environments are more favorably viewed when the building is labeled/certified "green", in comparison with one that is not labeled/certified, even though the two environments are actually identical [10]. In order to maintain green building, some steps should be taken care of as: Lighting, Cleaning, Decoration, Maintenance, Acoustic, Office Lay out, Thermal Comfort and Indoor Air Quality [11].

3.4. Steps for being Green Office

To be a green office, it is important for an organization to follow these steps which will help to enhance their performance for becoming a certified green office as:
- assemble a Green Office team
- complete the assessment form
- formulate an environmental program
- take decision and action on how to save energy
- consider the environmental aspects of procurement
- communicate
- instruct and train
- fill in the consumer habit questionnaire (voluntary)
- arrange for office inspection
- use a logo of green office
- formulate the aims and goals of the office in consultation with wwf [12].

4. Analysis of Green Office in various countries

Green Office in Singapore

Organizations in Singapore having green office are Singapore Environment council (SEC) and City Developments Limited (CDL). Distribution of eco office kits, containing materials to bring awareness and nurtured habits, which were environmentally friendly was the first eco office project in Singapore. Among the key programs of this project, rating system is worth to mention as it helps offices to administer a self – audit based on variables as corporate environmental policy, commitment, purchasing practice, measures for waste minimization and recycling level. The green office in Singapore is established with the following objectives:
- incorporate environmental practices into the daily life of office employees in order to bring environmental awareness in offices;
- educate and inspire all staffs to help to preserve the environment;
- availability of environmental policy which are easy, convenient and cost effective to implement to office staff,
- share knowledge and experience so as to promote the principles and practices of environmental responsibility in the office;
- continuous overall improvement for development of a greener office;
- identify areas that needs environmental initiatives or environmental project [13]. The following are the eco office tips in Singapore [14].

Indoor Air Quality:

Printers and copiers should be kept in a ventilated room far away from the staff working area. Substances which emit volatile chemicals in the office as glues, sealants and paints should not be used. To freshen, purify and remove toxins from the air in the office room, indoor plants should be grown. This will add aesthetic attraction of the office room as well as purify the indoor air. Along with this, indoor air quality should be monitored on a routine basis with the option to check for untreated, natural carpeting and flooring.

Tips for Waste Management & Recycling in green office of Singapore
- All recycling facilities should be placed in area which can be easily seen to all.
- The staff should be encouraged to reuse and recycle waste.
- The staff should be educated as how to distinguish and separate waste through display as graphs, posters and pictures on the office wall or notice board. They can also be notified or informed through e-mails.
- The contractor who is in charge of recycling should check and specify on what categories/kinds of plastic can be used for re-cycling.

Water Conservation tips in green office of Singapore

The following gives the guidelines for water conservation:
- Posters and stickers should be pasted in the pantry and toilets as a reminder to the staff on saving water;
- Talks, seminar and field trips should be organized in order to create awareness to the staff about the necessities of conservation of water.

There should be water saving faucets in toilets and pantries;
- If there is any water leakage, it should be immediately informed to the responsible person of the office.

Energy Conservation tips in green office of Singapore

The following gives the guidelines to conserve energy in Singapore as:
- All lights and electronic equipment should be switched off when not in use such as going out for lunch break, after office timing, holidays, weekends etc.
- Features which enable to save energy should be selected for all electrical equipment.
- The computer should be switched to sleep mode if it is inactive for more than ten minutes instead of switching to screen saving mode.
- Energy saving monitor screen should be used in the office.

- Cost effective multi-purpose machine designed to the needs of offices should be used for photocopying or printing.
- Outside doors and windows should be checked for any hole in order to stop cool air from escaping.
- Compare and make optional for lower energy consumption when purchasing,
- Use of natural lighting should be maximized if there is availability and possibility.
- Adjustable switches which can be changed to dim light should be installed in the office.
- Meeting rooms and toilets should have sensors of occupancy.
- Lighting reflectors should be used in the office to increase the intensity of brightness with less energy consumption.
- Regular maintenance and annual servicing of the air conditioning system helps to ensure maximum energy efficiency and performance.

Organizational Awareness in the green office of Singapore

- Commitment Guidelines.

In order to have commitment in the office, a green committee should be set up to make all colleagues involved together in the implementation of environmental decision. Along with the management support for the onward journey of green office, it is important to give staff encouragement, training and awareness through meeting, seminar and other group activities. This will provide an opportunity to increase the bondage among the office staff. In addition, an environmental auditing is necessary for determining the deficit area or issue to be focused.

- Forms of Communication guidelines in the green office of Singapore.

Electronic methods of communication such as e mails, online chat, video chat etc. should be encouraged. If using faxes, paper faxes should be replaced by computer linked faxes.

- Reference Material.

An electronic database, containing record of documents and reference which is easily assessable to staff should be maintained. In order to reduce waste disposal, staffs should be encouraged to use their own cups, plates and re-useable bags.

- Green Transport guidelines in the green office of Singapore.

Office staffs should be encouraged to use public transportation or bicycle when they go out for lunch or other places at work. They should have flexible working hours so as to avoid the peak hour and encourage them to use public transport or cycle to work.

Purchasing & Operation system in green office of Singapore

- Procurement.

Accredited environmental level which indicate that the product has reduced environmental impact compared to other products should be used in the green office. Papers which uses less pulp in production process and which are recyclable should be used in green office. Used office furniture and other equipment which are no longer used should be donated or sell out to second hand buyers. Re-useable towels should be used in the store room or pantry. Purchasing office food items such as milk, coffee powder or sugar should be bought in bulk rather than individual packaged item. Lastly, re-useable shopping bags made from clothes should be purchased for office supplies.

- Printing guidelines in the green office of Singapore.

In order to save paper and ink consumption, printing option should be adjusted to grayscale. Another important guideline is to get accustomed with the use on multi -purpose copier, such as the printing area adjustment, printing double sided and reduction in paper margins. To reduce consumption of printing material, paperless culture should be encouraged such as making online reports, sending file electronically through e-mail. Before printing out a draft document, the documents should be re-checked and edited on the screen so as to avoid useless consumption of papers. A tray to collect one sided used paper should be placed near the printer and the office staff should be encouraged to nurture the habit of re- using one sided paper before sending it to the recycle bin. If the printer or fax machine is to be moved, the cartridges should be removed in order to prevent the toner powder or ink from spilling and thereby spoiling the internal mechanism of the printer.

Hong Kong

Related Organization in Hong Kong are the Government of the Hong Kong Special Administrative Region and Environmental Protection Department [15].

The Green Office Objectives of Hong Kong

- Business & Environmental Protection
- Energy Efficiency & Conservation
- Environmental Assessment & Planning
- Global Environment
- Nature Conservation
- Noise reduction
- Sustainable Development
- Waste & Recycling
- Water saving

The Eco-Office Tips in Hong Kong

The following is the eco office tips in Hong Kong.

Waste Reduction tips in Hong Kong Green Office

The following points explain the waste reduction tips as:

Paper Saving Tips in Hong Kong office

The following instructions are the instructions that should be followed in green office in Hong Kong. The paper consumption can be reduced through innovation and use of computer technology such as using electronic mail instead of using printed paper, printing both sides of the paper and printing when required, recollecting one sided used paper by collecting it in

a tray and recycling both sided used papers. The setting of the printer and printing task should be adjusted so that it is economical and thus save unnecessary consumption of paper. In addition, the staff should be trained and encouraged to reuse stationery items as used envelope or folder. Instead of sending paper cards, e-cards should be sent.

Waste Electrical and Electronic Equipment (WEEE) usage

Waste electrical and electronic equipment should be donated to charity organizations or send them to recyclers for processing.

Promoting a "food wise" culture in the office of Hong Kong

For promoting a food wise culture, only sufficient quantity should be selected to avoid left over or wastage. If have leftovers, it can be packed and taken at home or give to someone. Use of disposable cutlery and utensils should be avoided.

Clean Recycling

The following give the step wise instruction for re cycling as: While installing recycling bins, it should be categorized to collect items that are recyclables as waste paper, glass bottles, plastics, batteries etc. To inform the staff of clean recycling, there should be display, notice or poster in the office. Hazardous recyclable items as fluorescent lamps should be disposed - off with care by wrapping them up properly.

Energy Saving

Here are some of the energy saving measures in the green office of Hong Kong. The electrical appliances should be turned off when not in use. In order to save energy even in summer time, the average indoor temperature of air conditioner should be set at 24 o to 26o Celsius. Thermometers should be installed in different area of the office to check the current temperature and at the same time, encouraging the staff to use staircase in place of elevator. Light bulbs which save energy should be used in lighting the room. In addition, the computer should be set at energy saving mode along with the regular auditing of energy consumption by the management department of the concerned office.

Indoor Air Quality (IAQ)

[16] There should be adequate air ventilation in the room. The room air ventilation system should be regularly checked for any blockade or presence of dust particles in the air filter. Used food products should be disposed-off properly to prevent unpleasant odor. If there is any problem in the office building such as leakage of water, it should be reported immediately to the concerned manager to repair it and check the indoor air quality before it causes the growth of micro-organism that affects the environmental hygiene. Lastly, aerosol products which contaminates air quality such as air freshener, pesticide should be avoided.

Green Procurement

While purchasing stationery items as paper, ball pens, pencils, ink etc. certified green label products which can be recycled should be selected. At the same time, while purchasing of office equipment as photo copier and printer, care should be taken to select those which are labelled as energy efficient along with the selection of office furniture which are recyclable.

Others

Beside this, a Green Manager should be appointed responsible for the implementation and promotion of green practices. For cleaning of the room accessories as carpets, only environmentally friendly products should be used. Finally, training program and workshop should be organized from time to time to provide knowledge on green office maintenance.

United Kingdom, UK (England)

Related Organization in United Kingdom (UK) is the British Assessment Bureau. There are many easy steps created for making the working environment to be congenial and that helps the staffs to promote greener office.

The Eco-Office tips in United Kingdom, UK (England)

The eco office tips in UK are; firstly, to get everyone in an office to be involved in the office affairs through regular meeting and communication with the office staff members. The objectives of communication is to encourage and make the staff to be aware as how to save the environment in the daily office practices; secondly, it is the creation of an environmentally action plan by designating responsibilities between team members; thirdly eco office tip in UK is the realization of the concept of reuse and recycle in the office affairs, such as using both sides of the paper for printing, buying office stationery items which are labelled as green and recyclable; fourthly, the reduction on the use of stationery and equipment, that is, to encourage staff to share together office equipment and other stationeries, to print double sided paper etc.; fifthly, it is related to the use of office infrastructure such as using water wisely for making tea, coffee, installing water saving toilet flushing devices etc.; sixthly, it is related to reduction on electricity consumption and expenditure, by switching on light only when it is needed, encouraging staffs to turn the monitor to sleeping mode when they were away from the desks, Seventhly, the reduction in expenses of unnecessary travels such as car share, using public transport, cycling, walking etc. for commuting to work. Along with this is the availability of the option of using video conferencing technology instead of travelling by car or train for attending offsite meeting; lastly, selecting eco office suppliers and products for office uses will help to control the carbon footprint and its environmental impact [17].

Finland

Related Organization in Finland with regard to green office is WWF Finland (World Wide Fund for Nature Finland).

The Green Office Objectives in Finland

Following are the green office objectives in Finland as reduction in the consumption of natural resources, awareness to mitigate climate change and promotion of a sustainable lifestyle. Lastly, its aim is to help environmental management system by reducing the environmental effects of offices.

The Eco-office topics in Finland

- Energy
- Transportation
- Procurement
- Food
- Waste and Recycling
- Water
- Biodiversity
- People

Green Office Tools in Finland

The Green Office Tools in Finland consist of three things as compass, climate calculator and consumer habit questionnaire [3]. The function of compass is to provide information of green office and its network, while the function of climate calculator is to calculate emissions. Lastly, the administration of consumer habit questionnaire will help to evaluate environmental awareness of employees, green offices and overall result summary.

The Green Office Criteria in Finland

The green office in Finland has the following criteria: firstly, it is the selection of green office coordinator to work with its team, secondly, it is the planning procedure of environmental program; thirdly, it is improvement of energy efficiency in a continuous process so as to solve the problem associated with greenhouse gas emission; fourthly, it is the reduction of waste and classifying waste into recyclable and non-recyclable in accordance to law and local requirements; fifthly, it is the priority of giving green issues at the time of procurement, sixthly, it is education and information of office personnel about green office practices; sixthly, it is the instillation or education to the staff for aspiring them for a continuous innovation and improvement in matters of the environment; seventhly, it relates to updating annual environmental program; lastly, it is choosing appropriate indicators for setting numeric objectives and to monitor as how the objectives can be fulfilled.

United States of America (USA)

Related Organizations in United States of America are the US Department of Energy and the Green America (National not-for-profit Co-op America). According to a report made in 2001 by the US Department of Energy, certain factors as equipment and appliances used in the office are responsible for increasing energy consumption both at home and in the office [18].

The Green Office Objectives in USA

Followings are the green office objectives as to

- Reduce Energy Use
- Eliminate Wastes

Reduce Energy Use

The followings are the instructions to be maintained in the green office of USA for energy use as buying office equipment and accessories which are labelled as "Energy Star" because 'Energy star' is a model program managed by the Environmental Protection Agency, (EPA), which indicates that it uses less energy than others, which are standard models. In addition, products that are labelled as "Energy Stars" means it have eco- friendly features, such as innovative printers which enable to print on both sides or a fax machine which can scan and send double side. Thus, an office using Energy Star equipment in the office as computer, monitor, printer, fax and other accessories saves power consumption expenditures. Similarly, to be eco-efficiency, lighting system which consumes less energy should be used. This should be added by reduction in power consumption by switching off unnecessary light or power in the office when not in use such as setting the office desktop monitor to sleep mode when away from the desk. Along with this is offsetting carbon dioxide emissions because of business travel by joining a "green tags" program. This program is made for generating renewable energy facilities that brings benefits to the environment by means of green power generation. In addition, minimizing business travel by using green business travel, or green office's daily travel as bicycling or telecommunication tools, public transportation in place of private conveyance saves a lot of energy.

Eliminate Waste

The recycling initiatives in the green offices in USA are as:

Buy recycled: To use the paper made from recycled post-consumer and also use envelops, calendars, planners and stationery made from recycled paper. Remanufactured ink and laser toner for printers and fax machines can also save the money and at the same time save the Earth. Waste loop should be closed by turning in old toner cartridge for recycling. To reduce paper consumption, there needs changes in the habit of the staffs in using office equipment such as setting the printer to print the documents on both sides, adjusting the length and margin to be printed, using smaller fonts to capacitate more texts on a single page, editing documents on screen before printing out to save paper for draft copies and circulation of mail, memo, report etc. electronically. In addition, selection of a responsible union printer, that can use recycled paper and vegetable-based inks and reusing or donating surplus or obsolete office infrastructure or equipment, saves a lot and this brings tremendous benefits to the environment. Finally, there should be a program of waste management auditing to help to find out the strategies, output and elimination of an office municipal waste in the form of a written waste report, thereby enhancing to track the office's success at reducing waste.

Thailand

Table 1. Summary and conclusions (similarities and differences among countries)

	SP	HK	EN	F	USA	TH
Organization Awareness	X					X
Energy and Resources	X	X	X	X	X	X
Waste and Wastewater Management	X	X	X	X	X	X
Indoor & Outdoor Environmental	X	X				X
Green Procurement	X	X	X	X		X
Continual Improvement						X
Staff communication/ Participation			X	X		X
Transportation			X	X		X

Note: SP is Singapore, HK is Hong Kong, EN is England, F is Finland, USA is the united state of America, and TH is Thailand.

Related Organizations in Thailand are Ministry of Natural Resources and Environment, Department of Environmental Quality Promotion (DEQP) and Pollution Control Department. Green Office in Thailand refers to the office or activities in the organization by using resources efficiently for a green environment and reduction in carbon emission [19].

The Green Office Objectives in Thailand

The green office of Thailand has the following objectives as:

- To bring or apply the Green Office principles in organization and offices for reducing resources used and being green.
- To promote to reuse and recycle in the office for reducing office expenses
- To reduce the emission released by activities in the offices.

The Green Office Management Topic in Thailand

- Organization Management
- Organization Awareness
- Energy and Resource
- Waste and wastewater Management
- Indoor & Outdoor Environmental
- Green Procurement
- Continual Improvement [20]

5. Conclusion

From the table 1, it can be seen that the first 3 major concerns in Green offices among the countries are Energy & Resources, Waste & Wastewater Management and Green Procurement. Thailand and Singapore are the only countries having focus on organization management. Thailand is the only country which practices all the mentioned variables as organization management, energy and resources waste and wastewater management, indoor and outdoor environmental, green procurement, continual improvement, staff communication/participation and transportation.

From the review of the above mentioned countries and their green offices, it can be concluded that the main goal of the green office management system is to apply the Green Office principles in organization and offices so as to reduce the consumption of natural resources by improving offices' environmental efficiency. It can be concluded that green office in the work places can be promoted through behavioral changes and efficient management practices in order to combat climate change through energy efficiency and the renewables, reduce natural resource use, and promote sustainable lifestyles through enhanced employee awareness.

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Indicators of active ageing for sustainable development: A comparative insights of ageing elderlies from Chiang Mai (highland) and Nakhon Pathom (lowland) Provinces, Thailand

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Abstract

There is a growing importance in the research of longevity, active ageing and its indicators as ageing has profound social and economic consequences in the 21st century with implications for nearly all sectors of society. As active ageing is a global goal in today's ageing world for meeting the challenges of older people and for improving their quality of life, it is important to understand the indicators of active ageing for developing policies and programs focused on active ageing in an ageing society like Thailand. This article aims to provide comparative insights of the important indicators of active ageing in the two provinces.

The data was collected through in-depth semi-structured interviews, including 6 participants from Chiang Mai and 6 from Nakhon Pathom, based on convenience and purposive sampling method.

The findings provide insights of the important indicators as family or neighborly support, community participation, health care improvement and social security to improve the well-being of elderly and concluded with the need of innovative policies and public services specifically targeted to elderlies' active ageing indicators, including those addressing, health care, social security, family support, social participation, activities and social protection for the ageing elderly.

Keywords: Active ageing, indicators, longevity, well-being of elderly
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1. Introduction

The proportion of ageing population is increasingly increased in the recent decades due to the significant advancement of medical science and technology, which enable to improve health, decreasing mortality, greater longevity and declining fertility [1 – 4]. As a result, the global share of older or ageing people (aged 60 years or over) is expected to be increased more in the next few decades, from 841 million people in 2013 to more than 2 billion in 2050 and by 2060, the elderly population will grow from 17.4% to nearly 30% worldwide [5]. This pattern is expected to continue over the next few decades with many important socio-economic and health consequences, including the increase in the old-age dependency ratio [6]. Therefore, ageing of population is expected to be among the most prominent global demographic trends of the 21st century.

There has been a both global and local promotion of the term 'active ageing' in order to develop policies related to the ageing population [7]. Active ageing for sustainability is concerned with promoting rights of older people to be healthy, so as to reduce the costs of health and social care, providing longer employment to reduce pension costs, along with active participation in social and community activities. However, the concept of active ageing lacks uniformity [8]. This lack of uniformity makes difficult in developing and comparing policy implementation, both internationally and nationally [9]. The current article used WHO definition of active ageing as "continuing participation in social, economic, cultural, spiritual and civic affairs, not just the ability to be physically active or to participate in the labor force" [10] (p. 12). This definition stresses elderlies to remain active which needs promotion of health, social participation and providence of social security.

It is important to study active ageing indicators

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as longevity has profound social and economic consequences in the 21st century with implications for nearly all sectors of society. The 2030 Agenda for Sustainable Development aims to achieve sustainable development in a balanced manner, including human rights of all people for all segments of society, at all ages, with a particular focus on the most vulnerable—including older persons [11]. For achieving this sustainable goal, the first and foremost indicator is to give increasing priority to promoting the well-being of the growing number and proportion of older persons in most countries of the world and stresses the importance of considering ageing elderlies as the active agents of societal development in order to achieve truly transformative, inclusive and sustainable development outcomes [12]. The study is carried out with the following objectives:
- to find the indicators of active ageing from socio demographic characteristic, social participation, health improvement and available social security for the ageing elderly
- to compare between the two Thai provinces in order to evaluate, monitor and recommend directions for policy making on active ageing, health and longevity of the older people
- to develop the indicators of active ageing of the elderly through grounded theory from the result of the study The article is organized into the following parts as: Introduction, Literature Review, Methods, Results and Discussion and lastly, Summary, Conclusion and Recommendations.

2. Literature Review

Zaidi [13] had mentioned the following important points for active ageing: 1).As active ageing indicators do not capture fully the rights of older people – additional rights with specific indicators are essential. 2). The Active Ageing Index (AAI) can offer a framework (methodology) for the baseline assessment and monitoring of rights of older people. In addition, he stated the key feature of active ageing index as: contributions of older people and identify their potential; evaluate and monitor progress, and engage policy makers for mutual learning. He highlighted the important indicators and their relationships as: age discrimination and low employment, healthcare services and independent living, social protection and secured living. Similarly, Douglas et al [14] investigated the importance of the indicator of social participation in the life of older people and also to provide information to health services the importance of social participation as an indicator of successful aging. The study aimed to find the association between social participation and health in adults aged 65 years and older, using three concepts of social participation as: social connections, informal social participation and volunteering and discovered that all the three concepts have demonstrated associations with health indicators and also revealed that social participation at baseline is positively associated with mental and physical health. Finally, the study concluded that by using social participation indicator, researchers of health services can discover the relative effect of each form of participation on the health of older adults. This was supported by other studies too in Australia [15, 16].

There were many studies in Thailand that focus mainly to estimate and identify active ageing attributes among ageing population in Thailand using three dimensions: health, community participation and security in relation to socio demographic characteristics [17 – 22]. These studies identified some indicators of active ageing as: being self- reliant, being actively engaged with society such as social participation and social contribution; growing spirituality; maintaining healthy lifestyle; being active learners; and managing later life security and also reported the need to study variation of active ageing in different regions of Thailand. The studies concluded that active ageing level of elderly is yet to be improved in Thailand as it is far behind the sustainable goal and pointed out the needs to consider the intervention measures for the welfare of the elderly with a focus to improve health needs, economic security, to promote longer working lives, to arrange lifelong learning program, and to improve economic conditions for increasing their active ageing level along with active participation of community activities among the elderly in both formal and informal social activities such as engaging in religious activities or meditation as important indicators [23 – 25]. [26] further reported that the number of ageing populations is growing everywhere including Thailand due to improvement in health facilities, medical technologies, services and sanitation. And these cause a number of challenges such as rising demand for health services, growing requirements for long-term care, declining family support, and increasing needs of income and social security. To solve this problem is the question for policymakers and social security administrators for its ageing society. In addition, recent social and economic developments in Thailand have resulted in increasing migration from rural villages to urban centers. This has led to varying living arrangements for older people such as skipped generation household, three generation household and older people living alone This instigated [27] to conduct a study in Kanchanaburi Province, Thailand with aims to identify the associations between the living arrangements of elderlies and their psychological well-being and indicated that older couple households experience higher psychological well-being in skipped generation households where grandparents raise children and parents are absent from the household, than those in three generation households. The study also brings the importance of social and cultural factors related to elderlies' psychological well-being. Recent study made by

Figure 1: Indicators of active ageing in Thailand (grounded theory)

[28] examined the relationship between social isolation, loneliness, health, social care and longevity of the ageing elderly in order to find out the factors, impact and the different kinds of approaches, care or interventions to reduce the negative impact of ageing. [29] have also reviewed previous studies on the indicators of active ageing studies in Thailand. These studies focused mainly to estimate and identify active ageing attributes among ageing population in Thailand using three dimensions: health, community participation and security in relation to socio demographic characteristics. The review highlighted importance of inclusion of ageing elders as their participation are important for achieving societal development goals so as to bring a thoroughly inclusive, transformative and sustainable development outcomes.

3. Method

3.1. Grounded theory

The study used grounded theory research design developed from in - depth qualitative case study research method to facilitate the generation of research objectives and process. Grounded theory is a general research methodology leading to the development of theory inductively from the analysis of the collected data [30]. The grounded theory that emerges from the analysis of the collected data in this study is given in Figure 1.

3.2. Universe and sampling

The study was conducted in Chiang Mai and Nakhon Pathom Provinces of Thailand. The city or province of the sample study was Ban Pang Bong and Ban Pok Villages in Chiang Mai and Salaya Village and Salaya Hospital in Nakhon Pathom, selected according to convenience of the researchers. There were 12 participants (6 men and 6 women), 80 years and above, consisting of 6 participants from Chiang Mai and 6 from Nakhon Pathom as given in Table 1 and Table 2. Gender consideration was taken into account in the selection comprising of 3 men and 3 women from each province. Purposive sampling was used for selecting the sample of convenience, with due consideration as the most productive sample to obtain the research objectives [31].

3.3. Data collection

Data collection took place in Chiang Mai Province from Ban Pang Bong and Ban Pok Villages in the beginning of 2019 and Nakhon Pathom Province from Salaya Village and Salaya Hospital in 2018 through semi-structured interviews because they allowed the participants to elaborate the responses with more flexibility and this help to elicit more information from the participants [32]. The participants to interview was selected through snow ball technique recommended by key knowledgeable personnel from local Municipality or ageing care centers in the selected provinces, on the basis of being able to provide informative answer relating to the theme of the research. In - depth interviewing processes were conducted in a private room of local ageing care centers, hospital, at the residence of the respondents and at a place according to their convenience on a particular appointment date, time and place. Even though, the interviews were semi-structured, they were conducted with a focus on a previously circulated list of key interview topics and questions drawn from the review of existing literature. This methodology was based on that described by [33] having some topics of discussion in mind rather than a fixed list of interview questions. Each participant was asked to provide a written informed consent for the study (including audio-taping, video recording and transcription of the interviews) prior to participation. The interviews conducted lasted between forty-five minutes and sixty minutes each. Data were recorded using a mobile phone device and transcripts were made. Additional information and informal discussions were also noted in a diary.

3.4. Data analysis

The collected data from the voice recording along with field notes was transcribed. When it was fully transcribed, the data was then coded, themes and sub-theme identified. The codes are keywords, phrases or sentences that represents data which are used to categorize or organize text and are considered as an essential part of qualitative research [34]. Codes found to be conceptually similar or related in meaning were grouped into sub-themes. Sub-themes were then grouped together into broad themes. The data were analyzed in this way and then interpreted accordingly. Constant comparison between one participant to another as well as between the two groups from Chiang Mai and Nakhon Pathom was done.

Table 1. Distribution of participants from Chiang Mai by gender, age, marital status, family size and past occupation

Participants	Gender	Age in years	Marital status	Family size	Past occupation
1	man	90	Remarried widower	5	Farmer
2	man	87	widower	2	Farmer
3	man	80	married	4	Farmer
4	woman	81	widowed	5	Farmer
5	woman	90	widowed	2	Farmer
6	woman	87	married	3	Wage laborer

Table 2. Distribution of participants from Nakhon Pathom by gender, age, marital status, family size and past occupation

Participants	Gender	Age in years	Marital status	Family size	Past occupation
1	man	86	widower	5	Farmer
2	man	81	Remarried	5	Manual worker
3	man	85	married	6	gardener
4	woman	84	Separated	7	Selling business
5	woman	90	widowed	4	Farmer
6	woman	81	widowed	2	Selling business

4. Results

Participant 1

Mr. L. R. is 86 years old man, widower and disabled, living in Salaya, Nakhon Pathom, Thailand. His past occupation was farmer and gardener. But, currently, he is retired and unable to work or walk as he is crippled after an accident. He comes from a joint family with two brothers and sisters under the care of his parents. His parents too were farmers by occupation. After he got married, he separated from his parents and lived with his wife in a nuclear household in Salaya, Nakhon Pathom. He has a son and a daughter. After the death of his wife, he went to live in the house of his daughter, who is a working woman, to take care of her family. She leaves her father alone during day time as she has to go to work but at night time after she comes back from work, she takes care of him. One day, when he was staying alone, he goes to the bathroom and accidentally he fell down on the slippery bathroom. He was taken to the hospital by his daughter. But it was found that his hip was fractured and since then could not recover or able to walk. His grandson, too lives in the same village of Salaya. Since then, he is living in the house owned by his grandson, who does business of selling groceries at home.

Participant 2

Mr. P. M. is 81 years old man living in Salaya, Thailand. His occupation was collecting firewood from nearby village and selling it. He was gardener and farmer too. He has one son and one daughter from his old wife. He and his old wife were divorced about 20 years back. His hometown was in Singburi Province. He remarried another woman after separating from his old wife and currently living in a joint family with his new wife in the house owned by his sister-in-law (elder sister of his new wife) in Salaya. His new wife has a daughter from her former husband and so there are five persons living together in the family as: he, his new wife, sister-in law, step-daughter and grand - daughter. His children were already married and established nuclear household with their families. As he is an intra- city immigrant, he is new to Salaya and does not have many friends there.

Participant 3

Mr. S. P. is 85 years old man from Salaya, Thailand. His home town is Salaya itself and worked as a farmer planting bananas, vegetables, seasonal fruits and reared fish in household pond. Their only source of income was from selling the harvested products from their farms. His wife was housewife but she helped him in economic expenses by selling local snacks made from sticky rice and banana. He comes from a joint family, consisting of 6 persons. He is happy and contented since all the family are living together in the joint household in Salaya. As he was very active when he was young, he does not have many health problems even though old, but gets tired fast, as he has hypertension. He has no fears as he has a dog, which always barks whenever any stranger enters the house. In addition, he has a daughter who runs a business of selling cooked food at home and also have good and friendly relationship with his neighbors. He owns a mobile phone too, for communication with friends and relatives.

Participant 4

Ms. C. T. is 84 years old woman from Salaya Village. She has a daughter from her marriage and ran a grocery shop attached to her house. She was separated from her husband when her daughter was only 8 years old because she could not get along with her husband due to many differences. The income from her selling business was the only source of income for running

her household. She brought up her daughter single-handedly after she lived a separate life away from her husband. Her husband remarried another woman and established a new family. Her husband did not send any allowance for the upbringing of his daughter and since then lost contact of each other. So, all the responsibility for the education and upbringing of her daughter fell on her shoulder. She was a strong single mother and by dint of her grocery business, she provided education to her daughter till the Bachelor Level. The house where she is living currently is her own house. She inherited from her parents because she is the youngest daughter of her parents. She lives with her daughter, her son-in-law, grand – sons, and sons of her grand-son. Currently, her occupation is babysitter of her great grand-son. The parents of the children gave her some salary for taking care of the young babies and children while they go for work. So, her current income for her living is the income from her grocery shop and baby -sitting.

Participant 5

Ms. B. C. is 90 years old woman, farmer and divorced, living at Salaya Village, Thailand. There are 7 family members in her family. She and her husband were separated many years ago when her children were young. Her husband has another wife and family and never comes back to look after her or her children. She brought up her children as a single mother and at the same time provided them education. Her children establish themselves in the course of time, having jobs, income and family.

Participant 6

Ms. T. K. is 81 years old widow from Salaya Village. She and her husband have five children. Their past occupation was banana and other seasonal vegetable plantation in their household farm. She comes from a big joint family. Currently, she sells roasted bananas with sticky rice (khao-tom-mud), which is a sweet dish of the Thai people. Till the time of interview, she is economically independent even though she is 80 years old. She lives with her youngest son at his house in Salaya Village. The other children are married and lives in separate households at a distance from Salaya.

Participant 7

Mr. J. K. is 90 years old man farmer, widower but remarried from Ban Pang Bong village in Chiang Mai Province, Thailand. His old wife died due to heart failure some years back. He has 8 children from his old wife. Now, all his sons and daughters are grown up and married. After remarriage with his new wife, who is a farmer in Chiang Mai, he lives in her wife's house. Currently, he stays at home and is occupied in home-based job with specification and labelling of coffee bean, which he gets 5 Baht per kilo. It provides him some income and at the same time kills time and does not feel lonely. He gets an income of about 5000-10,000 Baht/month from doing this job. He also has his own plot of land too and looks after his tea farm business.

Participant 8

Mr. S. K. is 87 years old man from Chiang Mai. He is Buddhist by religion and remarried thrice by marital status. His first wife died due to arthritis while the second due to heart failure while sleeping. He has 4 children, 3 are from his first wife while 1 is from his youngest wife. He, currently, stays together with his youngest son after his new wife, too, died 2 years ago. His occupation is a farmer in his own farm. He takes care of himself if his goes out somewhere. Sometimes his neighbor helps him if he needs anything. His other sons and daughters are working in other provinces of Chiang Mai. They usually send him about 2000 Baht/year.

Participant 9

Mr. K. P. is 80 years old man whose occupation is coffee farming in Chiang Mai village. He has only one son whose occupation is a coffee farmer. His wife, too, is a farmer but retired due to poor health as she suffers from asthma, diabetes and arthritis. His family is composed of 5 persons, but currently 4 persons are staying together because his daughter is studying at Rajabhat University in Chiang Mai city. His son and daughter-in-law live together with him and his wife and they take care of both of them. He discovered that he has lungs problem about a year ago and since then he has been taking medication and remains at home. Due to their health problem, they could not do any housework and their son and daughter-in–law look after them. He has appointment with doctor for health check- up once in a month or once in 3 months. His son takes care of him for going to hospital, which is located at a distant place far from the village.

Participant 10

Mrs. K. K. is 81 years old woman, widowed from Chiang Mai. Her husband died about 6 years ago due to brain hemorrhage while sleeping. He got acute headache for a prolonged period but he never goes to check up in the hospital, assuming it to be a minor issue. Both she and her late husband were farmers, working in their family business of coffee farming. She has a clever pet dog, who is very faithful company to her. After the expiry of her husband, she stays all alone in the house even though she has 4 children, 2 sons and 2 daughters. She has no car or other conveyance but no problem as she is very close with her neighbor. There is no partition wall between her house and neighbor's house. All her children are married and settled with their families in Chiang Mai city while one is working in Bangkok. Her children come to meet her occasionally on festivals as New Year, Thai Songkran Day, Mother's Day etc. However, the one who is working in Bangkok comes only once a year. At times she feels lonely as all her children work in other provinces.

Participant 11

Mrs. T. I. is 90 years old widowed, woman, farmer from Ban Pok village of Chiang Mai. She is widowed living currently along with her younger unmarried son. She has 5 sons but three of them expired long time back. Occupation of her son, too, is a farmer. Her husband died about 26 years ago. The other son lives in Chiang Mai city along with his wife and family. Her daily routine consists of cutting firewood, kitchen gardening, washing clothes and watching TV. Her son provides her money and all her requirements. She hardly participates in social functions except going to temple in her locality during the Thai New year. She does not own any modern gadget as mobile phone for communication with friends, relatives or neighbor. She has two pets, a cat and a dog and she takes care of them such as giving meal to them. She is always worried when her son goes out and have a fear of accident, that he will not come back home, as he usually cooks food for her.

Participant 12

Mrs. K. Y. is 87 years old woman living with her husband and son in Chiang Mai. Her husband's occupation is coffee farmer. He grows coffee in their farm and at the same time earns money as a wage laborer in coffee processing business. She, too, was a coffee farmer but now retired due to poor health. Her son too, is a farmer but is mentally retarded since birth. She has a son and daughter. Daughter works in Chiang Mai city. She, now, is married and stays with her family but she comes to meet her occasionally. However, she communicates with her quite often in mobile phone. Currently, she remains at home most of the time and refrains from socio – religious participation due to her poor health condition. As a result, most of the time, she feels lonely when her son and husband go to work. Sometimes the health care staff comes to see her and take care of her but sometimes she has to go to hospital with her husband. Whenever they go out, they have to hire a driver to drive their car as her husband, too, has difficulties to drive car due to ageing and her son cannot drive. She gets three social securities from government as: Ageing Pension = 800 Baht per month; Disability Pension for her son = 800 Baht/month and, Poor People= 500 Baht/month.

5. Conclusion

Comparing the interview data of the two provinces, it is found that all the participants of both provinces are beneficiaries of old age pensions but the amount varies depending on the family's socio – economic status. Some of them get only 600 baht per month while some get 800 baht per month. In addition, some household get additional allowance, 500 baht for poor people and 800 baht for disability. Even though all the participants get social security, they are not satisfied with the amount and want it to be increased to at least 1000 baht per month. With regard to the availabilities of health care services for ageing elderlies, Nakhon Pathom Province has better facilities than the villages in Chiang Mai Province. There is only a small health center, no hospital in the village and the hospital is located only in the city and the participants find hard to go there with no public conveyance for travelling. Most of the ageing elderlies living in the village of Chiang Mai Province want availability of facilities as: Free Transport, Meditation Center, Exercise Center and Ageing Health Care Center in their village. Another striking difference between Nakhon Pathom and Chiang Mai Provinces, is that most elderlies in Chiang Mai do not feel lonely or isolated as most of their children work in the family farm or in the neighborhood. In addition, they have very close relationship with the neighbors too. So, most of them seem to be happier as they are living in the traditional family system with family members' protection and at the same time in close relation with neighbor. However, in Nakhon Pathom Province, some of them who live alone feel lonely and isolated and they try to cope the monotony of ageing life through meditation or social engagements.

From the analysis of the interview data, it is found that making the elders engaged in some daily activities, hobbies, social, religious or economic activities make them active and at the same time prevent them from loneliness, depression, sadness or isolation. It is risky to leave ageing elderlies alone at home as they may have accident when they are alone and are prone to be depressed, lonely and isolated. Most ageing elderlies like to participate in socio – religious activities as they are social being, but refrain due to their health weakness, lack of companionship, family escort and conveyances for travelling. This causes many elderlies when affected by chronic disease or disability to have depression due to their inability to participate in social activities. Therefore, abilities for attending socio – religious function depend on socio-demographic characteristics. Healthy family or neighbor's support are essential due to the fragile health condition of most ageing elders. For healthy ageing, it is important to have healthy family environment, to enable the elders to eat, rest and sleep well, to have recreation and to provide friendship. It is also necessary to make the ageing elderlies to have someone to talk to, to be with family, friends, neighbors, having a mobile phone to communicate with families or friends, having a pet to make them busy are some variables in order to make them active. The overall results and discussion led to the research objectives of developing the important indicators of active ageing for sustainable development in Thailand. It can be concluded at the end that good health, family support, engagement in hobbies, adequate social security, health care, and participation in social activities are important indicators for active ageing. As populations become increasingly aged, it is more important than ever that governments design in-

novative policies and public services specifically targeted to elderlies' active ageing indicators, including those addressing, health care, employment, strengthening the family relationship, activities, infrastructure and social protection for bringing sustainable development.

The study recommended that elderlies suffering from chronic illness, social isolation and disability need special attention and may benefit from interventions which promote health and social interactions. There should also be intervening measure to strengthen traditional family ties or relationships. Increase in life longevity is not only a victory for medical science but also a huge challenge for society. It is therefore important to be prepared to address the needs of the ageing elderlies at the familial, social, environment, province and community level. Even though health care, social and economic policies for ageing persons vary substantially from country to country, province to province, or from region to region, more research analysis of these variations as well as formulation of effective social care and policies may assist in improving the over-all well-being of the ageing elderlies.

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No-fault patient compensation for medical malpractice in Thailand: option or not?

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Abstract

Thailand and its ASEAN partners, like many countries, employ strategies to provide quality care. They also face challenges from unsafe and negligent care, which may create transactions costs for their healthcare (e.g. defensive medicine) and legal systems (e.g. claims, litigation, and payouts). Like many countries, Thailand adopts traditional and/or nontraditional (e.g. no-fault patient compensation system (NFPCS)) tort reforms to limit these costs. Attempts to enact NFPCS usually fail. Thailand failed to enact a NFPCS through its Law on Health Service Affected Person Protection in 2007. To learn why NFPCS adoption efforts fail, the authors conducted a modified scoping review of the literature employing electronic, English keyword-based Arksey and O'Malley and PICOTS search of public (Google, Google Scholar, EBSCO, and Medline) and private (Lexis) databases. Review yielded 105 reviewable NFPCS publications, which revealed 9 countries and 2 U.S states (Florida and Virginia) adopted general (N = 6) or limited (N = 5) NFPCS schemes. After 2000, 5 countries (Canada, England, Ireland, Scotland, and Thailand) and 6 US States (Georgia, Maine, Maryland, Montana, New Hampshire, and Tennessee) attempted and failed. Conditions (e.g. reasons or factors) favoring or disfavoring adoption) included concerns for: (1) fairness of compensation amounts versus judicial awards, (2) excessive NFPCS costs, (3) system-based tort reform preferences, and (4) professional (medical and legal) association resistances. In conclusion, a minority of countries and US states currently maintain successful NFPCSs. NFPCS adoption remains a challenge worldwide, especially if the medical and legal professions oppose adoption.

Keywords: No-fault, medical malpractice

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1. Introduction

Medical malpractice (Med Mal) originates from the Latin words 'mala praxis' coined by the English jurist Lord Blackstone in 1765. In general, the term refers to the careless delivery of substandard medical care that harms a patient. [1 — 3] Both common (e.g. torts) and civil (e.g. law of delict or wrongful acts) law-based legal systems maintain a civil cause of action for victims of Med Mal. Arising during antiquity, Med Mal remains a worldwide problem that results from unsafe medical care. Unsafe medical and Med Mal are global problems, and ASEAN countries, such as Thailand, Singapore, Philippines, Malaysia, Indonesia, and Viet Nam also report similar problems. [4 — 8] Unsafe medical care may arise from adverse events or medical errors, and both contribute to global patient morbidity and mortality. [9, 10] Fortunately, only a fraction of them involve substandard care that leads to a Med Mal claim. Recent trends, however, suggest the incidence of unsafe medical care and Med Mal claims are rising in many developed and developing or emerging countries, including Thailand.

Countries attempt to lower their incidence of unsafe medical care and Med Mal claims by adopting a variety of strategies ranging from safety measures to legal systems reforms. Med Mal tort reform strategies may be characterized as traditional (e.g. limiting damage awards, time for filing claims, legal fees and expert witnesses) or nontraditional (e.g. establishing ADR programs, expert panels, or no fault patient compensation systems (NFPCS)) tort reforms. These reforms aim to reduce the (1) number of unmeritorious claims, (2) catastrophic payouts, (3) legal and health care costs, and (4) defensive medical practices, [10] Most countries, especially the US, favor traditional reforms over nontraditional tort reforms, especially NFPCSs. [12 – 18] NFPCSs differ from US state-based patient compensation funds (PCFs) enacted by US states (N = 9: Indiana, Kansas, Louisiana, Ne-

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braska, New Mexico, New York, Pennsylvania, South Carolina and Wisconsin), which provide state-based funds to cover judgments against physicians requiring payouts exceeding their Med Mal insurance coverage caps [14] NFPCSs and PCFs also differ from the US federal National Vaccine Injury Compensation Program (VICP), because the VICP is a federally funded no-fault-based program covering individuals injured by a vaccine. [15] While the goals of these systems or programs are to reduce or eliminate legal claims and achieve just compensation for its victims, only 9 countries and 2 US states support general or limited NFPCSs, and recent efforts to enact them fail, where more US states support PCS programs (N = 9) than limited NFPCSs (N = 2).

Like other countries and US states adopting NFPCSs, Thailand began its effort to establish a NFPCS for its public health services section when complaints and claim payouts started trending upwards in 2004. The Legal Office of the National Health Security Office of Thailand saw claims and payouts rise from 99 and 49,141 TB payouts in 2004 to 810 and 102,108 TB payouts in 2009. [19] Its total compensation went from 4,865,000 TB in 2004 to 73,223,000 in 2009, which represents a 281 percent growth over 5 years. Thai policymakers also associated these upward trends with a deterioration in physician-patient relationships and potential for defensive medical practices. [20] Their experiences mirrored those reported in developed countries. [21] Rising claims and payouts also became a potential threat to its efforts to become a regional medical hub.

To address these troubling risks and trends, the National Health Commission of Thailand convened a study committee in 2006 to improve relations among its health services participants by reducing or eliminating these events. Its members responded in 2007 with a Law on Health Service Affected Person Protection (HSAPP) which provided a legal framework for removing fault, liability and litigation for Med Mal for clinic-based services. [22] Drafting of the HSAPP did not lead to passage its in 2007 nor any time thereafter. Lack of passage and adoption by Thailand is unsurprising given several countries and multiple US states experienced similar results. [18, 23] Apparently, success or failure of NFPCS adoption efforts may depend on the presence or absence of a variety of conditions (reasons or factors) within a given country or state. These conditions may also influence key stakeholders within a health care system, such as patients, physicians, attorneys, advocates, and policymakers. Because the HSAPP remains before the Thai Parliament, it may be helpful to review the experiences in other countries and US states to adopt NFPCSs.

To learn why countries and US states pass NFPCS legislation or not, the authors conducted a modified Arksey and O'Malley scoping review of peer and non-peer reviewed literature to identify articles discussing adopted and unadopted no-fault compensation systems. [24 – 26] The authors searched for literature identifying potential conditions (defining condition as a reason or factor) potentially explaining why governments (national or subnational) adopt them or not. While the goal of this study is not to perform a formal cross-country comparative analysis between countries, including Thailand, the authors hope the information learned from the search will assist Thailand with understanding why it may or may not pass its Law on Health Service Affected Person Protection (HSAPP) given existing circumstances.

2. Materials and Methods

2.1. Modified scoping review methodology

This study relies on a literature review performed with a modified Arksey and O'Malley [24], [26] scoping review (deleting steps 1 and 6) combined with a PICOTS framework using a WHO [25] to identify current, relevant and valid secondary authorities on no fault patient compensation systems (NFPCSs). The authors modified the standard scoping methodology by deletions of step 1 (identifying a research question) based on an *a priori* setting of the research question and step 6 (consulting key stakeholders), which was not part of this study. The authors performed steps of (2) locate relevant sources, (3) select articles based on inclusion and exclusion criteria, (4) sort, organize, and study their data or information, and (5) collate, summarize and report data or information enabled investigators to rapidly map the literature for peer and non-peer reviewed literature. [26] Investigators added a PICOTS format utilized by WHO for scoping medical malpractice strategies in obstetrics reported in 2015. [24] The primary elements of PICOTS are: (1) patients, (2) interventions, (3) comparators, (4) outcomes or findings, (5) timing, (6) settings and (7) study design. [24] PICOTS allows for *a priori* inclusion (**Y**es) or exclusion (**N**o) of authorities based on the presence of English-based natural language (keywords, terms, and phrases) comparators in the order of: (1) title and abstract (**Y**) → (2) introduction (**Y**) → (3) body (**Y**) → (4) include and complete scoping steps (4) and (5).

The researcher further modified the above elements to: (1) population (victims participating or potential participating in limited or general NFPCS); (2) intervention (limited and general NFPCSs); (3) comparators (health service or medical service (injuries or deaths), no-fault (no fault, negligence and medical practice verdict) tort reform (traditional or nontraditional reforms: present or absent), NFPCS adoption or not, country, government and law and policy reasons; (4) outcomes (government adopted or not); (5) timing (date span 1990 – 2016), (6) Setting (country) and (7) study design (peer reviewed v. non-peer reviewed). Questions considered during step (3) include whether

or not a (1) comparator is present, (2) publication is relevant (topic and content similar or different from study), (3) publication is valid (source rating) and (4) publication is current or not.

The criteria for (4) currency of a publication on a topic vary (clinic research reviews not current (or stale) if less than 5 years). Currency for this study relies on a range of 26 years (1990-2016), because adoption of these systems is periodic and spans this time range. Limiting publications to less than 5 years could exclude relevant sources of information. If publications (or authorities) were deemed similar or same based on (1) to (3), then the most current publication ($\leq$ 5 years) trumped the less current one ($\geq$ 5 years). A publication greater than 5 years was included based on criteria (1) to (3) if there was a lack of similar or same articles and information or data contained in the stale article related to (1) to (3). If multiple articles contained similar content, then selection precedence defaulted to the timeliness (e.g. most recent publication) of the publication dates.

2.2. English-based keyword selection

A natural language keyword (primary English words, terms, or phrases) search routine served as the primary format for identifying literature for review. Primary keywords included: no fault, patient, compensate, medical, malpractice, victim, injury, death, limit, general, legislation, law and adopt. The initial search began with the keywords: no fault compensation medical malpractice. Different combinations of search terms were tried based on returns and elimination of terms following the modified scoping formats. If a database lacked a natural language format or failed to return items, then the investigators performed Boolean search (N = 0). Searches utilized a browser (Google Chrome™ or Mozilla Firefox®) and a single internet search engine Google™ (e.g. Web, Scholar and News plus News Archives) and Microsoft Bing® per query followed by use of a metasearch engine (DuckDuckGo©; N = 0 attempts), if either single search engine failed to return sources. Sources included legislative commentary; governmental and nongovernmental white papers; peer-reviewed articles; newspapers, scholarly, organizational blogs and proprietary legal database (Lexis Advance®) containing law reviews and journals.

2.3. Resource exclusions

The authors did not conduct a primary search for print media sources, because the goal of the chosen search methodology was rapid identification relevant sources of literature. One potential risk arising from not searching print media is loss of information or data that causes loss of relevant sources. The authors performed print media searches and review only if a source was identified electronically and available only in a print media format. The authors also excluded articles and information on post-fault patient compensation systems (e.g. state-based catastrophic Med Mal insurance) or post-catastrophic judgment insurance schemes, because these mechanisms do not qualify as NFPCSs.

2.4. Descriptive statistical methods

The study relies on a qualitative assessment of information as a form of text mining. The factors sought included: (1) countries adopting v. not adopting, (2) injury compensation scheme (limited: legally defined injury set v. general: any and all injuries) and (3) reason for adopting or not. Because the qualitative nature of the study only descriptive statics applied.

3. Results

3.1. Keyword-source returns

Keyword searching using natural language terms no fault or no-fault followed by inclusion of one or more primary keywords (sec. 2.2) returned 105 articles suitable for review (date ranges: 1990–1999 (N = 6); 2000–2009 (N = 14), and 2010 – 2016 (N = 88), where articles split 49.1% (53/108) peer-reviewed and 50.9% (55/108) non-peer reviewed (Legislative Responses (10); OPEDs (19); White Papers (21), and Book Chapters (5). Publication origins were Australia-New Zealand; Europe and Scandinavia; China, Japan, and ASEAN (Malaysia (N = 2) and Thailand (N = 9; 8%)); and United States (N = 50 or 43.4% NFPCs publications = majority of returns). Thai authors produced 9 documents (English-based) between 2006 and 2016, which coincided with policy discussions on its HSAPP during Parliamentary debates between 2007 and 2016 (English-only).

Based on the review of the literature, no-fault patient compensation systems (NFPCS) for Med Mal victims exist in 10 countries: New Zealand and Japan (Asia-Pacific region), Denmark, Finland, Iceland, Norway and Sweden (Nordic region), France and Belgium (Western Europe) and United States (US state = Virginia and Florida). [18, 23, 25] Of these countries, 6 qualify as general NFPCS (N = 6: New Zealand and Nordic countries (N = 5)) and 4 maintain a limited NFPCS (Fault-based No-Fault Schemes: France and Belgium and Birth-relate neurologic injury programs: Japan and US (Florida and Virginia). Administrative awards keyed on injuries and deaths related to treatment (N = 1), avoidable medical injuries (N = 5), avoidable medical injuries without negligence (N = 2) and birth-related neurologic injuries (N = 2). All schemes rely on the no-fault principle that links activities (driving, working, or health care) to harmful events (accident injuries or deaths). [18]

These schemes differ from legal causes of actions negligence associated with torts delict and wrongful acts. They differ because a harmed party need

not show the harming party owed a duty of care and breached it when he or she caused the injury or harm requiring compensation. [28] Thus, in theory, no-fault systems compensate without invoking blame, shame, fault or culpability often associated with torts and delict litigation. [28 – 33] While no one seems to favor litigation, western countries, such as Canada, England, Scotland (Debating) and Ireland entertained various NFPCS options as replacements for their existing civil Med Mal causes of action but none adopted one. [27, 30, 31] Thailand and 6 US states (Florida (Program Expansion), Georgia, Maine, Maryland, Montana, New Hampshire and Tennessee) also failed to adopt [12, 18 – 20, 22, 33] Based on this review, no country or US state has successfully enacted a general NFPCS similar to the New Zealand or Nordic programs, notwithstanding efforts of France (2002), Belgium (2010), and Japan (2009) to enact limited NFPCSs. [34] While theory says no-fault systems compensate without invoking blame, shame, fault or culpability often associated with torts and delict litigation or wrongful acts, apparently, countries and US states prefer not to adopt them for a variety of reasons. [29 – 32]

Critics of NFPCSs point out that their claim-inquiries often require analysis of causation that invokes culpability and fault. [29] Likewise, authors point out that health care providers worry culpability and fault may also arise when a no-fault claimant complains to a disciplinary authority, which responds with a regulatory-based inquiry into the standard or quality of care delivered by a health care provider subject to a NFPCS claim. NFPCS often require reporting by review panels if they make a determination of substandard care. So, health care providers may see litigation as a way to protect their reputation (e.g. Georgia and Tennessee Medical Associations). [33, 35]

Members in the legal profession also want retention of their negligence-based tort and delict systems, because they believe culpability, liability, and damage awards to punish health care providers for providing substandard care and harming patients. [29] Theoretically, laws in torts, delict and wrongful acts encourage health care providers to deliver safe, quality-based care by punishing unsafe care, compensating victims and deterring others from delivering unsafe, substandard care. [29, 32] Commentators also claim no-fault compensation without corrective justice mechanisms will make health care less safe, notwithstanding their potential to drive up the costs and risks for health care generally. [23] On balance, critics of NFPCSs oppose them because they believe NFPCSs undermine patient health and safety in health care.

To counter these criticisms, NFPCS proponents point out litigation in torts, delict or wrongful acts cannot (1) easily distinguish accidents from negligence, (2) fairly apportion fault-based awards, (3) easily deter substandard care and (4) consistently achieve what patients seek–explanations and prevention. [28] Although reviewed publications favoring NFPCS cited evidence that more claimants had an opportunity to recover in a NFPCS than torts and delict or wrongful acts, they also found general and limited NFPCSs only compensated claimants when they met their administrative claims filing and processing requirements. [30] Thus, NFPCS are not compensation giveaways as demonstrated by claims acceptance and compensation rates ranging from 30 to 60 percent. Even so, there were OPED pieces from physician groups in the US [33, 34, 37, 38] and Thailand [36] opposing NFPCSs, because they believe NFPCSs might unjustly increase the amount of payouts and unfairly require them to pay for injuries and deaths they did not cause.

The same authors also cited data showing NFPCS per-claim payouts were usually lower than tort, delict and wrongful act awards that relied on administrative structures that provided periodic payments (e.g. partial payments as opposed to lump sum tort judgment awards). [18, 37] Not only does the current experience with NFPCSs suggest they address more claims at lower costs, but also they must operate as a business or insurer. So, they must maintain their financial solvency, which requires claims management and actuarial oversight. They frequently draw funds from a variety of sources that may include tax-based general revenues, levies, and investments. [28, 30] Compared to tort, delict and wrongful act laws and litigation, NFPCSs resolve claims for qualifying claimants more rapidly and efficiently, while reducing the hostilities often invoked among the parties to litigation. [18]

Claiming and payouts are minimized by an administrative process designed to receive, process, and compensate claims based on a range of criteria and amounts that range from broad to narrow. [30] Currently, New Zealand supplies the broadest cover while the Nordic countries (Denmark, Finland, Iceland, Norway and Sweden) provide immediate levels of cover, while limited NFPCS in Belgium, France, Japan and US States may cover less based on their coverage criteria. [18, 38 – 41] These coverage criteria and limitations enable them to limit payouts to a specific set of patients and injuries. [27] The current version of the Thai HSAPP may follow a similar course given its application to public health services sector and apportionments of payments. [19, 20]

3.2. Country-based NFPCS: New Zealand (2005)

Currently, New Zealand maintains the oldest, broadest, Crown-supported compensation scheme that began as an accident compensation scheme managed by the Accident Compensation Corporation (ACC) under its Injury Prevention, Rehabilitation and Compensation Act of 2001 (amended 2005). [30, 32] All New Zealanders participate, and its ACC covers accident-related injuries, including treatment, through

general taxation revenues and levies that fund six accounts. Its Treatment Injury Account (TIA) is the smallest and it draws funds from the earner and non-earner accounts, but TIA is growing due to an increase in claiming following reforms of 2005. [30] Its legal and social goals enhance the public good and reinforce its social contract to minimize the impact of personal injuries on society. This translates into citizens forgoing the right to litigate injuries. [32] In 2005, reforms replaced its medical misadventure criteria with coverage of a personal injury related to treatment. This more liberal standard potentially includes all adverse medical events, preventable and unpreventable, but there are exceptions that limit claiming. Public trust in the ACC remains high, but at least one study raises concerns for patient safety and quality after the reforms of 2005. [32] And its policymakers must continue adjusting their system to keep it solvent and safe.

3.3. Country-based NFPCS: Nordic Countries (1975)

Denmark, Finland, Iceland, Norway, and Sweden) are similar to New Zealand in their desire to uphold the rights of patients to compensation by making coverage broad and accessible, promoting positive relations among physicians and patients, and fostering patient safety and quality care while maintaining efficiency. [30] All rely on legislative acts for their operation, and claims do not require proof of fault or Med Mal before compensation. Denmark, Finland and Sweden utilize 'insurance associations' whereas Norway maintains an independent national body to administer compensation.

Nordic countries rely on concepts of avoidable harm or injury to award compensation. Denmark, Finland, Norway and Sweden apply an 'experienced specialist' standard to compensate avoidable injuries occurring under optimal circumstances in the care of the specialist or best provider. Both Finland and Sweden apply a 'retrospectivity rule' that considers options and treatments not taken, while Denmark opts for an 'endurability rule' to compensate injuries going beyond a level of reasonable endurance. All rules compensate injuries ranging from treatment and diagnostic injuries (majority) to unavoidable injuries, with or without special circumstances. [30] But compensation also depends on other factors, and claimants are subject to time limits for filing (3 to 5 years, Max. 10 years). Even these broad criteria result in 30 to 40 percent of claims succeeding. All Nordic systems provide an appellate process for denials and claimants retain the right to file a tort-based claim in Denmark, Finland, Norway and Sweden. Even so, very few claims go to court or appeal, and if claimants do, they rarely succeed. Both physicians and patients express satisfaction with their systems. Thus, the Nordic experience serves as a counter to physicians who criticize NFPCSs.

3.4. Country-based NFPCS: France (2002) and Belgium (2010)

France and Belgium maintain statutorily based NFPCS, but their administrative procedures cover a limited set of injured patients. [38] Unlike most general and limited NFPCSs, they do not exclude fault or negligence from their assessment criteria and awards. In 2002, France reformed its Med Mal compensation scheme to address an insurance crisis by instituting its fault-based version of a NFPCS. [39] The crisis arose from courts awarding more claims with higher payouts causing instability in their insurance market. Its goals were (1) compensating its most injured victims through a no-fault system funded by its the Assurance-Maladie (Health Insurance System), the pillar of the French Welfare State, (2) maintaining the standard rules of fault to punish negligent, substandard care and (3) instituting an out-of-court settlement program to offer resolution without litigating. Overall, reformation was a way to (1) reduce court proceedings against its health care providers, (2) speedup compensation, (3) offer victims free representation to reduce any social inequalities, (4) respond to public and professional criticisms of their judicial systems and (5) organize medical expertise. Although articles and data are limited, the overall response is a balance between fairness and low number of claimants, which may be lower than expected.

Belgium followed in 2010 when policymakers adopted their Compensation for Damages Resulting from Medical Care (DRMC) law, where it creates a Medical Accident Compensation Fund (MSCF) to compensate a victim of medical care if the provider is without fault. [40] The DRMC and its MSCF define a no-medical accident as "an accident linked to medical care that does not trigger the caregiver's liability, does not result from the patient's health condition, and gives rise to abnormal damage." The DRMC also confines coverage to abnormal damage, which is not related to present state of science or present or foreseeable state of a patient's medical condition. To receive payment from the (MSCF), there must be an absence of fault and grave injury as defined by the statute. If there is fault, then recovery and payouts fall to Belgian insurers and legal system. The overall effectiveness of the Belgium experience remains an open question given its short time period.

3.5. Country-based NFPCS: US (1987: Virginia; 1988: Florida) and Japan (2009)

The US and Japan apply similar approaches in their NFPCSs, because they focus on birth-related neurologic injuries in specified group of infants. Unlike Japan, only two US states–Virginia and Florida–maintain NFPCS. Both states enacted their programs during the "Med Mal crisis" in late 1980s. Virginia administers its Birth Injury Compensation

Program through its Workers' Compensation Commission, while Florida program works with the Florida Department of Administrative Hearings. Both programs met their goals for stabilizing Med Mal insurance markets for obstetricians and other physicians, preserving access to obstetrical care for their citizens, and removing a set of expensive Med Mal claims from their tort systems. [42, 43] They address a specific, statutorily defined set of patients—infants suffering severe birth-related neurologic injuries. [43] Admission requires a petition with all relevant clinical information for review by a panel of experts. They exclude disabilities or deaths due to congenital anomalies or genetic disorders. They share similar program designs, but their enabling statutes possess key differences for claims, claimants, and compensation. Restrictive definitions for cover act as barriers to claiming and payouts. [43] Denied claims are subject to hearings and appeal to an administrative law judge that may go to district court. Once admitted to a program, participants exclude other litigation-based remedies, unless there is a denial or the act causing a birth-related injury or death legally qualifies as grossly negligent. Their funding sources include assessments on participating health providers, levies on Med Mal insurers, state funds, and investments to finance their programs. Currently, both programs operate based on traditional business principles, where undergo audits and remain financially stable.

Like the two US states, Japan adopted its limited NFPCS through its Ministry of Health, Labor and Welfare to address its Med Mal insurance crisis similar to those in the US during the 70s and 80s. [41] Like the US states of Florida and Virginia, the Japanese NFPCS is limited to infants with suffering a birth-related injury resulting in cerebral palsy. Its support comes from the Ministry, not the hospitals, and it stabilizes the insurance market for obstetricians who deliver babies. Injuries need not be the fault of the physician and they scheme will pay almost $400,000 USD per child for 20 years. Reporting occurs, and Japanese physicians do enjoy shielding from suits, although this report suggests payout are low. The Japanese experience appears to mirror the experience of Florida and Virginia, but these programs cutoff litigation and liability if a claim enters these programs. These programs also require reporting to state-based professional disciplinary authorities, so there is feedback and oversight too. Although there are critics who question its effectiveness.

3.6. Reasons to adopt or not adopt a NFPCS

Reasons countries may or may not a NFCS schemes vary. Why some countries and US states fail to adopt a NFPCS may lie with the presence or absence of one or more conditions. Country-based policymakers are more likely to adopt a general NFPCS when their countries possess a (1) smaller, more socio-demographically homogeneous populations, (2) government-run health insurance systems and (3) strong social insurance safety nets. [16] The authors could not, however, analyze the above conditions due to their study design and focus on the identification of more qualitative conditions. Two conditions identified were the presence or absence of a Med Mal crisis and professional support. Publications cited the presence of Med Mal crisis due to climbing claim and payouts associated with insufficient coverage by providers as a major push factor (e.g. New Zealand, France, Japan, and US States Florida and Virginia). Thailand may also be an example of crisis given events post 2006. Even so, a Med Mal crisis may not be a sufficient condition for adoption, US states in crisis are more likely than not to opt for a traditional tort reform (e.g. award limits or expert witness requirements) rather than implement a NFPCS. [12, 18]. [20, 43] Positions of the medical and legal professions may serve may serve as positive or negative conditions depending on its impact on policymakers. [30, 43] In general, conditions unfavorable for NFPCS included: (1) concerns for fairness of compensation amount versus judicial awards, (2) fears over excessive costs (professional tax), (3) preference for traditional tort reforms (limited access to courts), and (4) resistance among professional (medical and legal) associations. In fact, physicians expressed these concerns in Thailand, where the Medical Council opposes the current version of the HSAPP. Physician fears of culpability and loss of reputation along with the specter of a rising number of claims and payouts likely encourages health care providers to either litigate or seek alternative reforms, either traditional or nontraditional. Some authors note attempts to adopt NFPCSs run amok in common law systems, especially with its trial lawyers, because many litigators believe these systems do not fairly compensate the victims or punish physicians for their substandard care. [27, 30] Thus, NFCS enactment faces obstacles at multiple levels, regardless of the country or type of scheme.

3.7. Study Limitation Review

This study possesses several limitations even though the cited literature supports the applied methodology. [24 – 26] Because the authors employed a modified scoping to rapidly identify publications, the potential loss of relevant publications and their information and data. [24, 25] A related limitation may be the use of keyword search methodology that required modification of terms. Term modification may lead to loss of relevant publications. This study is also limited by its reliance on the use of English-based, electronic publications and its qualitative review, which potentially relevant non-English publication were excluded, unless an English translation was captured. It also lacks a formal country-based comparison, which means inferences or generalizations among countries

may not be possible.

4. Conclusion

Ultimately, adverse events and medical errors are a global concern, and they may injure and kill more patients than reported in past or current studies. [9, 10] Fortunately, most of them are not the result from substandard care nor do they trigger Med Mal claims or litigation. [10, 11] When they do, they may exact a price from health and legal systems, alike. For health care providers, especially physicians, Med Mal actions may hurt their professional and patient relationships and encourage them to practice defensive medicine, real or not. [11, 12] Support for Med Mal litigation and litigation reforms persists worldwide, although governments, policymakers, professionals would like a more efficient, cost-effective mechanism to fairly compensate victims and reduce or eliminate unsafe medical care than civil litigation. [13] Based on this study, the reviewed authors support replacing litigation with a NFPCS similar to the Nordic or New Zealand programs, whereas others opposed them because they saw wrongful acts or torts as mechanism to encourage safe care and fair compensation for injuries and deaths related to substandard, unsafe care. [29, 32]

Perhaps, the underlying reason for support of NFPCS by some academics and policymakers may be the evidence in the literature shows NFPCSs compensate victims more rapidly, fairly, and efficiently at lower costs than litigation. [18, 30, 37] But most governments, including Thailand do not adopt them for a variety of reasons. [18] One reason for the lack of adoption identified by this modified scoping review was opposition from professional groups, especially medical associations or councils. Authors reported policymakers were swayed by professional groups who threatened to limit or stop caring for patients. [41] To overcome the inertia against passage and change, it may take more than a major liability crisis to achieve adoption. In fact, it may require the absence of unfavorable conditions identified by authorities reviewed in this study, which included (1) concerns for fairness of compensation amount versus judicial awards, (2) fears over excessive costs (professional tax), (3) preference for traditional tort reforms (limited access to courts) and (4) resistance among professional (medical and legal) associations. It should be no surprise these conditions existed beginning with Thai policymakers first efforts to pass their Law on Health Service Affected Person Protection (HSAPP). [18] It continues to face opposition.

What remains unclear is whether Thailand and its physicians face a Med Mal crisis in both their public and private sectors. It is also uncertain whether Thai physicians have insufficient liability coverage to constitute a claims and payouts problem. Without more, conditions may be suboptimal and there may be little interest in opting for a paradigm shift from the current status quo to either a general or limited NFPCS in Thailand or any other country or US state. Only time will tell if Thailand will enact its Law on Health Service Affected Person Protection (HSAPP) to establish a NFPCS or not.

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Sensitivity analysis and validation of socio-eco-efficiency score (SEES) on companies doing business in Thailand

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Abstract

Since The word 'sustainability' was introduced in the 1980s to define an efficiency and responsible consumption. Sustainable Development Indicators (SDIs) and tools have been playing an important role on offering companies an improving performance with superior economic. Socio-Eco-Efficiency Score (SEES) is the SDIs that combines the advantages of each well-known and widely used sustainability tool together and allows a company to monitor and benchmark its positioning and sustainability performance on financial, environmental and social aspects. In this research, workability and sensitivity analysis on SEES model has been analyzed. The result showed that even though there are several important factors during data interpretation and sustainability performance ranking process, SEES model was still working well in terms of performance assessment and business evaluation and development. The sustainability score from each scenario of sensitivity analysis did not have significant difference from each other. Each scenario of sensitivity analysis has pointed out the same summary with the other. In terms of model evaluation, the results satisfied expectations on solving the lack of linkage between each indicator in sustainability tools. The companies would be able to realize perspective that they are falling behind in their business section.

Keywords: SEES, sustainability tools, performance indicators, sustainable, sustainability development
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1. Introduction

Over the last few decades, Sustainability Development Indices (SDIs) and other sustainability measurement tools have started to play an increasingly important role in providing meaningful concepts in terms of how to balance corporate objectives and judge a company success or failure in sustainable way [1-3]. By comparing to ordinary indicator, SDIs is a set of indicator that is used to describe company sustainability in terms of economic, environmental, and social aspects. Previous research study has pointed out the main disadvantages of present SDIs in terms of two concerns, 1) the absence of any linkage between each indicator and the worldwide perception of sustainability, as well as 2) the lack of transparency regarding the input data [4-7]. Several SDIs have their perspective on providing the effective operating concept to the company but cannot derive the effective end result and solution to the company [1, 4-7]. For solving this limitation, several researchers tried to create new SDIs to justify the company sustainability performance. Some previous researchers used thermodynamics theory to develop new SDIs called Emergy analysis (EmA). EmA measure energy consumed in transformations process. By this regards, several researchers tried to link environmental assessment through EmA and economic as well as social assessment together [8-11]. However, the energy consumption alone may not be sufficient for evaluating the company sustainability. Moreover, some researchers used eco-efficiency concept, which has been introduced by World Business Council for Sustainable Development, to create SDIs to measure the environmental impact via processing process in many conditions [5, 7, 12-16]. Still, the linkage of each indicator in terms of social aspect was absent. Furthermore, some researcher used ISO to frame up the company sustainability development, but there were limitations in linkage between each ISO series that resulted in innovation reduction [17-20]. For the extensive discussion on modern SDIs limitation, it was recommended that the good SDIs need re-designation and shall provide company the ability to withstand sustainable challenges according to three main aspects as economic, environmental and social [21]. Moreover, good key indicators or guidelines should be easy to measure and comprehend, relevant, lead to positive action, empower the user, control company investment

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blueprints and reflect strategic value drivers[22-28].

Socio-Eco-Efficiency Score (SEES) is an SDIs that has been developed by combining the advantages of each well-known and widely used sustainability tool, such as Dow Jones Sustainability Index (DJSI)[29, 30], Global Reporting Initiative (GRI)[31], International Organization for Standardization (ISO)[32-37], Emergy Analysis (EMA) and other sustainable development guidelines [38, 39]. The main purpose of SEES is to eliminate the disadvantages of modern sustainability tools and provide companies the ability to monitor and benchmark its/their positioning and sustainability performance with regard to financial, environmental and social aspects.

SEES is defined as a single unit expressed in SDIs that uses normalization and an Analytical Hierarchy Process (AHP) technique to summarize the benchmark positioning of companies alongside current market trends. SEES is a type of SDIs that analyses evaluation of company sustainability performance with regard to financial, environmental and social aspects. In order to achieve this, the overall operating performance input (including financial performance, environmental impact performance and social satisfaction) must be categorized to be in line with each company's size and sector, and must factor in a conversion and weighted process through the application of a pairwise comparison known as 'qualitative scaling'.

During the processes of data interpretation and sustainability performance ranking, there are several sensitive factors that could cause deviations in the obtained results. In order to deal with this issue, the sensitivity analysis and the factorial adjustment have both been analyzed in order to ascertain the perfect parameters and numbers that suit the application of the SEES model for companies conducting business in Thailand

2. Methodology

To create perfect SEES, enhanced SDIs that solve the restrictions and limitations delivered by current SDIs, a total of 10 different sustainability indicators and sustainability criteria which were expected to cover all sustainability aspects were gathered from several well-known and widely used sustainability tools and reports. The workability, in terms of result delivery, and result sensitiveness of SEES were analyzed by comparing to 1) the result from other well-known and widely used sustainability tool and 2) company present circumstances and performance. The indices from well-known and widely use sustainable tools included DJSI, GRI, ISO, and other sustainable development guidelines. These indicators cover three categories, namely financial, environmental and social.

2.1. Baseline criteria and indices for analysis

In consideration of business sustainable development, three key aspects, financial, environmental and social were included. For each of these within the model of SEES, a set of key performance indicators (KPIs) were established which were formed around the DJSI, ISO, GRI, and the World Business Council for Sustainable Development (WBCSD) indexes and guidelines that are used to measure the sustainability of businesses around the world. For the SEES model, a classification system comprised of 11 levels (ranging from a low of -5 to a high of +5) was used to rank every sustainability index. This level system was used to visualize the performances of each company in comparison to other companies in the same industry. It also has the potential to be used to gain a clearer picture how each business' sustainability practices are evolving in line with society.

For the environmental consideration in terms of SEES, the criteria was formed on the basis of Thailand's official "Nationally Appropriate Mitigation Actions" (or "NAMAs") [40]. The financial aspect took into consideration the overall business performance in Thailand as well as the ability for such businesses to survive within the current market place.

Finally, in consideration of social aspect, only indicator in the part of market and employee concern are perfect since there is no perfect solution and scoring for social aspect has been found by any researchers. This may be due to the fact that the sustainability criteria in social aspect are related to both stakeholders and community. To compensate this imperfection, the number of different CSR activity in each category is used for scoring system instead. SEES indices covering three aspects which have their criteria related to Thailand's Department of Business Development (DBD), NAMAs, are shown in Table 1 and Table 2. The average NPS from Temkin Group [41] and the Net Promoter Network [42, 43] for each industry are shown in Table 3.

2.2. Framework of conceptual analysis

In this study, the researcher selected a total of eight companies to test the sensitivity and workability of SEES model. These covered a total of five different industries which are Oil and Gas industry(x1); food processing (x1); airline industry (x1); storage tank terminal industry (x1); and banking and finance industry(x4). The financial data of each companies were gathered from DBD. The performance over 12-month period was used for financial aspects. The data for environmental and social aspect of each company were collected from its annual reports, and its sustainability reports. In the case that a company refused to release essential data, such company would receive a -6 score for the corresponding index as a penalty for non-compliance and lacking of transparency.

2.3. Sensitivity analysis for making counter weight of the indices

The Analytic Hierarchy Process is a technique that has been developed for organizing and analyzing com-

Table 1. Sees insex criteria summary.

	Level -5	Level 0	Level +5
Financial			
Return on Assets ("ROA")	The ROA of the last in their business sector or 0 depending on which is higher	The average ROA of their business sector or 0 depending on which is higher	The ROA of the leading company in their business sector
Return on Equity ("ROE")	The ROE of the last in their business sector or 0 depending on which is higher	The average ROE of their business sector or 0 depending on which is higher	The ROE of the leading company in their business sector
Return on Fixed Assets * ("ROFA")	The ROFA of the last in their business sector or 0 depending on which is higher	The average ROFA of their business sector or 0 depending on which is higher	The ROFA of the leading company in their business sector
Net Profit Margin	The Net Profit Margin of the last in their business sector or 0 depending on which is higher	The average Net Profit Margin of their business sector or 0 depending on which is higher	The Net Profit Margin of the leading company in their business sector
Environmental	0% or more	-7%	-20%
GHG Emission per unit Reduction ("GHGE")			
Electricity Energy consumption per unit Reduction (EEC)	0% or more	-12.5%	-25%
Water consumption per unit ** (WC)	0% or more	-12.5%	-25%
Social			
Net Promoter Score (NPS)	0	Mean of NPS in that business sector	Maximum of NPS in that business sector
Employee Engagement (EE)	50%	59.22%	80%
Social Activity Indicator (SAI)	Not available	Not available	Not available

Remark: * ROFA= Net Income / Total Fixed Assets

** The indicator in this part can be changed to another environment and energy consumption issues of concern in Thailand. In this research, water consumption per unit (WC) was selected.

*** SAI measures the number of activities in each category that company has contributed to the social and surrounding environment (surrounding environment and communities) in which they operated(33).

plex decisions in wide variety fields such as government, business, industry, healthcare, shipbuilding and education. AHP can derive the complex decisions as well as transform the in-put, guts feeling into numerical counterweight and derive ratio scales. In this study, magnitude of each index was weighted through. In AHP, the pairwise comparison of alternatives on a qualitative scale is considered as the main factor that has a high effect on the result from the AHP since the AHP results are extremely sensitive to the pairwise comparison matrix [44-48]. In this regard, the sensitivity analysis for making a pairwise comparison of alternatives on a qualitative scale that is suitable for SEES has been conducted. Four cases of sensitivity analysis for finding suitable pairwise comparisons of alternatives on a qualitative scale have been conducted, which are as follows:

Case 1: High range differentiation

In the high range, the value difference in each range is set to two (2) and the total value difference, from equal to extremely strong, is equal to 8. The significant values are equal to 1 and 9 for equal and strong, respectively.

Case 2: Middle range differentiation

In the middle range, the value difference in each range is set to one (1) and the total value difference, from equal to extremely strong, is equal to 4. The significant values are equal to 1 and 5 for equal and strong, respectively.

Case 3: Low range differentiation

In the low range, the value difference in each range is set to zero point five (0.5) and the total value dif-

Table 2. Criteria for SAI

	Level -5	Level -4	Level -3	Level -2	Level -1	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5
Number of covered categories	>2	3	3*	4	4*	5	5*	6	6*	7	7*

Remark:* means there are two or more activities in each said category.

Table 3. Average NPS for each industry.

Industry Sector	Score
Department/Speciality store**	58
Brokerage/Investments**	45
Auto Insurance**	44
Home/Contents Insurance**	42
Tablet Computer***	40.5
Auto dealers*	40
Grocery Supermarkets**	39
Online Entertainment**	39
Online Shopping**	39
Smartphones**	38
Credit Cards**	37
Laptop Computers**	37
Shipping Services**	35
Hotels***	34
Supermarkets*	33
Investment Firms*	32
Life Insurances**	31
Airlines***	30.5
Cellular Phone Services**	30
Insurance carriers*	30
Retailers*	30
Software and Apps***	29.5
Banking***	29
Major appliances*	29
Drug Stores/Pharmacies**	28
Parcel delivery services*	26
Rental cars*	24
Fast food chains*	23
Health Insurance**	18
Wireless carriers**	18
Travel Websites**	16
Health plans*	14
Utilities*	12
Cable/Satellite TV Services***	3
Internet Service***	2

Remark:*The value from Tempin Group;
** The value from Net Promoter Network;
***The average value of Tempin Group and Net Promoter Network

ference, from equal to extremely strong, is equal to 2. The significant values are equal to 1 and 3 for equal and strong, respectively.

Case 4: Very fine differentiation range

In the fine case, the value difference in each range is set to zero point twenty-five (0.25) and the total value difference, from equal to extremely strong, is equal to 1. The significant values are equal to 1 and 2 for equal and strong, respectively.

2.4. Surveying

In order to analyze the significance level of each indicator in each aspect, the pairwise comparison patterns of each indicator must be found. The pairwise comparison surveys on the topic of "Which aspect do you consider as the most important in doing business in Thailand?" were sent to the business owner, employees, and government office. The data from the survey were analyzed through the Analysis of Variance method (ANOVA).

According to the previous studies and research that performed their investigations on unknown numbers of the population, the Cochran 1977 Sampling Technique has been considered in this study(49-52). As a result, a maximum sample size of 400 has been used to satisfy the weighting survey analysis. Therefore, 400 questionnaires were distributed to state enterprises, private companies, and government officers.

2.5. Data normalization

In order to prevent any anomalies or redundancies occurring from the collected raw data, a normalization was applied in this study. All company was first categorized based on their business size which announced by DBD. After that, the company was categorized and then further segmented into different business categories depending on their market segment and their core business value. The raw data of each category was normalized as below:

Financial: The raw data of interested company were converted into ranking level based on their business segment maximum performance and lowest performance.

Environmental: the collected data were used to calculate the amount of greenhouse gases emitted per product by that company. For example, the tank terminal company main product is the raw materials supplied to storage tanks and plants; this was calculated as a unit of emission (of greenhouse gas) and expressed as CO2 (carbon dioxide) eq emission per ton.

Social: companies used in this study were categorized by business type according to their industry sector and main business values. Data relating to each

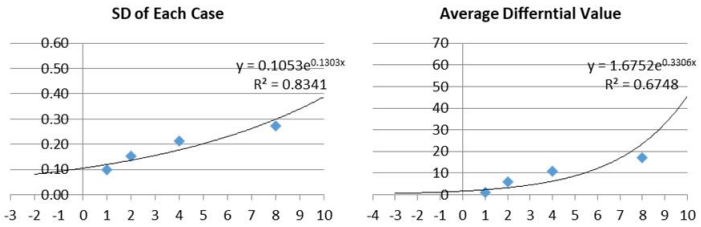

Figure 1: Exponentially prediction of standard deviation and Average Differential of each case

Table 4. Survey result of each business sector

	Public Company Limited	Non - Public Company Limited	Private Sector	State Enterprise	Government Officer
Economic	46	36	50	44	24
Environment	21	34	27	19	37
Social	33	30	23	37	39

company's performance on a social level were compared to the average values within the same industry. As an example, an airline company NPS was compared with average airline transportation service industry NPS in Thailand. This means that to calculate scores regarding employee engagement and social satisfaction, sampling companies was compared with their industry's average value in Thailand.

2.6. Data interpretation

In order to analyze the environment loaded and emission in environmental aspect, such as the emission of greenhouses gases and the consumption of unsustainable energy, a Life Cycle Assessment (LCA) was applied in this study.

The level of scoring in SEES was set from -5 to +5 (11 levels in total). Any score below zero represented a performance that below average or non-sustainable. A positive score (above zero) indicated an above average score and lying in sustainability area. This could be used to compare the performances of company with other in the same industry, as well as to compare the other companies in different industries. By using key performance indicators (KPIs) concept, company raw data were converted into single units score depending on each levels criteria. The single unit less score from three different aspects were further given a counterweighted from AHP and combined into final single unit less score that covered 3 sustainability aspects called SEES.

3. Results and Discussion

3.1. Surveying result

The survey results showed that different company sectors had an effect on the counterweight of the aspect that was being considered. In the private company sector, the economic aspect was considered as the most important, followed by the social aspect. For the state enterprise sector, the environmental and social aspects were considered more important than the economic aspect. In the government officer sector, environment was considered as the most important, followed by the social aspect. Moreover, the type of company also had an effect on the counterweight of the concerned aspect - public limited companies place greater emphasis on social and economic aspects than on the environmental aspect. The survey result of each business sector are show in Table 4.

3.2. Sensitivity analysis for AHP pairwise comparison matrix of alternatives on a qualitative scale

Four cases of sensitivity analysis for finding suitable pairwise comparisons of alternatives on a qualitative scale were conducted. Once all possible results from all cases were analyzed, the standard deviation and the average difference from the survey results of each case were analyzed and are shown in Table 5.

The analysis showed that high cases gave a large value deviation from the survey results. Middle cases and low cases delivered the value that resembled the survey result in every case. In some cases, for giving the significant difference between each aspect, the middle case would be selected for forcing companies to adapt their business plan to follow the criteria announced from the Thai government or any other organizations concerning sustainability development. However, in this thesis, the fine case was used to test the workability and sensitivity of SEES since every pillar could have a significant effect upon the final SEES score. Moreover, the sensitivity analysis shown that the data deviation of each scenario in the fine case was minimal compared to the high, middle, and low cases.

Table 5. Standard deviation and average differential from survey of each case

	High Case	Middle Case	Low Case	Fine Case
Average diff from actual	17%	11%	6%	1%
SD	0.271	0.214	0.153	0.098

Table. 6 The ranking comparison of SEES from different sector's perspectives

	Low Case	Company A	Company B	Company C	Company D	Company E	Company F	Company G	Company H
Scenario 1	46%								
(PLC Sector)	21%	-2.35	-4.82	-1.10	-1.90	-1.19	0.35	0.34	-2.34
	33%								
Scenario 2	40%								
(Non-PLC Sector)	33%	-1.76	-4.72	-1.74	-2.41	-0.56	0.89	0.47	-1.64
	26%								
Scenario 3	50%								
(Private Sector)	28%	-1.86	-4.76	-1.67	-2.02	-0.55	1.02	0.98	-1.69
	22%								
Scenario 4	45%								
(State ENT Sector)	20%	-2.45	-4.83	-0.97	-1.93	-1.35	0.18	0.13	-2.49
	36%								
Scenario 5	22%								
(Government officer	35%	-2.05	-4.70	-1.34	-2.95	-1.18	0.05	-0.95	-2.18
	42%								

3.3. Sensitivity analysis of SEES associated with each sector's point of view

From Table 6, it shows the ranking comparison of SEES from different sectors' point of view. The analysis showed that the changing in counterweight had an effect on the final score, SEES, but did not have a significant effect on the ranking. From scenarios 1, 3 and 4, SEES promoted company G as the number one sustainable company among the others while scenarios 2 and 5 promoted company F as the number one sustainable company among the others. This oscillation came from the difference in the main focus of each company depending on their business sector. Scenarios 1, 3 and 4 gave weighting to financial performance, which was two times higher than the others, and gave enormous benefit to company G which had the highest financial score among the others. On the other hand, the financial aspect did not have a huge effect on SEES by comparison to other aspects in scenario 2, and had the lowest effect in scenario 5.

The analysis and results from Table 7 and 8, showed that SEES has derived the different result if comparing to other well-known and widely used sustainable tools. The numerical measurable unit less score from each aspect in SEES had majority impact to the final sustainability score which derived superior result and in line with their business situation by comparing to the other well-known and widely used sustainable tools.

For example, Company A's main business focus is on the exploration and production of petroleum. Due to the growth in the US, Company A has struggled with decreasing global oil and gas prices. As a result, their annual turnover and net profits have been lower than predicted. In addition, political problems in Thailand has also hampered Company A's brand image which has been somewhat impaired due to a lack of transparency in relation to the activities of NGOs. However, after the on-going problems regarding the company's transparency were made evident, negotiations on the projects in which the company was involved with were cancelled.

The GRI awarded Company A with a grade of 'A+' and they were subsequently listed in DJSI. However, Company A received a score of between -2.45 and -1.76 for the SEES which was very much in contrast with the results from the more widely used sustainability measurement tools as mentioned above. In addition, there were also significant differences when it came to evaluating the company's environmental and financial concerns when compared with its competitors. Even though they did outline various schemes to address environmental issues in its sustainability report, the actual company results showed deterioration in this area.

SEES provides the ability to benchmark their sustainability performance to the others. For example, companies E, F, G and H are from Bank sector, SEES promotes company G as the leader in terms of financial aspect but promotes company F as the leader in social aspect. Moreover, the company can compare their

Table 7. GRI, DJSI, SEES sor companies A, B, C, and D.

	Company A	Company B	Company C	Company D
Finance				
ROA	-5.00	-5.00	-1.15	-2.84
ROE	-5.00	-5.00	-2.77	-3.07
ROFA	0.16	-5.00	-1.19	1.41
Net profit margin	0.34	-5.00	0.00	5.00
Environment				
GHG Emission per unit	0.62	-3.65	-5.00	-5.00
Energy Consumption per unit	-1.90	-5.00	-5.00	-5.00
water consumption per unit	5.00	-3.83	-5.00	-6.00*
Social				
NPS	-6.00*	-6.00*	5.00	-6.00*
Employee Engagement	-2.83	-6.00*	5.00	0.26
Social Satisfaction	-5.00	-3.00	-5.00	-2.00
SEES (average score)	-	-	-	-
DJSI	Yes	Yes	No	No
GRI	A+	B	No	B

Remark: *companiesnot providingdata received-6 as themaximum penalty

sustainability performance score via SEES. Company C which has main business in tank terminal section has better sustainability performance score by comparing to Company H which is lying in Bank section. The financial performance positioning of company C comparing to their competitor in Tank Terminal section are better and more sustainability by comparing to company H, but less sustainability than company F, and company G. Not only financial aspect that could be compared through SEES, Environmental and social aspect can be compared. By comparing company F and G, SEES showed that company G has better performance in environmental and social. This could be resulted from the fact that Company G recently started to focus more on improving its brand image and as well as regaining the trust of the public. In terms of expenditure, marketing and advertising cost the most money. It started an eco-friendly scheme that aimed to reduce its usage of raw materials such as paper and electricity and the result was a reduction in Company G's overall carbon footprint.

4. Conclusion

Results indicated that in comparison to ordinary sustainability tools SEES made sense for sustainability development with superior performance. SEES allowed companies the ability to monitor and benchmark their positioning and sustainability performance regarding financial, environmental and social perspectives. Companies could then identify which perspective needs improvement. Moreover, the single unit less score from SEES provided companies with the ability to benchmark against others in different business sectors. Every company can compare its performance as normalized and converted through SEES. For example, a company with below average ROA and ROE can manage and maximize their fixed assets to save expenses.

In terms of model evaluation, the results satisfied expectations on solving the lack of linkage between each indicator in sustainability tools. Linkages in SEES were demonstrated for the oil and gas, airline and banking sectors. However, investing in new technologies to improve carbon footprints would reduce short-term financial performance.

For the extensive conclusion on the sensitivity of SEES, the different point of view provided (1) great impact on SEES on the negative side; but (2) had a slight impact on SEES on the positive side; and (3) did not have the significant effect on the final ranking - the ranking was almost the same. By this meaningful conclusion, the SEES model worked well in terms of performance assessment and business evaluation and development.

However, there were some limitations that may dictate the result in this study. The evaluation of SEES from published reports alone might not be sufficient for flawless analysis. All reports, used in this analysis, have been deliberately published by companies to make themselves look superior when compared to their competitors' performances. In order to solve this issue, it is suggested that an independent party should be created for the purposes of validating such data. Furthermore, a more in-depth analysis is required for a more accurate interpretation of the social aspects, particularly when calculating scores for the social satisfaction index. It is suggested that a harsher penalty is imposed on those companies which fail to provide data and are noncompliant in offering full transparency. In order to make SEES available for controlling every company working in Thailand to be in line with each

Table 8. GRI, DJSI, SEES for companies E, F, G, and H.

	Company E	Company F	Company G	Company H
Finance				
ROA	-1.07	4.82	5.00	-3.48
ROE	0.47	4.21	5.00	-5.00
ROFA	0.13	-1.58	0.16	5.00
Net profit margin	-1.33	-0.35	5.00	-4.04
Environment				
GHG Emission per unit	-1.33	-0.35	5.00	-4.04
Energy consumption per unit	2.26	4.91	3.96	3.01
Water consumption per unit	2.35	2.74	2.60	-1.41
Social				
NPS	3.08	2.54	-5.00	3.87
Employee Engagement	-6.00*	-6.00*	-6.00*	-6.00*
Social Satisfaction	-6.00*	0.09	-6.00*	-6.00*
SEES (average score)	-	-	-	-
DJSI	No	No	No	No
GRI				

Remark: *companies not providing data received-6 as themaximum penalty

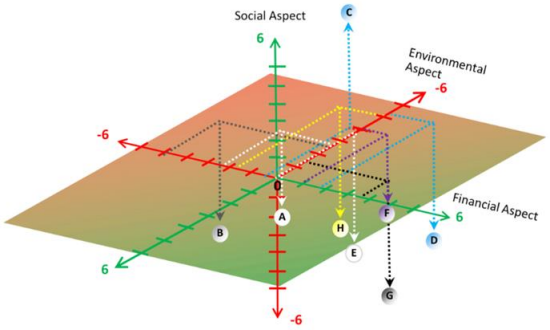

Figure 2: Sustainability development comparison based on SEES.

other, the supportive policy from government is considered as an indispensable concern. The government shall decree the final score in each year together with counterweight for each aspect that every company in Thailand shall comply with.

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Enhancing intercultural communication for Muslim tourists in South Korea

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Abstract

This paper aims to highlight the influence of intercultural communication on tourism of Muslim tourists from the perspectives of Malaysian and South Korean scholars. The informants of this study were eight Malaysian and eight South Korean scholars who conduct research and teach in the fields of communication, tourism, or intercultural studies. The data were thematically analyzed using NVivo software. The paper included that to improve intercultural communication, the South Korean informants should be open to multiculturalism and Muslim values, and in the meantime, Muslim tourists should also be open to understand multiculturalism in general, Korean culture and society in particular. This study provides profound understanding for the improvement of intercultural communication in South Korea for international Muslim tourists and of its effectiveness in practical events. This study obtained information from scholars expertizing in the fields of communication and tourism. Therefore, the findings are expected to benefit the development of intercultural communication in tourist destinations.

Keywords: Intercultural communication, culture, Korea tourism, Muslim tourists
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1. Introduction

Tourism has been one of the most prioritized industries globally. When visiting different countries and cities, people interact and communicate with different cultures and societies, which causes different behaviors [1]. According to Albu [2], when tourists choose to visit countries that are totally different from their own, they experience culture shock. However, tourists can understand and adjust to other cultures by experiencing intercultural communication, and they can better understand the visited destination culture [2]. Moreover, it is a good chance for tourist destinations to create unique offerings for tourists, to develop the tourism industry, and to achieve high-quality intercultural communication.

Muslims represent 23% of the world's population [3]. The faithfulness of these Muslims leads to a huge consumption of halal products. Certified halal products are important to faithful Muslims when they are traveling [4]. Food manufacturers and retailers based in non-Muslim countries have begun to recognize this potential. Therefore, international restaurants and fast-food chains, such as Kentucky Fried Chicken (KFC), McDonald's, Nando's, Pizza Express, and Subway, currently serve halal food in some non-Muslim countries [5].

Muslim tourists are one of the most important tourism targets, and there has developed significantly in the past years in this market [6]. Aside from its importance in South Korea, most studies on tourism have been conducted on tourist satisfaction, the image of South Korean popular culture in East Asia and the US market [7]. However, few studies have investigated Muslim tourists in South Korea. In addition, because Korean and Muslim cultures are different, it would be useful to examine how to improve intercultural communication in the Korean tourism industry. Therefore, this paper conducts a series of in-depth interviews with Malaysian and South Korean scholars in tourism, intercultural studies, or communication expressed toward the improvement of intercultural communication in Korean tourism for Muslim tourists.

2. Background of the Study

Zhou [8] stated that tourism, particularly international tourism, is connected with intercultural communication, which refers to individuals from two cultures communicating with each other. Chen and Starosta [9]

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explained that the concept of intercultural sensitivity is a 'mindset' that includes engagement, confidence, enjoyment, and attentiveness that enable interaction and respect for cultural differences. It guides people to be sensitive regarding differences in perceptions.

In their research on Muslim travel preferences, Hassani and Movghavvemi [10] found that Muslims have different travel motivations and preferences. Some Muslims who are motivated by non-Islamic factors try to avoid religious attributes in their destinations, while others who are motivated by Islamic factors prefer to go to places that have religious hospitality services and facilities. Noticeably, both types of tourists prefer places that have halal food within reach.

Vargas-Sánchez and María Moral-Moral [11] highlighted that the increase of Muslim women travelers would encourage service providers to offer more specialized travel products and lifestyle services. Security is a major concern, especially for female tourists wearing the hijab. In addition, spreading Muslim travelers' visual stories can become a useful tool to eliminate stereotypes and avoid Islamophobia, in addition to establishing ties with other communities. In addition, despite the creation of online search engines, travel in accordance with halal is still limited by information on halal from hotels, resorts, restaurants, etc., which is still very scarce, particularly in Western countries.

In the context of tourism, intercultural communication is defined as the communication experiences between tourists and hosts with cultural differences [12]. Therefore, related studies on intercultural communication have encompassed the intercultural adaptation of tourists, relationships between tourists and hosts, and the attitude change of tourists toward the destination and host culture [8].

3. Methodology

The method of this study is limited to in-depth interviews with Malaysian and South Korean scholars in the fields of communication, tourism, or intercultural studies. These scholars should be Muslims or have attached experience with the Muslims. Malaysian scholars were selected because South Korea has become a significant destination for Malaysian, where the total number of Malaysian tourists has rapidly increased from 2010 to 2014 with a 21.1% growth rate [13]. In addition, Malaysians were selected based on Hassan [14], who indicated that Malaysia is more conservative and concerned about Islam, which will provide more valuable data on Muslim tourists. This study employed a qualitative research design in accordance with the research questions, which are related to meaning and perspectives. This method is appropriate for obtaining insight into the behavior and thinking of people. Qualitative research facilitated the exploration and development of a detailed understanding of a phenomenon [15].

In-depth interview is a technique that involves intensive individual interviews with a few informants to substantially explore their thoughts and behaviors [16]. Atran et al. [17] explained that "as few as ten informants were needed to reliably establish a consensus" (p. 753). Moreover, Guest et al. [18] stated that "a sample of six interviews may be sufficient to enable the development of meaningful themes and useful interpretations" (p. 78). However, Baumberg [19] stated that an interview is based on the limits of time and resources. The current study involved 16 informants, comprising eight Malaysian and eight South Korean scholars.

3.1. Data collection

To accommodate the informants, the in-depth interviews were conducted in September 2016 in Changlun (Kedah, Malaysia) and from October to November 2016 in Seoul, Korea. The researcher used a semi-structured interview format that featured open-ended questions.

3.2. Data analysis

Overall, the analysis was performed thematically, and the in-depth interviews were conducted in English. After the interviews, the researcher transcribed the gathered information. Traditionally, researchers performed manual coding using color pens, dividing and categorizing these data thereafter because coding involves gathering the related words or phrases mentioned by the informants or in the documents [20].

NVivo software was used to analyze the data to ensure a high level of perfection and adequacy [21]. Moreover, the use of NVivo enabled an analysis of qualitative data at ease and the generation of a relevant model that supported the results [20]. The codes and categories were ensured to represent the perspectives of the informants.

3.3. Results

To answer the research question, this section presented the perspectives of the informants on the enhancement of intercultural communication in the tourism program of South Korea for Muslim tourists. The results showed that the perspectives of the informants on the improvement of intercultural communication in South Korean tourism for Muslim tourists can be divided into two aspects, namely, improvement from the side of Muslim tourists and improvement from the side of South Koreans (see Figure 1).

3.4. For Muslim tourists

The Malaysian and South Korean scholars suggested that Muslim tourists should understand Koreans and should be open-minded toward non-Muslim countries.

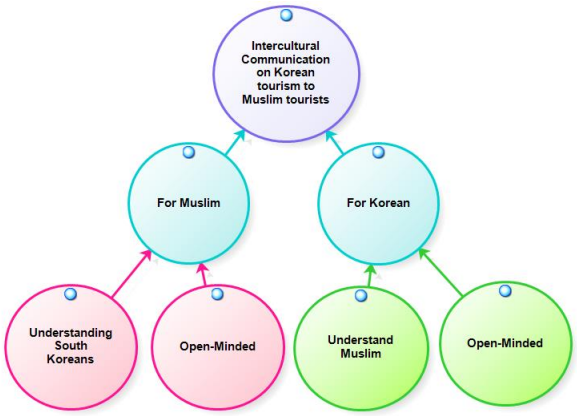

Figure 1: Perspective on the enhancement of intercultural communication in Korean tourism for Muslim tourists.

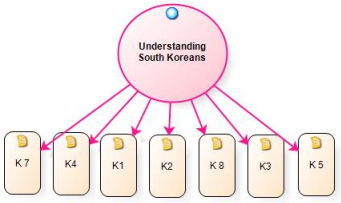

Figure 2: The informants mentioned about understanding South Koreans for Muslim tourists.

3.4.1. Understanding in South Korea

The cultural modernization of South Korea was influenced by Westernization after the Korean War [20]. Informant K1 offered the following insight:

Muslims should be open-minded and understand that South Koreans are influenced by Western views. Thus, South Koreans may exhibit ignorance but [that] does not mean they have any intention. South Koreans are typically nice people; so Muslims may need to explain more. (Informant K1)

Informant K2 provided the following insight:

Korean society now is more westernized but [that] should not be a cause for worry. However, the language may cause problems in communication because South Koreans cannot speak English. However, Arabs come for medical services. ISIS and other Islamic extremist groups have caused the South Koreans to fear Islam. However, Muslim tourists can change this stereotype. (Informant K2)

Information and understanding of Muslims are limited in South Korea. However, Informant K6 said that Koreans are friendly and merely need to learn more about Muslims.

Foreigners in homogenized countries, such as South Korea or Japan, will easily attract attention. People who wear [a] hijab will also attract attention. However, South Koreans often do not talk to strangers, but they may stare at you. As far as I know, South Korea is quite open to all tourists. The ratio of racist people is the same as other places in the world. We just need to learn more about the needs of Muslims because we may do something wrong just because we are unaware. (Informant K6)

Informant K7 further explained that religion or gender should not be discussed with South Koreans:

They can do everything that is legal. However, if they practice their religious beliefs in front of other people, then the people will stare at them because the locals do not do that. Try to respect the host culture. Avoid speaking about religious or gender issues. I have a Muslim friend, and he tried to speak about religion. However, our culture does not allow us to do that. (Informant K7)

3.4.2. Open to non-Muslim countries

Being open-minded in an unfamiliar situation is important in understanding various cultures [23]. In the current study, the informants suggested that Muslim tourists might try to be open-mind toward non-Muslim countries. Informant K7 said that "Muslim tourists must be ready for new things in South Korea or in other non-Muslim countries." Informant K5 observed that a few of her Muslim friends attempted to adapt to a non-Muslim society:

The host and Muslim tourists must understand each other, especially the extremes. Muslims always said the host should follow their way, but some of my Muslim friends said they are satisfied if the host can prepare the general things, such as a place to pray and halal food for them. (Informant K5)

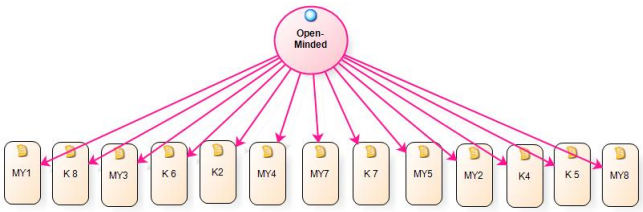

Figure 3: The informants mentioned about open-mindedness for Muslim tourists.

Informant K2 explained the lifestyle of non-Muslim countries: "for non-Muslim countries, we are not strictly controlled by the religious or what we believe, so you need to understand that, and this is a new experience to learn."

Informant MY3 offered the following insight:

Muslim tourists will go to places that have different cultures. We must be open-minded, and we must respect our religions at the same time. We cannot transfer our culture to the world. The people who are non-Islam, they are not your enemy, but they are your brother and sister in this world. We must deal with different cultures; you have respected their culture. At the end of the day, all of us are human, and we live in one world. We have lived with others and help each other. (Informant MY3)

Informant MY8 shared the following ideas:

We Muslims should understand the host's culture, and they do not need to change just to fit us. Maybe I travel a lot, so I am ok with the small things if it does not hurt feelings or is not humiliating because I do not expect that people will behave like me because we are from different cultures and lifestyles. If you are traveling to non-Muslim countries, you should prepare well for where you want to stay, a place to pray, or where to have halal food. You must be open-minded to accept different things. (Informant MY8) Lastly, Informant MY 1 stated that "We are all human beings. Education about Korea and Islamic value is needed. Muslims also need to learn. Finally, you must cultivate the desire to know the others, or people from different cultures."

3.5. For South Koreans

The Malaysian and South Korean scholars suggested that South Koreans, including those involved in the South Korean tourism industry, service providers, or local people, should understand Muslim tourists and be open-minded to multiple cultures.

3.5.1. Understanding Muslims

In view of the improvement in intercultural communication in Korean tourism for Muslim tourists, Informant K8 provided the following argument:

In the era of globalization, the most important aspect is global citizenship, which respects the universe system. The Muslim culture is one of the largest cultures, and South Koreans should understand them in terms of the positive way of a Muslim's way of life, Islamic cultural civilization, and the limitations. The facilities are not enough; we should prepare our friendly attitude as well. (Informant K8)

However, Informant K7 stated that some Koreans misunderstood Muslims:

Korean employees know Western, Chinese, and Japanese cultures very well; however, they don't know Muslim culture. Recently, Muslim tourists came to Korea for a medical tour, but the medical staff members know Muslims; however, the staff do not know their culture. Other than that, it is scary because of the bad reception of the Muslim image. When people talk about Muslims, they usually think about terrorists, but it is a misunderstanding because not all Muslims do that, only the very extreme case of Muslims; however, people are still scared because of their wrong perception about Muslims. (Informant K7)

Moreover, Informant K4 mentioned that "even though some people [have an] anti-Islam attitude in society, our government and some scholars are trying to correct such kinds of negative images of Muslim. So, the education or activities of a multicultural society is important." Some informants in this study held similar views to suggest methods to improve the understanding of Muslim tourists. For instance, Informant K1 mentioned the relationship between Koreans and Middle Eastern people is a chance to improve the understanding of Muslims:

A good opportunity is older Korean men (50-60 years old), who have worked in Saudi Arabia or Iran, so they have the same kind of working experiences. So, they have good experiences with Muslims and positive opinions, thus these people can help] to improve the understanding of Muslims for Korean people. In addition, I suggest creating their kind of eating culture halal; it is very good. I do not have direct experience with Muslim food. If some Muslims show me the culture of their food, I think it can promote the understanding of their culture to Koreans. (Informant K1)

Moreover, Islamic teachings should be taught in non-Muslim societies to understand Muslim tourists. For example, the physical contact between genders is not allowed. Informant MY5 explained this: The general for cross-culture communication between Muslim

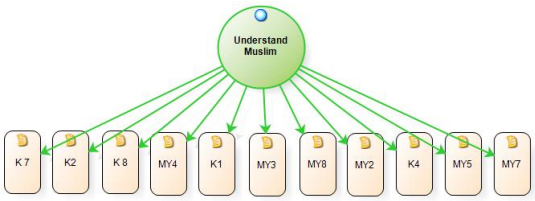

Figure 4: The informants mentioned about understanding Muslims for Koreans.

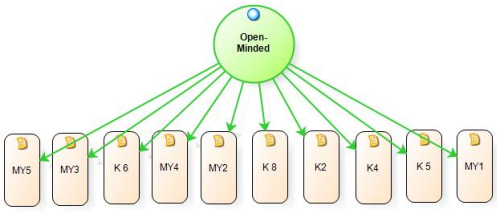

Figure 5: The informants mentioned about open-minded to multi-cultural societies for Koreans.

and non-Muslim, it is general ethics, such as politeness, using soft words, which is acceptable. Whereas, in the focus between Muslim and non-Muslim, it is about gender as well. For the same gender, touching, such as shake hands is quite ok. However, when we talk about different genders, basically, some people do not mind shaking hands, but some people they are quite strict because different genders should not touch if they are not married or have no family relation. Therefore, normally, we do not shake hands, physically touch, and we maintain the space/distance between people when they are talking. (Informant MY5)

Furthermore, Informant MY8 indicated that "avoiding physical contact, such as shaking hands or hugging between different genders. Do not offer alcohol."

Informant K7 argued that training is required to improve the understanding toward Muslim tourists, he said:

Training is needed. Korea's ranking is 16 in the world in the hospitality and tourism industry; however, I have never heard that they officially train how to deal with Muslim customers, so we need a system. What they know, they don't know from the system, they know from word of mouth; that's terrible. (Informant K7)

3.5.2. Open minded to multi-cultural society

According to [24], South Korea is one of the countries that rejects outright multi-culturalism and has focused on maintaining a mono-culture instead. However, [25] explained that decreasing negative sociocultural can support the sustainable tourism development. Thus, being open minded to multi-cultural society can also promote sustainable tourism. Informant K2 said:

Especially, I want to tell the Koreans that we usually have a kind of pride in our culture. In every country, they have pride for their culture, but Korea is famous for that. People from outside Korea, they are only different, the issue is not superior or inferior, so we have to open our attitudes toward people from different ethnic groups, different cultural groups, and different religious groups. (Informant K2)

Informant K6 stated, "treat them with respect and try to be nice, no matter what color of tourist." Moreover, Informant MY1 suggested, "do respect the mindset of your guests." Furthermore, Informant MY 2 suggested, "we should actually practice intercultural communication, including verbal or non-verbal communication. We try to communicate based on the other's culture, although what you are practicing is not aligned with your culture." Additionally, Informant MY5 detailed the following:

For the host, you should understand different cultures and beliefs because sometimes cultures and beliefs come together. However, there are occasions when your guests may not understand your culture. You can tell them politely, give them chances, and tell them about our culture. You have to compromise. Sometimes they forget; sometimes they do not know. (Informant MY5)

4. Conclusion

This study aims to enhance intercultural communication with Muslim tourists in the South Korean tourism industry. Accordingly, Malaysian and South Korean scholars in the fields of tourism, communication, and intercultural studies were selected to participate in a series of in-depth interviews to analyze their views on the enhancement of intercultural communication in South Korean tourism for Muslim tourists.

The results of this study indicated that the informants identified the significance of Muslim tourists, their population around the world, their interest in travel, and their spending power, which is considered an immense opportunity in the tourism industry. Furthermore, the informants suggested that the cooperation between the host (South Korean tourism) and guest (Muslim tourists) in improving intercultural communication must be highlighted. Muslim tourists should understand that South Koreans are proud of their culture while they are trying to learn more in a multi-cultural environment. Moreover, their society is quite open because they have been westernized. The informants suggested that adapting multi-cultural perspective would result in understanding and showing respect to one another.

The results of this study provide profound understanding of the special needs that are in accordance with the practices of Muslims, the improvement of intercultural communication in South Korean tourism for Muslim tourists, and how it will affect their daily lives. This research is important because it serves as a guide for South Korean tourism policy to prepare and promote South Korea as a Muslim tourist destination.

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