

กลุ่มที่ 1

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กลุ่มย่อยที่ 1

Education, Liberal Arts

AN INQUIRY INTO STUDENT UNDERSTANDING OF BUSINESS KNOWLEDGE THROUGH VERBAL PROTOCOL ANALYSIS IN A TRANSFER TASK

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ABSTRACT

In this project I conduct a probing activity into the cognitive processes and level of understanding of three students of differing ability, whilst performing a short business case study. As this is an initial probe, I therefore, am not making any predictions on the results, but am clearly suggesting a preferred model of human understanding within which to interpret the data gathered throughout this activity. As such then, there is no stated research hypothesis. However, it remains an extremely worthwhile and original piece of research into the subject of ‘transfer’ in an educational setting. Furthermore, the overall mixed results, as detailed in the discussion, potentially informs the educator on how to best plan and prepare for future learning episodes.

Keywords: Understanding, Transfer, Verbal protocol, Cognitive science, Introspection, Mental faculty

1. Introduction

In setting up this project and deciding on what perspective to take in interpreting any results, I give an overview on the issue of ‘transfer’. Bransford and Schwartz (1999) believe most educators are “hopeful that students will show evidence of transfer in a variety of situations” and this belief “lies at the heart of our educational system” (p.61). However, the same authors state that research into ‘transfer of learning’ has rarely been free from criticism, due mainly to the low incidence of evidence of positive transfer in such research. This study is neither intended to confirm, nor to deny the validity of such conclusions, and it remains worthwhile and necessary to observe students whilst performing a ‘transfer task’ irrespective of the outcomes. Similarly, the main method of data collection, verbal reporting, has received much criticism historically. Introspection, as a method to study thinking, fell out of favour for a long period of time until the dawn of cognitive science, and with it, the modern IP proponents of this method.

2. Research Objective

(1) The research question for consideration is, ‘How do students of differing ability readily form new, or relate to existing notions?’ From this exercise I hope to gain some valuable insights into students’ thinking processes, and begin to further shape my pedagogy in order to counter or remove the obstacles from the development of student understanding

3. Literature Review

3.1 Theory, Concept and Related Research

Humans are intrinsically motivated to understand and develop competence. In realising the importance of that, ‘can we describe what it is?’ Perkins (1997) believes, “We know it when we see it. Teachers and indeed most of us seem to share a good intuition about how to gauge understanding” (p.41). That is true, but that does not necessarily answer the question of what it is. Perkins further elaborates on ‘understanding’ by distinguishing it from both ‘knowledge on tap’, and a ‘routine skills performance’, and considers it to be more than that.

An example of these mental distinctions, is Richard Searle’s (1980) Chinese Room experiment. In this ‘room’ the subject is given the rules, or ‘knowledge on tap’, to effectively answer questions posed using Chinese characters. The subject in the room does not understand a word of Chinese, but gives the impression to the ‘outsiders’ that they do. In this instance, if the individual went through the process several times with the same question set, it may be possible for them to stop referring to the ‘rules’, by remembering the sequences, and for it to become a mere ‘routine skills performance’. However, in observing the person from inside the room, one would never be able to say the individual understood Chinese.

The understanding is consciously recognised as a mental faculty. Philosophers have, therefore, historically thought of the ‘understanding’ as a kind of mental representation. For example, Mahan (1882) considers the faculties of consciousness, sense and reason, as primary, or intuitive faculties. For example, our ideas of time or duration and space are apprehended as being necessary by our reason. The reason, therefore, apprehends ideas of the infinite, absolute and universal, or the innate. Mahan further posits understanding to be a secondary faculty of the mind, and terms it the ‘notion-forming power’. The intellect combines the intuitions of the primary faculties, both contingent and necessary into notions or conceptions. A notion, therefore, being “a complex intellectual phenomenon, composed of intuitions”. Perhaps that is why we intuitively understand something when we do see it, irrespective that one may have been unconscious of it beforehand. Understanding can be thought of as a developing awareness of, that which is intuitive. Piaget (1963) considers the existence of innate logical-mathematical combinatorial functions as guaranteed, regardless of whether the child knows the identity thereof or not.

Perkins (Op. Cit., 1997) takes a different stance from the mental representation model and prefers to think of the understanding as a ‘flexible performance capability’. Not only, he states, do “we recognise understanding through a flexible performance criterion”, he proposes we take the view that a “flexible performance capability is the understanding”. My main reservation about this view, is that to analyse a poor

performance for example, or a lack of understanding, how or where does one begin to make inquiries? I suspect that one refers to appropriately developed mental criterion, or a model visualised by a more experienced individual.

For notions to form, as Mahan (Op. Cit., 1882) suggests, one may look upon this in the sense of input, a knowledge of facts or procedures, and when sufficiently combined, begin to form a notion or concept. Wood (1998) confirms this distinction as being a knowledge of procedure, a trained and instinctive reaction to a prompt for example, and a conceptual knowledge formed through our abstractions of that knowledge or procedure.

For teaching, it is not enough just to give information, or practise the procedures if one wishes to develop student understanding. One desires to encourage the activity of constructing mental models and notions through a variety of 'input'. In attempting to do this, one must be able to analyse the performance, or degree of 'transfer', defined as "the ability to extend what has been learned in one context to new contexts", CDSL (2000, p.51), already achieved.

Traditional transfer research has historically received a lot of criticism. Lobato (2006) states there has been little or no agreement on the nature or extent of transfer and its mechanisms. Some researchers have almost abandoned the need for research "by adopting a view that learning and transfer are conceptually indistinguishable" (p.432).

In answering criticism levelled against research into the transfer process, Bransford and Schwartz (Op. Cit., 1999) suggest that the low instances of positive transfer found in such research is due to one's perspective. Traditional transfer research and the methods used, may be too insensitive for the study of smaller changes in learning. Consequently, they have identified two areas that could exacerbate the perception of low transfer rates, 'sequestered problem solving' and 'direct application' theory. SPS is an experimental methodology in research, where free demonstrations of students' abilities to solve new problems in a typical social setting are denied. DA is the traditional 'transfer' metaphor, CDSL (Op. Cit., 2000). Whilst confirming the validity of these, they wish to broaden the conception of transfer by emphasising students' "preparation for future learning" (PFL). This shifts the focus onto "assessments of abilities to learn in knowledge-rich environments" (p.68). Their approach stresses the requirement in the learning environment for conceptual understanding foremost, and therefore when analysing transfer performance on a one-shot task in a traditional paradigm, may hide the fact of otherwise beneficial learning experiences for understanding.

Having considered the view of what it means to understand, and accepting the broad educational aims of assisting transfer, one needs to have access to the learner's thinking processes in order to assess progress in transfer and how that may best be achieved. Ericsson (2002) describes how the method of introspection was resurrected in the 1950's on account of the arrival of cognitive and IP theories for thinking processes. 'Thinking aloud' and verbal reporting became a serious method used to study thinking. Ericsson and Simon (1993, cited in Ericsson, 2002) posited that for accurate research, the "closest connection between thinking and verbal reports is found when subjects verbalise thoughts generated during task completion". In contemplating the effect of the act

of verbalising on the subject's thought sequences, the same researchers also found no concrete evidence that sequences were changed.

Smagorinsky (1998) believes that "from an IP perspective, the functional and developmental aspects of cognition are not of interest" (p.159) stating that the focus is on building relatively static models, and therefore is not developmentally oriented. If the understanding can be considered a continually developing awareness, I agree that having static models may not wholly represent reality. Smagorinsky, however, feels that protocol analysis may indeed be used by either party, but he argues that, what is important when analysing any results, is a clear idea as to how speech represents thinking. Accepting the view of Vygotsky (1987, cited in Smagorinsky, 1998, p.164) "the word or sign is fundamental to the process of concept formation and development", then the word meaning is the appropriate unit of that analysis. In consequence, "words serve as signs that represent concept development".

This study is an opportunity for the student to explain what they are doing or thinking at certain stages of a relatively complex task. As such, it is accepted that by using the method of 'explaining thinking' by a verbal report, it will undoubtedly require extra cognitive effort to formulate such responses in a social setting. This indeed would "change the sequences of mediating thought", as Ericsson (Op. Cit., 2003, p.2) suggests. This is readily noted by this author, and for this study is not under issue.

4. Research Methodology

4.1 Research Design

Framing the research around a mental model of understanding, I begin this study with a series of learning episodes concerning the importance of cash flow forecasting for a business start-up. The learning episodes (3 in all), should equip the students with a broad idea of cash flow versus profit in a business, and the basic components of a template that should be used when attempting to compile a forecast. The learning episodes also include two short, guided practise tasks.

To gather the data for this study, the participants are given the task of completing a cash flow forecast from data given in a business case study (Appendix I/II). In contemplating the level of difficulty of this task, I desired it to be comprehensive, and for this student level, challenging. It was intended not to be a test of the routine or well-practised skill, i.e. a memory test or a 'low-road transfer', Salomon and Perkins (1989). The students will experience information given in unfamiliar formats, and as such will need to be focused on extracting that data; the relevance or redundancy of data elements are to be judged accordingly by the students. Each student is allotted 20 minutes to attempt the task.

The students (3) invited to participate in this study are beginning Grade 12 (over 16 years old) in the next school year. I have known the students for approximately one year. They are well-motivated, and take a good level of interest in most classes, (CDSL, 2000; Pugh and Bergin, 2006; Dweck, 1986). The three are of differing ability when ranked using formative and summative assessment scores taken together. The students shall hereafter be referred to as, Student 1, Student 2 and Student 3, when taken from high to low performance.

The participants were given an information sheet (Appendix V) broadly outlining the research aims and requirements and accepted the invitation.

General ethical guidelines for this study (BERA and University of Nottingham as in Appendix XI), were followed throughout the task and subsequent data handling. I informed the manager of my intentions and sought approval for this study, which was duly given.

4.2 Data Collection

The main data collection methods for the discussion section are;

(i) A video/audio record of the students verbalising their thought processes at several points during the task, and

(ii) The students' completed worksheets, together with a short end of task interview using three main questions (Appendix IV).

4.3 Data Analysis

The analysis of the data will comprise referencing each student's performance to a task analysis sheet (Appendix III), detailing the processes of which an expert would likely perform in order to finish the task appropriately. By analysing this first, I will be able to focus in on problem areas relating to notions that the students may or may not have, and with using a verbal reporting method, the degree to which they hold them. These notions or concepts have been studied previously with (iv) being the subject of the most recent learning episodes prior to this study.

- i. Business profit being, Total Revenue (TR) minus Total Costs (TC)
- ii. Fixed Costs versus Variable Costs
- iii. Business Finance and the sources of finance
- iv. Business Profit versus Business cash flow

5. Research Findings

This study aimed to reveal evidence of the level of student understanding across broad notions or concepts within the realms of business knowledge. I have assessed the degree to which these were present, and the interrelatedness of these, in the students by analysing both their performance in the transfer task initially, and through the verbal reports that they were asked to give during the task. Partial transcripts are provided in the appendix.

Student 1 (Appendix VI) Student 2 (Appendix VII) Student 3 (Appendix VIII)

The task overall was very challenging for the students. A summary of their responses to the short questions is shown in Appendix IV. Students 2 and 3 provided little clear verbalisation during the task. When asked if they had any particular strategy for completing the task, Student 1 had a broad idea of what to do, while Students 2 and 3 did not have any real overall plan for attempting the task. This is quite evident in terms of the differing student performance levels. However, all three students maintained good focus throughout the exercise.

This first level of analysis (Table 1 Appendix V) is a measurement of overall student performance shown as correct items populated on the task sheet, and then as performance when compared to 'expert' elements completed (Appendix III). I had to give a mixture of both verbal and non-verbal prompts in order that the students could move through the task. I have acknowledged this whilst considering overall performance when compared to the 'expert' elements. In reviewing individual student performance and assessing the degree to which they have achieved conceptual knowledge across four main four categories, these are my main observations.

All three students were not able to discern the different treatment of fixed and variable costs in this task, and what that means for cash flow forecasting. Both the fixed and variable costs should have been populated only to the amount shown on the P&L report first, then an assumption made at the end. No student recognised this. Furthermore, these students had enormous difficulty in calculating the cash inflows required from the revenue data in the last paragraph of the case study (Appendix I). The students also made very little reference to the P&L table on the case study (Appendix I). If asked, however, I am confident that they would be able to give you a description of both business profit and fixed/variable costs. Therefore, all three students could be said not to possess the overall conceptual understanding of cash flow versus business profit.

Student 1 possessed a broad idea of how to accomplish the task, as per the interview responses given, and the confident verbal reports given at 8:12 and 9:27. These indicate that she has a good grasp procedurally on how to complete a cash-flow report. However, the format of the data given was a problem at the start, while she attempted to find the necessary amount for cash in, evidenced by the verbal report at 3:27. This student, however, was close to finishing the task, and would have, given a little more time. The data for start-up finance was given, and the cash flows for months 0 and 1 were already complete, and this information was correctly disregarded by the student.

Student 2 appeared overwhelmed; but remained calm. The student possessed no firm mental framework, and as such was hesitant in her few verbal reports. Her procedural knowledge was also quite weak, with basic totals not being completed, and much time was spent reviewing the information. The student failed to disregard the start-up finance data, and realise that months 0 and 1 were already complete, report at 7:58. She was not able to work out the P/L table in the case study, verbalised at 6:20. I would say that her concept of business profit overall is underdeveloped.

Student 3 similarly appeared submerged with the data and was fixated with the start-up finance data on two occasions, once after being prompted to ignore it. This being the last topic studied prior to these learning episodes. This student did not have a firm conceptual framework and lacked procedural knowledge. As such her verbal reports were also few and hesitant. This student, for the most part, ignored the P/L table for data needed to complete the task. Although the student worked through four of the expenses, the concepts of business profit and fixed/variable costs appeared underdeveloped.

6. Discussion

In this study I have attempted to reconcile the performances of three students of differing ability in connection to an expert model of understanding on a suitable transfer task encompassing business knowledge. In answer to the original question ‘How do students of differing ability readily form new, or relate to existing notions?’ I would have to conclude overall, that the mental steps needed to be taken by an individual in order to form any new notions take time and patience, and without a firm conceptual framework, relating existing notions to each other is extremely difficult for the novice.

The results in this study may cause alarm when making expert-novice comparisons, but in taking understanding to be a developing awareness, then I witnessed students that were trying to understand, and were motivated to develop their competence, White (Op. Cit., 1959). When not viewing the performance solely through the ‘DA theory’ lens in interpreting the performance, and appreciating the ‘SPS effect’, as Bransford and Schwartz (Op. Cit., 1999) suggest, one realises the importance of having clear and distinct models of thinking and learning from which to “look for evidence of initial learning trajectories”. Furthermore, performances on ‘one-shot’ tasks can appear poor, when the initial learning is conceptually based, as opposed to being based on a fixed set of skills or procedures. If, as they suggest, one concedes the fact that there is no education or training that can make people experts, one may only be able to set them onto a path where expertise may eventually be realised. Pugh and Bergin (Op. Cit., 2006) suggest that ‘transfer’ will increase “when students are aware of what they know and do not know, possess conditional knowledge of when and why to access certain knowledge, and apply metacognitive strategies” (p.148).

Secondly, as these students are bilingual, with an adequate grasp of English, I am mindful of the degree to which an individual has a command of the language, and the relation of that to the development of concepts, Vygotsky (1987, cited in Smagorinsky, 1998, p.164). This possibly had consequences for the method used in this study, particularly for students 2 and 3, and highlights the need for further development of specific language skills within the business studies topic.

I appreciate the need to provide the students with more worked examples and procedural practise for this topic. I also realise, that whilst necessary, there is also a diminishing effectiveness of simple and routine procedural practise. Therefore, one should assist in improving concept awareness and the building of a conceptual framework. This will inform me of my future practise. And even though we may never understand it all and, those things we do, only in a reverse sense, it is correct on this model to at least set our students onto the right path in their own learning pursuits beyond schooling.

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A NEEDS ASSESSMENT FOR ENHANCING RESEARCH COMPETENCY OF THAI TEACHERS IN 21st CENTURY

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ABSTRACT

This research was to assess the needs in enhancing Research Competency of Thai teachers in the 21st century, and to prioritize the importance of needs for the enhancement. The research included a Needs Assessment which studied the Expected and Authentic states of Research Competency in teachers in the 21st century and prioritized the needs by using the Priority Needs Index ($PNI_{modified}$). The population of this research was 1,725 teachers from 67 schools under the Pathum Thani Primary Educational Service Area Office 2. The sample used for the research was 334 teachers obtained by utilizing the Stratified Random Sampling which separate evenly into 3 groups: The Lam Luk Ka District, the Thanyaburi District, and the Nong Sua District. The instrument in this research was the Questionnaire in a 5-level Likert Rating Scale. The statistics in the data analysis were the Means, Standard Deviation, and Priority Needs Index ($PNI_{modified}$).

Findings

The findings revealed as follows:

1. The overall Research Competency by analysis, synthesis, and studies to enhance learners, the composition, or indicators of Research Competency in teacher in the Authentic state over the competency of teachers in the 21st century in 3 aspects is in the moderate level ($\bar{X} = 3.20$, S.D. = 0.14, and $PNI_{modified} = 1.09$). The item with the highest means in Research Competency is the Research Affective ($\bar{X} = 3.35$, S.D. = 0.23, and $PNI_{modified} = 0.89$), Research Psychomotor ($\bar{X} = 3.14$, S.D. = 0.20, and $PNI_{modified} = 1.22$), and the lowest one is the Research Knowledge and Understanding ($\bar{X} = 3.11$, S.D. = 0.18, and $PNI_{modified} = 1.20$). For the Expected state over the competency of teachers in the 21st century in 3 aspects was in the excellent level ($\bar{X} = 4.30$, S.D. = 0.35, and $PNI_{modified} = 1.09$) respectively. The item with the highest means was the Research Competency in Research

Psychomotor ($\bar{X} = 4.33$, S.D. = 0.41, and $PNI_{\text{modified}} = 1.22$), Research Knowledge being the second ($\bar{X} = 4.31$, S.D. = 0.34, and $PNI_{\text{modified}} = 1.20$), and the lowest one was Research Affective ($\bar{X} = 4.25$, S.D. = 0.33, and $PNI_{\text{modified}} = 0.89$).

2. The highest Priority Needs Index with immediate need for the enhancement of Research Competency in teachers in the 21st century was as follows: Research Psychomotor ($PNI_{\text{modified}} = 1.22$), Research Knowledge ($PNI_{\text{modified}} = 1.20$), and Research Affective ($PNI_{\text{modified}} = 0.89$) respectively.

Keywords: Needs Assessment, Research Competency, Priority Needs Index (PNI_{modified})

1. Introduction

Thai education has been enhanced to keep up with globalized societies by emphasizing the excellence of educational management and the desired characteristics of Thais: virtuous, talented, and able to live happily with the community. One of the important roles for such progress are teachers who are the key in educational developments. Therefore, teachers need to be competent and skillful in terms of deep academic and professional knowledge from extensive trainings, and be able to apply concepts and intentions of educational reform to a practical use in order to enhance the competence of individuals in the midst of change accordingly. To accomplish such reformation, the objectives of teacher development has been clearly determined in Chapter 4, Section 24 and 30 of National Education Act B.E. 2542 (1999) that teachers are required to conduct research in order to enhance teaching activities or utilize the learner-centered approach by encouraging teachers to use research methodology as an instrument to assist learners to be able to acquire knowledge from experiences, practices, and critical thinking consistently by themselves and apply such knowledge fittingly to the change of society. (Office of the National Education Commission, 2002: 4-15), This, in turn, helps enhance teachers to be intellectual and possess good behaviors in teaching and seeking knowledge to improve oneself and the system of continuing education progressively (Longhran; Mitchell, 2002: 107).

For its missions, experts and scholars have determined the proficiency assessment of teachers which mentions the proficiency in researching to enhance learners with 3 criteria: 1. Able to design and conduct the research systematically and accordingly to the plan 2. Able to verify the accuracy and reliability of the research systematically 3. Able to apply the result to other cases in similar contexts (Teachers and Basic Education Personnel Development Bureau, 2015). The role of teachers as instructors and researchers becomes more explicit after the standard formulation of basic education to ensure the quality in academic institutions as stated in Indicator 7.7 that teachers are able to conduct research, enhance the learning in courses they are in charge of, and apply the result to the adjustment (Bureau of Educational Testing, Office of the Basic Education Commission, 2016).

The research methodology will play an important role in teaching as it helps in understanding the process of learning in learners, yielding questions regarding the teaching activities, and applying the methodology to enhance the activities. Therefore, the efficacy of the teachers will be considered as the "Research Competency"

which is the ability realized by performing as researcher with classrooms as a context of the research and utilizing the methodology as the main part of teaching activities. The Research Competency, in turn, will also be a critical characteristic of teachers that directly influence the development in quality of teaching and standardized performance as an instructor (Bellanca & Brandt, 2010; Evertson et al., 2003; as cited in Aypay, 2009).

It is acknowledged that, to become a research instructor, teachers will need to be more competent in accordance with the National Education Act and its operation, along with ever-changing knowledge in present time. The acquisition of such knowledge will need to rely on methods that base on concepts, evidence, and reliable sources which are considered crucial in performing as an independent, competent instructor. However, as indicated in many studies regarding the conditions of researching by instructors, teachers are unmotivated to do so for they lack knowledge, understanding, and experience in conducting research as they see no point in it. To simplify, they do not consider research as part of being an instructor. The complications of time and annual duties, funding, learning resources, and necessary consultations also contribute to the obstacles to effective development and training (Berger et al., 2005). This parallels with an interview given by Miss Nongnapat Chiwaklinsak, a Science teacher at Wat Ladsanun School, Pathum Thani, Thailand, that provides an overall insight to the problem, saying that it stems from the fact that most teachers lack knowledge and experience to conduct research as some academic institutions do not offer opportunity to do so, except those who graduated from the Master degree. There are insufficient specialists who can give advice to younger teachers that were trained to conduct a full research during their fifth year of study in colleges. As a consequence, substantial differences in researching in each school such as competency, opportunity, time, and environment become limitations to teachers who, determined to enhance the learning, ultimately give up and see the task as cumbersome and irrelevant to teaching. Teachers will need apparent, easy-to-understand, and practical reinforcement to help enhance Research Competency. Yet, the circumstances of enhancing the role as research instructors still face many barriers with the lack of knowledge and experience in researching of the teachers being one of the factors. One solution is to understand the problems and needs from the research conducted by the teachers, especially the teaching management to provide convenience to teachers by designing the research from diverse learnings. This is to help teachers understand the methodology and emphasize positive attitude that research in classroom are not as difficult as they believe, and that they can conduct research while they teach in class. It also helps the teachers to accentuate necessary and practical ability which they can utilize with the research methodology in enhancing the teaching activities to reach the desired outcome (Saunders, 2006).

Solutions or personnel development needs to begin from the stage of planning. The most critical and the first step to such development is to conduct a Needs Assessment, an evaluation of issues found inside organization, by comparing between what it should be and what it really is. The gap will reflect the problems of the organization which need to be reprioritized to determine the objective desired (Wongwanich, 2015: 133-138). The process of a complete Needs Assessment consists of 3 parts: (1) Needs identification, (2) Needs analysis (to determine the cause), and (3) Needs solution. In terms of practicality, however, the scope of the Needs Assessment may not need to include all 3 parts. Therefore, the process of the assessment depends on questions

and the scope of the research. For this study, the researchers are interested in studying the Authentic and Expected sets of data in building Research Competency for teachers in the 21st century in order to reorganize the needs gathered from the research to help enhance such competency of the teachers. This is to help decide the best method to enhance the teacher accordingly to the real conditions of the 21st century research instructors which will help save cost, time, and consequences to the teachers. The researchers are aware of the enhancement of teachers as an important mechanism which helps enhance learners, and the reinforcement of Research Competency in teachers, the main goal towards self-improvement and the enhancement of the career, contributing to a professional learning society where teachers are able to keep pace with the digital world and other changes, becoming productive academic leaders who can enhance their teaching activities to elevate the quality of achievements in learners to be virtuous, talented, and able to live happily with the community.

2. Research Objective

The aims of this research were to: (1) assess the needs in enhancing Research Competency in teachers and (2) prioritize the needs needed to enhance Research Competency of the teachers.

3. Literature Review

3.1. Theory, Concept, and Related Research

This research involves a Needs Assessment which intends to study the Research Competency of teachers from the Pathum Thani Primary Educational Service Area Office 2. According to documents and related research regarding the competency, domestic and international researchers have given a similar insight that competency is a nurtured ability obtained to apply in teaching activities in terms of using the research methodology as the basis of teaching aimed to find solutions, improve learning and the activities. Teacher Competency is distinctive from Research Competency in terms of interactions that occurs from the teaching and experience of the teacher inside the class. Therefore, the competency mainly consists of Teacher Competency and Research Competency.

For the Research Competency in teachers, the researchers have based on the concept of McClelland's Iceberg Model (1973: 9) which explains the differences between individuals by comparing to the iceberg. The most obvious parts are the ones above the surface: The Knowledge, and the Skills. The obscured parts are those under the water: The Personality of individual. The behavior of an individual is explained with the model of iceberg. The Knowledge and Skills above; the Social Role, Self-image, Traits, and Motives below. This is to help teachers display appropriate behaviors and promote their productivity.

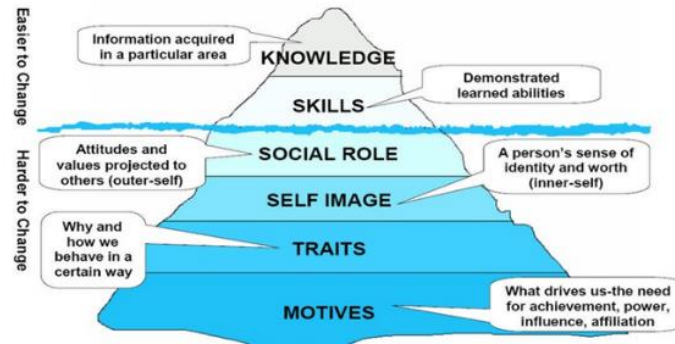


Figure 1. McClelland's Iceberg Model of Competences (McClelland, 1973: 9)

4. Research Methodology

4.1. Research Design

The research was designed to be a Needs Assessment with the method of Needs identification to help enhance Research Competency of the 21st century teachers. The process was as follows:

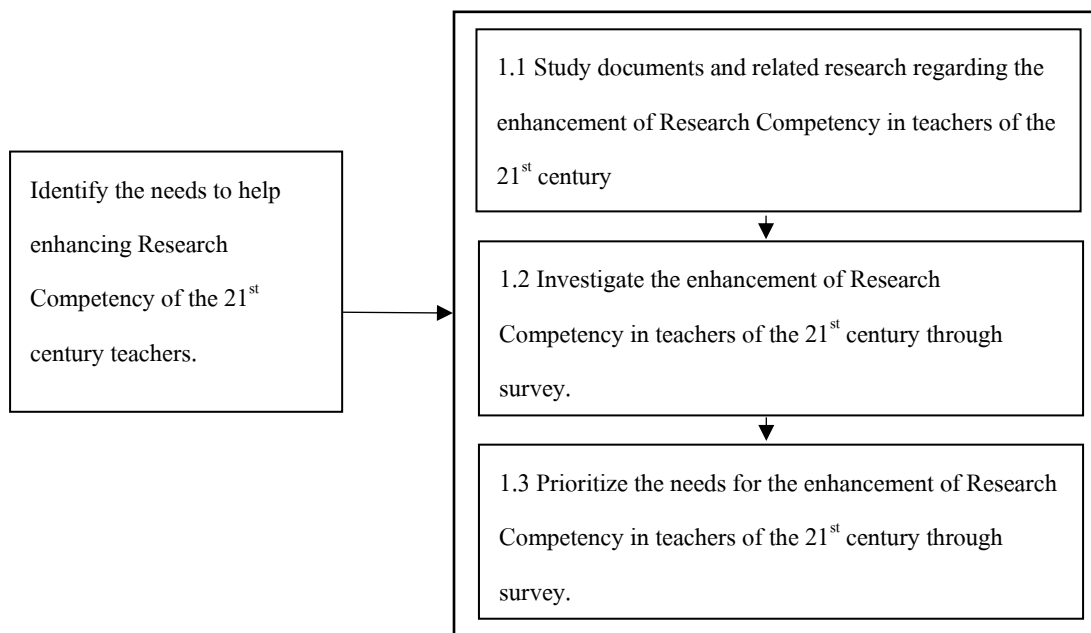


Figure 2. The process of identifying the needs for the enhancement of Research Competency of Thai teachers in the 21st century.

4.2. Population and Sample

Population

The population in this research was 1,725 teachers from 67 schools under the Pathum Thani Primary Educational Service Area Office 2.

Sample

The sample in this research was teachers from the Pathum Thani Primary Educational Service Area Office 2 by categorizing the sample size with Sample Size table. The size of the sample used for identifying the means of population was 334 teachers at 95% Confidence Interval and $\pm 5\%$ Margin of Error (Kanchanawasi et al., 2004: 15) achieved by Stratified Random Sampling with the size of the District Group categorized as Strata, and teachers as the Sampling Unit. The research split each Strata into an even ratio (3 districts with 1,725 teachers in total).

1. Identifying the number of teachers from the Human Resources Department
2. Integrating the number into 1,725 teachers in total
3. Utilizing the Sample Size table to identify the size of sample for the means of population at 95% Confidence Interval and $\pm 5\%$ Margin of Error (334 teachers)
4. Calculating the ratio of teachers in each District Group.
5. Utilizing the Simple Random Sampling with the teachers in each District Group

Table 1. Population and Sample used in the research.

| District Group | No. of Teachers | No. of Sample in ratio |
|---------------------|-----------------|------------------------|
| Lam Luk Ka District | 600 | 116 |
| Thanyaburi District | 575 | 111 |
| Nong Sua District | 550 | 107 |
| Total | 1,725 | 334 |

(Report of Teachers and Educational Personnel in Pathum Thani Primary Educational Service Area Office 2, 2020)

4.3. Research Instrument

The instrument used for this research was the Needs Assessment as a questionnaire to collect data from 334 teachers to enhance Research Competency of teachers. The aim of the questionnaire was to acquire information regarding the Authentic and Expected needs to enhance the competency in teachers of the Pathum Thani Primary Educational Service Area Office 2. The assessment was categorized into 2 parts as follows:

Part 1: The status of the respondents

Part 2: The questionnaire regarding the Authentic and Expected needs to enhance the competency in teachers of the Pathum Thani Primary Educational Service Area Office 2. The questionnaire is put into a 5-level Likert Rating Scale (Likert, 1967).

After that, the questionnaire would be presented to the advisor to verify and give suggestions for further revision. Then, 5 specialists would verify its Content Validity by using the Index of Item-Objective Congruence (IOC). The analysis found the value between 0.60-1.00. The questionnaire would then be tried out to find its Reliability after being analyzed with Cronbach's Alpha Coefficient. All copies of the questionnaire displayed the value of 0.94. The questionnaire was finalized to collect data from the sample.

4.4. Data Collection

The researchers sent official correspondence from the Faculty of Industrial Education and Technology, King Mongkut's Institute of Technology Ladkrabang to the Pathum Thani Primary Educational Service Area Office 2, then sent 400 copies of the questionnaire via electronic mail (Email) to the schools in district groups. 334 Reply emails were received.

4.5. Data Analysis

1. The researchers used the statistics to analyze the data by using the Means and Standard Deviation as the statistics and data of Research Competency enhancement in teachers of the 21st century.

2. The researchers prioritized the needs for enhancing Research Competency in teachers of the 21st century with the data from the analysis by using the $(PNI_{modified})$ formular (Wongwanich, 2015: 279).

Priority Needs Index (Revised) $(PNI_{modified})$

$$(PNI_{modified}) = (I-D)/D$$

With "I" (Importance) as the Expected Means

"D" (Degree of Success) as the Authentic Menas

5. Research Findings

The analysis of the Needs Assessment for enhancing the Research Competency in teachers of the 21st century by analysis, synthesis, and studies to enhance learners, the composition, or indicators of Research Competency in teacher consists of 3 aspects: Research Knowledge and Understanding, Research Affective, and Research Psychomotor.

The Authentic state over the competency of teachers in the 21st century in 3 aspects is in the moderate level ($\bar{X} = 3.20$, S.D. = 0.14, and $PNI_{modified} = 1.09$) respectively. The item with the highest means in Research Competency is the Research Affective ($\bar{X} = 3.35$, S.D. = 0.23, and $PNI_{modified} = 0.89$), Research Psychomotor ($\bar{X} = 3.14$, S.D. = 0.20, and $PNI_{modified} = 1.22$), and the lowest one is the Research Knowledge and Understanding ($\bar{X} = 3.11$, S.D. = 0.18, and $PNI_{modified} = 1.20$).

The Expected state over the competency of teachers in the 21st century in 3 aspects was in the excellent level ($\bar{X} = 4.30$, S.D. = 0.35, and $PNI_{modified} = 1.09$) respectively. The item with the highest means was the Research Competency in Research Psychomotor ($\bar{X} = 4.33$, S.D. = 0.41, and $PNI_{modified} = 1.22$), Research Knowledge being the second ($\bar{X} = 4.31$, S.D. = 0.34, and $PNI_{modified} = 1.20$), and the lowest one was Research Affective ($\bar{X} = 4.25$, S.D. = 0.33, and $PNI_{modified} = 0.89$).

As seen from Table 2, it can be concluded that the Priority Needs Index ($PNI_{modified}$) for the enhancement of Research Competency in teachers of the 21st century ranges from 0.89 – 1.22. The items that need immediate priority are as follows: Research Psychomotor ($PNI_{modified} = 1.22$), Research Knowledge and Understanding ($PNI_{modified} = 1.20$), and Research Affective ($PNI_{modified} = 0.89$) respectively.

Table 2. The Means (\bar{X}) and Standard Deviation (S.D.) of the Authentic and the Expected for the enhancement of Research Competency in teachers of the 21st century.

| Items | Authentic | | Expected | | PNI _(modified) | Prioritizing |
|--|-----------|------|-----------|------|---------------------------|--------------|
| | \bar{X} | S.D. | \bar{X} | S.D. | | |
| Research Knowledge and Understanding | | | | | | |
| 1. The competency of basic knowledge and concepts of research | 3.13 | 0.26 | 4.22 | 0.27 | 1.09 | 5 |
| 2. The competency of understanding in defining research problems | 3.08 | 0.29 | 4.34 | 0.44 | 1.26 | 2 |
| 3. The competency of understanding in using IT and learning resources for research | 3.24 | 0.33 | 4.34 | 0.46 | 1.10 | 4 |
| 4. The competency of understanding in research methodology | 3.00 | 0.31 | 4.40 | 0.43 | 1.40 | 1 |
| 5. The competency of interpretation and analysis | 3.08 | 0.48 | 4.27 | 0.43 | 1.19 | 3 |
| Total | 3.11 | 0.18 | 4.31 | 0.34 | 1.20 | 2 |
| Research Affective (Attitude) | | | | | | |
| 1. Willingness | 3.31 | 0.33 | 4.33 | 0.39 | 1.02 | 1 |
| 2. Enthusiasm | 3.16 | 0.60 | 4.08 | 0.23 | 0.92 | 3 |
| 3. Academic Reasoning | 3.39 | 0.44 | 4.16 | 0.33 | 0.77 | 5 |
| 4. Dedication and Responsibility | 3.34 | 0.49 | 4.30 | 0.44 | 0.96 | 2 |
| 5. Research Codes and Ethics | 3.58 | 0.36 | 4.36 | 0.47 | 0.78 | 4 |
| Total | 3.35 | 0.23 | 4.25 | 0.33 | 0.89 | 3 |
| Research Psychomotor (Skills) | | | | | | |
| 1. The competency in defining research problems | 3.20 | 0.22 | 4.32 | 0.42 | 1.26 | 2 |
| 2. The competency of understanding in using IT and learning resources for research | 3.06 | 0.31 | 4.34 | 0.45 | 1.28 | 1 |
| 3. The competency of knowledge and understanding in research methodology | 3.17 | 0.22 | 4.35 | 0.40 | 1.18 | 3 |
| 4. The competency in analysis and guidelines for further applications | 3.13 | 0.37 | 4.30 | 0.42 | 1.17 | 4 |
| Total | 3.14 | 0.20 | 4.33 | 0.41 | 1.22 | 1 |
| Overall | 3.20 | 0.14 | 4.30 | 0.35 | 1.09 | |

6. Discussion

The Authentic state over the competency of teachers in the 21st century in 3 aspects is in the moderate level ($\bar{X} = 3.20$, S.D. = 0.14, and $PNI_{\text{modified}} = 1.09$) respectively. The item with the highest means in Research Competency is the Research Affective ($\bar{X} = 3.35$, S.D. = 0.23, and $PNI_{\text{modified}} = 0.89$), Research Psychomotor ($\bar{X} = 3.14$, S.D. = 0.20, and $PNI_{\text{modified}} = 1.22$), and the lowest one is the Research Knowledge and Understanding ($\bar{X} = 3.11$, S.D. = 0.18, and $PNI_{\text{modified}} = 1.20$).

It is found that most teachers lack research competency which may be due to personal reasons. As they are already overloaded with teaching in class, along with the lack of motivation and support from related departments, teachers are less likely to dedicate themselves for research. Most academic research are not in line with research methodology as many teachers do not understand in researching. This is in accordance with the concepts of building a positive attitude (Kanter 1981: 72-82) which state that individuals who receive supports are more likely to be willing and eager to learn, dedicated, responsible, and enthusiastic about achieving success. Those who lack support or possess negative attitude, however, will lose enthusiasm and dedication to work (Becker, 1994: 35). Individual that receives support will be able to improve their potentials, achieve the goals, and feel a sense of self-worth which helps when working as team, leading to the success of the organization and perception of one's own abilities.

The Expected state over the competency of teachers in the 21st century in 3 aspects was in the excellent level ($\bar{X} = 4.30$, S.D. = 0.35, and $PNI_{\text{modified}} = 1.09$) respectively. The item with the highest means was the Research Competency in Research Psychomotor ($\bar{X} = 4.33$, S.D. = 0.41, and $PNI_{\text{modified}} = 1.22$), Research Knowledge being the second ($\bar{X} = 4.31$, S.D. = 0.34, and $PNI_{\text{modified}} = 1.20$), and the lowest one was Research Affective ($\bar{X} = 4.25$, S.D. = 0.33, and $PNI_{\text{modified}} = 0.89$). The highest Priority Needs Index with immediate need for the enhancement of Research Competency in teachers in the 21st century was as follows: Research Psychomotor ($PNI_{\text{modified}} = 1.22$), Research Knowledge ($PNI_{\text{modified}} = 1.20$), and Research Affective ($PNI_{\text{modified}} = 0.89$) respectively, in accordance with Classroom Action Research.

It is found that most teachers lack in understanding of the research methodology, motivation, support, learning resources, and advice to conduct research. They are overwhelmed with duties other than teaching in class, along with insufficient funds from the school board. Moreover, the reason that many teachers lack research competency to enhance learners is because they cannot see the point of doing so as they believe research cannot be utilized to enhance teaching and learning. In other word, it has failed to elevate the research competency in terms of practicality which affects the expectations of research competency in teachers of the 21st century. According to many research, (Pornchai, P., 2018: 27-29), (Suksunai, D., Wiratchai, N. & Khemmani, T., 2011) it is stated that one of the factors for the failure is the fear in researching (Berger, J. E., Boles, K. C. & Troen, V., 2005) when, in actuality, research and teaching activities depend on each other (Saunders, L., 2006)

7. Suggestion

1. Research should be developed for courses and activities that promote the skills in Research Competency.

2. Curriculums that can help with the development of teachers' ability in content development are needed to be created. Ideas are also needed to be given to help organize teaching activities using the multimedia.

3. The School Director or related personnel in managing the curriculum in institutions can utilize the data in this research as an instrument or a guideline in developing the institution and instructors.

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THE INFLUENCE OF STORYTELLING TECHNIQUES IN CHINESE SCIENCE FICTION FILMS AND CHINESE CULTURAL VALUES ON THE PERCEPTION OF FILM REALITY AMONG CHINESE AUDIENCE

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ABSTRACT

This research aimed to explore the influence of Chinese science fiction film's storytelling techniques and cultural values on Chinese audiences' perception of film reality. The survey research used online questionnaires to examine the perception of 231 Chinese audiences aged 18-41 years old, who have watched the film "The Wandering Earth (2019)" at least once. The researchers used Spearman Correlation and Multiple Regression analysis to test the hypotheses at the significance level at 0.05. The survey found the following results: Firstly, storytelling techniques in science fiction films were positively correlated with the Chinese respondents' perceived cultural values. Among them, respondents had the highest perception toward visual and scene among all storytelling techniques. Secondly, their perception of Masculinity and Confucian dynamism significantly influenced the perception of film reality. Thirdly, conflict, and structure are the two storytelling techniques that significantly influenced the perception of film reality. The knowledge will certainly increase the body of knowledge about the current storytelling techniques of Science Fiction in China, and it will increase the role of the film in China in reinforcing Chinese cultural values and in shaping the audience's perception of reality in their life.

Keywords: Chinese audience, Chinese Sci-Fi films, film storytelling techniques, film reality, cultural values

1. Introduction

For a long time, China's world-famous films are mainly Kung Fu films, such as the series of films starring Jackie Chan and Bruce Lee, and family ethics films, such as the series directed by Ang Lee and Zhang Yimou. But in the field of science fiction, China is far behind the Western countries. Western films are far ahead

of China in terms of technology and content. Until the beginning of 2019, there was a Sci-Fi film made entirely in China, “The Wandering Earth”, was ranked the highest box office of Sci-Fi films in China. Although such achievements cannot represent the complete rise of China's Sci-Fi films, it indicated that China's Sci-Fi films are no longer far behind the Western countries in terms of technology and quality, and have begun to be recognized by Chinese audiences.

As an ancient civilization for more than 5000 years, China has its own cultural values which are different from western countries. Chivalry, ethics, and worldly sophistication, which are different from the values of Western countries, have created a unique Chinese film. Each country's cultural values will be reflected in its own country's films, and then conveyed to different audiences through the film. It is undeniable that due to the lack of technology and backwardness, China's Sci-Fi films have always been unable to grasp the right to speak, and even have no international status. Now that China's technology is gradually improving, can Chinese directors use Chinese unique narrative methods to embody all kinds of excellent and unique cultural values of China in the past five thousand years in Sci-Fi films, so that Chinese Sci-Fi films, like ethical films and Kung Fu films, can have a place in the international film industry?

Based on Hofstede's Cultural dimension, the storytelling techniques portrayed in the film created an impression or perception on the film differently depending upon how the film reinforces or changes the cultural values that the audience previously had. Thus, their perception of the storytelling techniques will affect how the audience appreciated the unique charm of the film, for people tend to appreciate the film contents if it resonates with their past beliefs. If the audience recognized and perceived these values clearly, they will unconsciously change their way of life, or change their values. And, these films that can be recognized by most people will also gain more audiences' popularity, leading to the highest box office of Sci-Fi films or not. Therefore, this research will explore the influence of storytelling techniques and cultural values on the Chinese audience's perception of film reality or the degree to which individual perceived how well the film accurately represents real life, which was posited by Hawking (1977 cited in Perse, 2009). In the past, very limited study was conducted to examine the storytelling techniques in the film contents especially on Chinese Science film and how the Sci-Fi film affected how Chinese people perceived reality.

2. Research Objectives

1. To examine the relationship between storytelling techniques of the Sci-fi film named “The Wandering Earth” and the cultural values as perceived by young Chinese people.
2. To examine the influence of young Chinese audience's cultural values on their perception of film reality on “The Wandering Earth”.
3. To examine the influence of storytelling techniques of “The Wandering Earth” on their perception of film reality.

3. Literature Review

Impact of film in shaping people's value and beliefs

Each film contains one or more meaningful stories. It is through these wonderful stories that the audience perceived the reality of the film and then understands the ideas or values the director wants to convey. So, how to tell a good story in a film is a very important thing. As a special type of film, Sci-Fi films infected audiences with emotional resonance through character narratives, thereby achieving cross-cultural communication. The director conveyed deeper practical significance through the film, arouse people and society to reflect, and thus realize the value of communication (Yang, 2019). Yang (2010) mentioned in his research on the film "Crouching Tiger, Hidden Dragon (2000)" directed by Ang Lee that the film can integrate different values of China and the United States and resonate with the audience, which is an effective means of intercultural communication. Films can use an innovative worldview to reconstruct and breakthrough traditional cultural values. Storytelling techniques are a way to narrate the story by using 5 factors including character, structure, plot, scene, conflict, dialogue, resolution, and visual.

Hofstede's concept of cultural dimension

Geert Hofstede is a very important person in the field of cross-cultural communication. His "cultural dimension" theory has been widely recognized by many scholars and researchers, and introduced and quoted it. From 1980 to 2011, he divided culture into six dimensions: Power distance (PDI), individualism (IDV), Masculinity (MAS), and uncertainty avoidance (UAI), long term versus short term orientation (LTO) "and indulgence and restraint (IND) (Hofstede, 2011). He described the six cultural dimensions as follows: (1) Power distance is the degree to which weaker members of organizations (such as families) accept and expect uneven distribution of power. The difference of power distance is reflected by power distance index (PDI). (2) Individualism and collectivism (IDV): individualism can be defined as the degree to which a society maintains interdependence among its members. Individualism tends to loose social relations between people. Community collectivism tends to focus on the relationship within the group. Individuals in this society must be loyal to the community. The position of society in this dimension is reflected in whether people's self-image is defined by "I" or "we". (3) Masculinity and femininity (MAS): masculinity represents a society's preference for achievement, heroism, determination and material rewards for success. The whole society is more competitive. Femininity represents a preference for cooperation, modesty, concern for the weak and quality of life. (4) Uncertainty Avoidance Index (UAI) indicated the degree of discomfort of social members to uncertainty and ambiguity. A culture that encourages its members to overcome and develop the future can be seen as a strong culture to avoid uncertainty. Otherwise, educating its members to accept risks, learn to tolerate and accept different behaviors can be regarded as weak uncertainty avoidance culture. (5) Long term orientation and short term orientation (LTO): In 1991, Hofstede added Confucian Dynamism, which he called long-term orientation (LTO), as the fifth of his dimensions of cultural values. Studies have shown that the decision-making of a society is influenced by traditional and past events or by present or future events. Short term oriented societies tend to retain tried and tested traditions and norms while observing social changes suspiciously. On the other hand, in the long-term

orientation society, they encourage frugality and modern education efforts to prepare for the future. (6) Indulgence and restraint (IND): the sixth new dimension is indulgence and restraint, which is the extension of the Confucian Dynamism. Indulgence represents a society, which allows people relatively free to satisfy the basic and natural human desires related to enjoying life and entertainment. Restraint represents a society in which control needs are met and regulated by strict social norms (Hofstede, 2011).

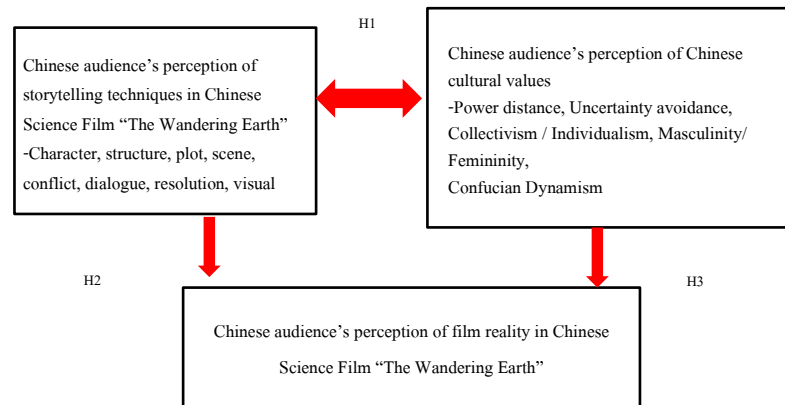
Chinese cultural values

The thoughts of harmonious coexistence, benevolence, harmony without uniformity, and great harmony in the world were embodied in contemporary Chinese values. In addition, the concept of “harmonious society” is of positive significance for promoting the exchange of world civilizations and peaceful development (Luo & Kong, 2015). Chinese mainstream culture emphasizes collectivism, power distance and harmony within groups (Liang, 2003). Ju and Qin (2019) said in the analysis of cultural dimension theory that China is a typical country with high power distance, high uncertainty avoidance, masculinity, long-term orientation and collectivism. Hence, the researcher will use Hofstede’s Cultural Dimension to examine the contemporary Chinese cultural values after the Sci-fi film named “The Wandering Earth”, which might have changed from the previous studies.

The Central Hypothesis of Cultivation theory

The central hypothesis of Cultivation theory is that the longer people spend on TV, the more likely their beliefs and assumptions about life and society are consistent with the most stable and repetitive information on TV (Gerbner & Gross, 1976). In the study of Cultivation Theory by Morgan et al. (2016), people are more susceptible to the influence of the media after watching TV in large numbers. At the same time, people will watch TV selectively, and their understanding of TV content will also be different. In addition, previous research has shown that television makes a small but important contribution to viewers’ beliefs in the world (Morgan, Shanahan, & Signorielli, 2016). Rubin (2009) found that the film content shaped audience’s film reality if it resonates with their personal experience, values, and beliefs. Each culture has its own advantages and disadvantages, strengths and weaknesses, and the exchange of various cultures, complement each other, is the mainstream of historical development. Thus, China's unique natural, social, and historical characteristics have formed values that center on harmonious thinking of Chinese audience (Chang, 2007). Perception of film reality can be described in 3 dimensions, including the magic window, instruction, and identity. Magic window refers to the degree that the audience believes that TV content is a constant and accurate expression of real life. Instruction refers to the audience using TV as a teaching aid. Identity refers to the audience between the TV characters and the scene and in reality the perceived similarity between life experiences (Rubin & Mary, 2009). Hence, this study used Hofstede’s Cultural Dimension and Cultivation theory to develop the theoretical framework and hypotheses as follows:

3.2 Research Framework



3.3 Research Hypotheses

Hypothesis 1: Perception to storytelling techniques of Chinese Sci-fi film “The Wandering Earth” (i.e., character, plot, conflict, resolution, structure, scene, dialogues, and visuals) are positively correlated with cultural values among Chinese audience.

Hypothesis 2: Cultural values (i.e., power distance, uncertainty avoidance, collectivism/individualism, masculinity/femininity, and Confucian Dynamism) of Chinese audience significantly influence their perception of film reality in “The Wandering Earth”.(i.e., Magic window, instruction, and identity).

Hypothesis 3: Perception to storytelling techniques of Chinese Sci-fi film “The Wandering Earth” significantly influences their perception of film reality (i.e. Magic window, instruction, and identity).

4. Research Methodology

4.1 Research Design

The aims of Hollywood films is to show humanity, spread American values, and increase audience's cultural identity with the United States (Wang, 2018). Researchers believe that these aims of Chinese films are to disseminate Chinese cultural values and to increase the audience's recognition of Chinese culture. So does science fiction movies. "Wandering earth" is an excellent science fiction film in China. Hence, the researcher has sent an online survey to Chinese respondents through Wechat .

4.2 Population and Sample

The target population of this study is Chinese audience between the ages of 18 and 41, who loved watching films and have watched the film "The Wandering Earth (2019)" at least once. 231 respondents were selected using purposive sampling and convenience sampling method.

4.3 Research Instrument

The questionnaire is divided into 4 sections, including demographic profile of the respondents, the respondents' perception on the storytelling techniques of Chinese Sci-Fi film, and the reality of Chinese Sci-Fi films for audience films. In Section 1, the 4 questions are nominal and ordinal scale, asking about whether they have watched the Sci-Fi film “The Wandering Earth (2019)”, gender, age, and educational background. Section

2 asked about the respondents' perception on the storytelling techniques of Chinese Sci-Fi films. There are 16 statements, describing about the storytelling techniques portrayed in the film, dividing into 8 key constructs, including character, structure, plot, scene, conflict, dialogues, resolution, and visuals. The questions used 5-point-likert scale, arranging from 5 "Strongly agree" to 1 "strongly disagree". Section 3 asked about the respondents' perception of Chinese cultural values portrayed in Chinese Sci-Fi film. There are 15 statements that described how the film portrayed the six dimensions of Chinese cultural values, as suggested by Hofstede's Cultural Dimension (2011). The questions used 5-point-likert scale, arranging from 5 "Strongly agree" to 1 "strongly disagree" for Section 3. Section 4 asked about the respondents' perception of film reality, cited from Rubin (2009 cited from Wang, 2018). The film reality scale has 19 statements, dividing into three constructs, including magic window, instruction, and identity.

4.4 Data Collection

These data were collected via WeChat in June 1- July 15, 2020, because WeChat is the social media with the largest number of users in China and the widest age range of users. The researchers collected a total of 231 to complete questionnaire. The questionnaire was translated into Chinese and did back translation into English to promote content validity. The questionnaires were pretested. Four sections of the questions had reliability higher than 0.70, which indicated the questionnaire is reliable (i.e. Cronbach alpha of perception of storytelling techniques was 0.866, Cronbach alpha of perception of Chinese cultural values was 0.886, and Cronbach alpha of perception of film reality was 0.964).

4.5 Data Analysis

The independent variable of Hypothesis 1 is perception of storytelling techniques in Chinese Sci-Fi films and the dependent variable is perception of the cultural values of the Chinese audience. Spearman Correlation was used to test hypothesis 1. The independent variable of Hypothesis 2 is perception of the cultural values of the Chinese audience and the dependent variable is Chinese audiences' perceptions of film reality. Multiple Regression was used to test hypothesis 2. The independent variable of Hypothesis 3 is perception of storytelling techniques in Chinese Sci-Fi films and the dependent variable is Chinese audience's perception of film reality. Multiple Regression was used to test hypothesis 3.

5. Research Findings

5.1 Descriptive findings

The descriptive findings showed that most of the respondents were female (69.3%, n=160), followed by male (30.7%, n=71). Most of the respondents were aged 18-23 years (49.4%, n = 114), followed by those aged 24-29 years old (27.7%, n = 64), respondents aged 30-35 years old (15.6%, n=36) and 36-41 years old (7.4%, n=17). All respondents have watched the film "The Wandering Earth (2019)". Majority of the respondents completed bachelor's degree (72.7%, n=168), followed by those with vocational diploma (13.9%, n=32) and they earned a master's degree (7.8%, n=18). The remaining respondents accounted for 5.7% of the total sample, respectively.

The survey results showed that among all eight storytelling techniques, Chinese audiences had the highest perception toward visuals (Mean = 4.29, SD = 0.66), followed by scene (Mean = 4.18, SD = 0.72), characters (Mean = 4.10, SD = 0.72), plot (Mean = 3.91, SD = 0.79), structure (Mean = 3.90, SD = 0.77), resolution (Mean = 3.81, SD = 0.79), conflict (Mean = 3.80, SD = 0.72), dialogues (Mean = 3.61, SD = 0.90), respectively. Chinese audiences perceived collectivism/individualism (Mean = 3.99, SD = 0.69) the most, followed by Confucian Dynamism (Mean = 3.95, SD = 0.70), masculinity/Femininity (Mean = 3.86, SD = 0.74), uncertainty avoidance (Mean = 3.91, SD = 0.73), power distance (Mean = 3.55, SD = 0.76), respectively. Chinese audiences perceived identity (Mean = 3.88, SD = 0.71) the most, followed by instruction (Mean = 3.71, SD = 0.77) and Magic window (Mean = 3.43, SD = 0.86).

5.2 Testing Hypothesis Findings

Hypothesis 1 results (shown in Table 1) found that there was a positive relationship between Chinese audiences' perception to storytelling techniques and perception of Chinese cultural values ($r^2 = 0.740^{**}$, $p < 0.05$). The results suggested that the higher the perception to storytelling techniques, the higher perception to the cultural values. The hypothesis 1 was supported.

Table 1: The correlation between storytelling techniques and cultural values in the film “The Wandering Earth (2019)”

| | | | Storytelling techniques | Cultural values |
|----------------|-------------------------|-------------------------|-------------------------|--------------------|
| Spearman's rho | Storytelling techniques | Correlation Coefficient | 1.000 | .740 ^{**} |
| | | Sig. (2-tailed) | | .000 |
| | | N | 231 | 231 |
| | Chinese Cultural values | Correlation Coefficient | .740 ^{**} | 1.000 |
| | | Sig. (2-tailed) | .000 | |
| | | N | 231 | 231 |

^{**}. Correlation is significant at the 0.01 level (2-tailed).

Hypothesis 2 results (shown in Table 2) revealed that Chinese respondents' perception of cultural values had a significant effect on their perception of film reality ($R^2 = 0.391^{**}$, $p < 0.05$). When examining each dimension of cultural values, the findings found that perception of masculinity/ femininity had the highest influence (Beta = 0.138^{**}, $p < 0.05$), followed by Confucian Dynamism (Beta = 0.224^{**}, $p < 0.05$), but uncertainty avoidance (Beta = 0.122, $p > 0.05$), power distance (Beta = 0.099, $p > 0.05$), and collectivism / individualism (Beta = 0.318, $p > 0.05$) were not significant predictors of film reality. Hypothesis 2 was partially supported.

Table 2: Regression analysis on the influence of cultural values on the perception of film reality

| Regression Analysis Table | | | | | | | | |
|--|----------------------------|-----------------------------|------------|---------------------------|-------|-------|---------------------------------|-------------|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | 95.0% Confidence Interval for B | |
| | | B | Std. Error | Beta | | | Lower Bound | Upper Bound |
| 1 | (Constant) | 1.04 | 0.236 | | 4.409 | 0.000 | 0.575 | 1.504 |
| | Power Distance | 0.089 | 0.06 | 0.099 | 1.488 | 0.138 | -0.029 | 0.207 |
| | Uncertainty Avoidance | 0.114 | 0.071 | 0.122 | 1.603 | 0.110 | -0.026 | 0.255 |
| | Collectivism/Individualism | -0.032 | 0.078 | -0.032 | -0.41 | 0.682 | -0.187 | 0.122 |
| | Masculinity/ Femininity | 0.299 | 0.079 | 0.318 | 3.774 | 0.000 | 0.143 | 0.455 |
| | Confucian Dynamism | 0.22 | 0.08 | 0.224 | 2.747 | 0.007 | 0.062 | 0.377 |
| 1. Predictors: (Constant), Confucian Dynamism, Power Distance, Collectivism/Individualism, Uncertainty Avoidance, Masculinity/Feminism | | | | | | | | |
| 2. Dependent Variable: Film Reality , $R^2 = 0.391^{**}$, $p < 0.05$, $F = 28.935$, $df = 5$ | | | | | | | | |

Hypothesis 3 results (shown in Table 3) revealed that the perception to storytelling techniques in films can significantly affect the perception of Chinese audiences about film reality ($R^2 = 0.326^{**}$, $p < 0.05$). When examining each construct of the storytelling techniques, the findings found that conflict (Beta = 0.217^{**}, $p < .05$) had the highest influence on their perception of film reality, followed by structure (Beta = 0.216^{**}, $p < .05$), respectively. However, other constructs including character (Beta = -0.034, $p > 0.05$), plot (Beta = 0.141, $p > 0.05$), resolution (Beta = 0.035, $p > 0.05$), scene (Beta = 0.121, $p > 0.05$), visuals (Beta = 0.062, $p > 0.05$), and dialogues (Beta = -0.018, $p > 0.05$) did not significantly influence film reality. Hypothesis 3 was partially supported.

Table 3: Regression analysis of each storytelling techniques and film reality

| Regression Analysis | | | | | | | | |
|---|------------|-----------------------------|------------|---------------------------|--------|-------|---------------------------------|-------------|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | 95.0% Confidence Interval for B | |
| | | B | Std. Error | Beta | | | Lower Bound | Upper Bound |
| 1 | (Constant) | 0.967 | 0.307 | | 3.151 | 0.002 | 0.362 | 1.572 |
| | Characters | -0.033 | 0.069 | -0.034 | -0.48 | 0.631 | -0.168 | 0.102 |
| | Plot | 0.117 | 0.06 | 0.141 | 1.953 | 0.052 | -0.001 | 0.235 |
| | Conflict | 0.208 | 0.071 | 0.217 | 2.922 | 0.004 | 0.068 | 0.348 |
| | Resolution | 0.03 | 0.062 | 0.035 | 0.486 | 0.627 | -0.092 | 0.153 |
| | Structure | 0.193 | 0.068 | 0.216 | 2.859 | 0.005 | 0.06 | 0.326 |
| | Scene | 0.116 | 0.069 | 0.121 | 1.673 | 0.096 | -0.021 | 0.253 |
| | Visuals | 0.065 | 0.072 | 0.062 | 0.907 | 0.365 | -0.076 | 0.207 |
| | Dialogues | -0.014 | 0.048 | -0.018 | -0.295 | 0.768 | -0.109 | 0.08 |
| 1. Predictors: (Constant), Dialogues, Scene, Plot, Resolution, Visuals, Characters, Conflict, Structure | | | | | | | | |
| 2. Dependent Variable: Film Reality | | | | | | | | |
| $R^2 = 0.326^{**}$, $p < 0.05$, $F = 13.397$, $df = 8$ | | | | | | | | |

6. Discussion

The results showed that most of the respondents perceived eight storytelling techniques after having watched the Chinese Sci Fi film "The Wandering Earth (2019)" at a high level to the highest level. All eight storytelling techniques had a significant impact on Chinese audiences' perception of cultural values. Zhou (2014) said that nowadays people are more dependent on the stimulation of images, and the visual effect is one of the main characteristics of Sci-Fi films to attract audiences. The descriptive results coincided with these past studies and found visual and scene are also the two most influential storytelling techniques. The descriptive finding also revealed that the strongest cultural values they perceived from the film "The Wandering Earth (2019)" are collectivism and Confucian dynamics. They are the highest cultural dimensions perceived by Chinese audiences, because these cultural dimensions are consistent with their past experience, and they are more relevant or resonate with their personal life and experience than other cultural dimensions.

Hypothesis 1 results suggested that perception of storytelling techniques of Chinese Sci-fi film are positively correlated with cultural values among Chinese audience. That means, the higher perception of storytelling techniques that Chinese respondents had, the more cultural values orientation they will perceive. The cultural values of collectivism and Confucian vitality have the greatest impact on Chinese audiences. And all the other cultural values have a strong impact. Therefore, the narrative techniques in sci-fi films are an important factor which shaped the Chinese audience's different cultural value orientation, which depends on the film content that the director wanted to depict or to portray.

Hypothesis 2 results showed that the Chinese audience's cultural values significantly affected their perception of film reality. That means, the perception of cultural values portrayed in the file significantly influences how they perceive the film reality. The finding supported the central hypothesis of the Cultivation theory (Gerbner & Gross, 1976). China is a typical country of masculinity and Confucian vitality. Chinese audiences have been influenced by the cultural values in films for a long time, so they have a strong perception of the reality of films in these two dimensions. However, contemporary Chinese cultural values are gradually changing. Young Chinese people are willing to take risks, to search for social equality, and to pursue a unique self for life (Wang, 2009). The results suggested that in the uncertainty avoidance, power distance, and collectivism that the film portrayed in this film did not resonate with the contemporary Chinese cultural values that the audience had.

Hypothesis 3 results showed that perception of storytelling techniques of Chinese Sci-Fi films significantly affected their perception of film reality. That means the storytelling techniques portrayed in the film-shaped the degree to which individuals perceived how well the film accurately represents real life as posited by Hawkin (1977 as cited in Perse, 2009). Film reality can be measured by three dimensions as suggested by Porter (1986), including magic window, instruction, and identity. Hypothesis 3 showed that the conflict and structure in films can significantly affect the audience's perception of the reality of the film. Many characters, scenes, and visual effects in Sci-Fi films are completely fictional, but the character conflict, story plot, and story structure may be the same or similar to people or situations in real life. According to the selectivity of media (Gerbner &

Gross, 1976), they chose to perceive the reality of the film from the two skills of conflict and structure which are similar to the respondents' real life or past experience. However, researcher believes that although the visual effects and movie scenes in Sci-Fi films are very different from respondents' real life, because the character, dialogue, and problem-solving are rather determined by the film maker's values and past experience. The audience has the opportunity to perceive the strong reality of the film from these three storytelling techniques, which are perhaps the three weak elements of the film.

7. Suggestions

(1) According to hypothesis 1, future sci-fi filmmakers may try to strengthen the production of plot, conflict, resolution, structure, and dialogue. Dialogue, in particular, is one of the least exposed storytelling techniques of the audience. According to hypothesis 2, as contemporary Chinese cultural values are changing, filmmakers may need to pay more attention to contemporary young Chinese in order to make the audience better perceive the reality of film from different cultural dimensions, by focusing on their pursuit of social equality and self, as well as their tolerance for the risk of uncertainty as well by combining with their own cultural values to make Chinese science fiction movies more popular. According to hypothesis 3, the three storytelling techniques, including dialogue, character, and resolution, had low influence on the audience in this science fiction film. Future sci-fi filmmakers may try to strengthen the production of these three storytelling techniques so that resonate or consistent with contemporary audience's real-life and experience so that the audience can easily perceive the film reality related to them, so as to achieve the role of disseminating cultural values. (2) Future research may adopt a qualitative approach to examine the influence of Sci-Fi films to examine its influence on teenagers' perception of violence or other social aspects of society since this study found that perception of Sci-Fi films shapes how audience perceived social reality. The findings will make the film makers aware of the impact of Sci-Fi films on audience's beliefs, values, and behavior more.

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ANALYSIS OF FACTORS AFFECTING LEARNER'S ENGLISH-SPEAKING SKILLS

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ABSTRACT

This paper aims to recognize the need to concentrate on the factors influencing English for language learner's speech capacity. This review paper traces the body of research on the *importance of speaking*, and the relevant *factors influencing speaking performance*. According to the literature review, adequate speaking instruction was found to be the priority of the learners and a priority area they need more attention in. This study can be beneficial for teachers and researchers to understand their language and know pertinent speaking needs of learners in the sense of English language learning; and relevantly applied the knowledge in language teaching.

Keywords: importance, speaking, problems, factors, characteristics, needs

Introduction

For a lot of EFL/ ESL (English as a Foreign Language/ English as a Second Language) learners, mastering English speaking skills is not just an option but a necessity. Language learners also assess their output in language learning on the basis of how well their spoken language ability has grown. Educators and course readings utilize either direct methodologies that focus on specific parts of oral collaboration, for example, turn-

taking and theme the board or backhanded methodologies which make circumstances for oral cooperation by bunch work, task work, and different techniques (Richards 1990).

Definition

The word “speaking” has been defined differently and was given definitions that have been suggested by the researchers in language learning. In Merriam Webster Online Dictionary, speaking is to utter words or articulate sounds with the ordinary voice, to communicate as by talking, to make a request, and to make a speech (Nunan, 1995). According to Chaney (1998), speaking is the process of making and sharing meaning by using verbal and non-verbal symbols in different contexts. Bygate (1987) defined speaking as the production of auditory signals to produce different verbal responses in listeners.

It is regarded as combining sounds systematically to form meaningful sentences. Eckard and Kearny (1981), Florez (1999), Howarth (2001), and Abd El Fattah Torky (2006) defined speaking as a two-way process including a true communication of opinions, information, or emotions. This top-down view regards the spoken texts as the collaboration between two or more persons in the shared time and the shared context. Brown (1994) and Burns and Joyce (1997) defined speaking as an interactive process of making meaning that includes producing, receiving, and processing information.

Importance of Speaking

It is said that, speaking is widely used outside of the classroom rather than reading and writing (Rivers, 1981). We use speaking to convey the message you want others to perceive of you. But learning how to speak English is a totally different thing. It needs fluency, knowledge of vocabulary, understanding of the grammar, and comprehension. It is also stated that the learners need English speaking ability in order for them to speak and communicate effectively.

As much as we want to let our students be well versed in speaking in English, more often than not, this is neglected, and only reading and writing has been given focused, this is according to Richard and Rodgers (2001). For example, in the grammar-translation method, only reading and writing are given importance while listening and speaking are not given priority. Also, based on Ur (2000), among the 4 skills, speaking, listening, reading and writing, Speaking is the most important skill for effective communication.

The benefit of having good speaking skills means having a better chance in life, promotions, good jobs and better education. For students, if they have good speaking ability, they will be able to express themselves, tell stories, request, talk, discuss, and show the various functions of language which will lead them eventually to finding good jobs and big companies in the future (Baker and Westrup, 2003).

But what’s stopping this development in speaking in English? There are factors that can hinder learner’s capacity to speak the language. There are those that I have encountered that even though they’ve been studying English in their whole life, they still lack the confidence in speaking in English.

Speaking problems

There are some problems that teachers encounter in helping students speak English. These are inhibition, lack of topical knowledge, low participation and mother tongue. (Tuan, Mai 2015). Inhibition is the first problem that students encounter in the classroom. When they want to say something, students feel ashamed that they don't have enough knowledge and skill thus, they feel inhibited to express themselves. They are scared of being criticized and be at the center of attention in the class. Littlewood (2007) said classroom language can also affect student's desire to speak English.

The second problem is that they lack of topical knowledge or they don't have anything to say. This is according to Rivers (1978) which he found out that learners lack the idea to say something about a topic that their teacher has chosen. This idea is supported by Baker and Westrup (2003), that every time learners are asked by their teachers, they cannot reply or answer back, it is because, they don't have idea or it's difficult for them because of little opinion to foreign language, this is where learning vocabulary applies and how to use them grammatically.

The third problem that stops or slows down the learning, is the class participation which is low. This means that when one is speaking English, and when he dominates in the class, the rest will just be listening, so the rest will not be given opportunity to speak or they will have a little chance in speaking.

The last problem is the use of Mother tongue. When learners share the same mother tongue especially when it comes to learning a language, they're going to use their mother tongue because it's easy for them. (Tuan, Mai 2015). Based on Harmer (1991). There are reasons why learners use their mother tongue, one is it's very easy for them to use especially they lack knowledge of the topic and second, it's natural for them and they will try to use the language in order for them to communicate. If the teachers do not urge them to talk in English, they will use their first language to explain something to others.

Previous Studies on the Factors Affecting Speaking Skill

Bozorgian (2012) investigated the relationship between listening skill and the other language skills. The results revealed that there is a close correlation between listening comprehension and language proficiency. That is, the higher the listening score, the better the speaking score.

Lukitasari (2003) carried out a study towards learners' strategies in overcoming their speaking problems. The results obtained from this study show that learners face a lot of speaking difficulties such as inhibition, nothing to say, low participation, and mother tongue use in their speaking classes. The other result of this study demonstrates that learners did not improve their speaking skill because they had not learned three components of speaking called vocabulary, grammar, and pronunciation.

Tanveer (2007) examined the factors caused by anxiety for learners in learning speaking ability and the impact of anxiety on target language communication. The obtained results indicated that learners' feelings of stress and anxiety stop their language learning and performance abilities. The researcher emphasized that the high anxiety lowers the learners' speaking performance.

Boonkit (2010) carried out a study on the factors increasing the development of learners' speaking skill. The results represented that the use of appropriate activities for speaking skill can be a good strategy to decrease speakers' anxiety. The results also revealed that the freedom of topic choice urged the participants to feel comfortable, persuaded to speak English, and increased the speaking confidence among EFL learners.

Factors Affecting Speaking Skill

If teachers want to help learners overcome their difficulties in speaking English, they should pinpoint the factors that contribute to their speaking performance. Learners performance is affected by factors like performance conditions, affective factors, listening skill and feedback during speaking tasks. (Tuan, Mai, 2015).

1. Performance conditions

Learners carry out the activity under different conditions. Performance conditions gives a great impact on speaking performance and these conditions involve time pressure, planning, the quality of performance and the amount of support (Nation and Newton, 2009). According to Stefan O'Grady (2019), it states that proper time planning with the activities contributes to the assessment of speaking ability of the learner, if they are given enough time to prepare to interact in English, they can properly respond and gather their thoughts about a certain topic thereby giving a quality performance. Also, if they are under pressure, learners will just be conscious about the people around them and would think of the comments that they would get from them. Next is the amount of support that they get, may it be from teachers or from authentic materials, it does affect a lot when it comes to learning the foreign language.

Nowadays, as we are facing the pandemic, we are experiencing a different mode of learning, and learning how to speak English in a normal classroom setting is in a lot near extinct. We as educators, some of us are doing the remote learning where we are challenged on how to create activities that can help our learners. This is true for learners, according to Zaidee Stavely (2020) in the USA, they struggle in creating language rich classes for students who are with them physically. What they do, they call the parents and send emails to check on the students and create activities even that will help them learn.

Another factor which should be determined to achieve effective learning is by using technology. Using technology, internet, computer-based authentic materials, video, CDs and distance education can be one of the good and effective solutions to overcome students' motivational problems in the classroom (Kang and Dennis, 1995). It is said that through computer and internet-based lessons, weak learners reveal their learning capacity and their creative minds are open.

2. Affective Side

This is about the affective side of the students which Oxford (1990) has said. He also stated that this is the most important thing that we should focus upon. According to Krashen (1982), aside from the connection of language acquisition and motivation, self-confidence and anxiety were the three main variables that affect the learner's ability to speak.

Boosting self-confidence in the students requires a lot of assigned group activities, group presentations and self-presentations. It will allow them to be more creative and work productively knowing that they have to collaborate and interact with others. This is based on a study conducted with Kasetsart students by Malysa Hutchinson (January-June 2019). With this study, it was found out that through different speaking activities, students are motivated and this boost their self-confidence and speak freely expressing their own ideas in a range of materials. Their teachers were also aware of the problems that their students are encountering.

3. Listening skill

According to an author, Doff (1998), that unless you developed the listening skill of the learners, they will never be good at speaking in English. They should learn to understand first what they hear before they can actually speak and share what they know about a certain topic. Shumin (1997) stated that when a student speaks the other students will listen and respond to the speaker. So, the speaker has two roles, which is also a listener and speaker at the same time because he answers to the questions and inquiries of his listeners or audience. Moreover, Nation and Newton, 2009 stated that "Listening is a new way of learning a language".

There are certain reasons for the importance of listening for foreign language learners. First, listening is an essential prerequisite for oral communication to take place. Second, it often influences the development of reading and writing. Third, it plays a central role in academic success, since students understand teachers or lecturers through listening.

In order to teach listening comprehension, the teachers should understand the nature of the skills that they need to develop.

In Richards and Renandya's study (2010), it examines a commonly used format for teaching listening, one which involves three stages in a listening activity: pre-listening, while-listening and post-listening. They are also known as listening techniques.

The Pre-listening Stage

This is the first stage of teaching listening. At this stage, students are given some background information about the audio. Indeed, this is the preparatory phase of teaching listening in which students are prepared and motivated for listening and performing the tasks. After that, it consists of several activities like giving background information, looking onto pictures, topic discussions, question-answer, etc.

The While-listening Stage

In this stage, the students listen to audio, perform the activities and do the tasks based on the listening comprehension. This is the actual listening stage whereby students are asked to do exercises based on the audio. The main purpose of this stage is to help the students develop the skill of eliciting messages from spoken language.

The Post-listening Stage

This is the final stage where follow-up activities are done. As its name implies, post-listening stage embraces all the activities related to a particular listening activity which are done after the listening is completed. In a way, this stage is the extension of the activities done at pre-and while-listening stages. Problem- solving and

decision-making activities, interpreting activities, role-play activities, written work, etc. can be exploited at this stage.

Listening should be taught properly at schools. It should be given importance as this is the key in learning the language and not a skill waiting to be developed. As kids are learning half of their time listening in school, proper approaches should be made so that listening will be developed just like reading. It is a vital factor that should be learned and developed to students through instructional approaches and methods.

4. Topical Knowledge

Bachman and Palmer (1996), said that it is the knowledge factors of long-term memory. It is also the knowledge of the speaker in a topic information. The more well-versed a person is about the topic, considering the vocabulary, syntax, phonics and grammar rules, the richer his mind will be and will be able to respond to questions. But if the speaker has limited knowledge on a topic and he doesn't have any idea, how can he reply and answer the questions with words that he should have uttered?

5. Feedback

The fifth factor is about feedback related to speaking activities. The learners are interested on the feedback of the teachers based on their speaking performance. Harmer (1991), said teachers give feedback on their performance based on the following; stages of the lesson, the tasks and the mistakes that they make. It is stated that if instructors directly correct the mistakes of the learners then they will destroy the flow of dialogue and the aim of the speaking task will not be achieved. This was supported by Baker and Westrup (2003), when correcting the mistakes of the learners they should give positive criticism that will still motivate them not inhibit them from speaking. It is also suggested that the instructors should always motivate the learners and persuade them to speak in English.

6. Role of Instructors

Speaking is the most important skill in learning a language and much of the job or contributions come from the teachers. Teachers have the most important role in learning a foreign language. As it has been discovered by many researchers, foreign language learning best occurs through interaction, teachers should provide learners with the opportunities to communicate in English during lessons. Since many learners' goal in language learning is to be able to communicate fluently in formal and informal interaction, classroom activities should be designed to promote oral fluency. However, the ability of speaking is a complex process in nature, students are anxious and become shy when speaking in front of the classroom. This is maybe due to different social or psychological reasons that's why they keep silent when asked. Therefore, the job of the teachers is to provide natural strategies such as: role plays, group works or projects to avoid shyness or unwillingness to speak English.

According to Ur (2012) students should communicate orally and fluently in informal interaction, this should be the primary goal. But, how can teachers help the learners? In what way? For that, it is important that teachers design the classroom activities to promote oral fluency. He also states that getting students to talk is much harder than teaching reading and writing or listening.

Harmer (2010) states that there are three primary reasons why students must be encouraged to speak in the classroom. First, students can have the opportunities to practice real-life speaking in the classroom atmosphere where they are likely to feel less anxiety. Second, speaking activities can provide teachers and classmates with the knowledge of how well learners can speak English, what kind of mistakes are being made so that the teachers can have the chance to focus on specific speaking features to foster. Finally, the acquired language knowledge can be activated as long as the learners speak English in the classroom; moreover, some linguistic elements can become automatic resulting in the learners' ability to use them unconsciously, and in this way the fluency can be improved. We can say that our goals are met by looking at their exposure in the classroom, just as what Huda (1999) said that they should practice speaking English with their classmates.

7. Family Support

In learning the language specifically, family plays an important role in the speaking ability of the students. The parent's positive attitude, education and awareness encourages and provides support mainly to the learners. It is said that there is a consistent relevance of family relationship and students' academic achievement. (Alam, Ahshikullah and Rahman, 2018)

Bordieu (1990) stated that learners who come from rich families have the greatest chance of learning facilities for speaking in English. This is true compared to the low-income families who send their kids to school who has limited access to resources. Parents who also have parents who are educated help a lot with the success of their kids. They can practice speaking in English at home.

Conclusion

This paper tackled the components that influence learner's English-speaking performance. The mentioned factors in this paper have significant functions in building up students' talking ability. The factors may either build-up students' confidence in speaking or drag-down learner's positive attitude to be motivated to speak.

The findings of this paper showed that students with a low confidence, higher anxiety, and low in motivation have really struggled in talking regardless of having appropriate linguistic knowledge. The paper showed that learners who have enough-to-high motivation and less anxiety can talk effectively and viably. Subsequently, students ought to have a well-disposed and suitable learning atmosphere that can assist them with conquering their troubles in oral recitation.

Based on the review of the literature of the study, teachers should understand their students' interests and feelings, improve their learners' self-confidence, and choose the best teaching method to keep their learners involved in the speaking activity. Instructors should cultivate their students to communicate in English.

They should introduce a good teacher-student relationship with their learners, causing them to feel exceptionally glad in their classes and have a sentiment of incredible eagerness and enthusiasm to explore the fun-world of English learning and allow them to communicate accordingly. Based on other previous studies,

instructors should also give their students enough opportunities for them to practice speaking. Instructors should assist them in eliminating their shyness through well planned activities; to cause them to feel good when talking.

They should remind their students not to be pressured with performance feedbacks, and give them helpful guidelines and enough direction on how to improve their speaking skills. Instructors should give their students more chances to communicate in English through utilizing some speaking assignments that help them to talk and urge them to participate in real life exercises. Moreover, instructors should realize when and how to address their students' errors with the goal, that in time they are most certainly not scared of committing errors.

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THE SUSTAINABILITY OF ENGLISH LANGUAGE TEACHING AND LEARNING IN THE ERA OF THAILAND 4.0

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Abstract

In the paradigm shift to Thailand 4.0, English language teaching and learning in higher education inevitably plays a crucial role in this economic transformation as it is one of the key drivers of development and innovation. Without efficient English proficiency of its citizens, Thailand's economy will not be able to transform to a high-income nation or compete with other countries in the global market. Therefore, it is a challenging task for higher education to produce a new generation workforce with high English language skills, in addition to other skills, namely stronger problem-solving, analytical reasoning, and ICT, which are in line with the Thailand 4.0 era.

This paper reveals the trends, especially online learning, in English language teaching and learning in the era of Thailand 4.0. Challenges in utilizing those trends in the context of language teaching and learning in Thailand will be addressed. However, those challenges are taken as an opportunity for change in English language teaching and learning toward Thailand 4.0.

Keywords: Sustainability, English Language Teaching and Learning, Thailand 4.0

1. Introduction

As Thailand is transforming towards the new era of economy 4.0 which is based on “the technological concept of cyber-physical systems and the internet of things” (Schuster and others, 2015, p.1), English skills are crucial for the learners who will be future employees or entrepreneurs in the Thailand 4.0 era where a “Value-

Based Economy,” based on innovation, technology, creativity, and trade in services, is emphasized. In this era, Thailand as a country of traditional farming, traditional SMEs, traditional services, buyers of technologies, and unskilled labor will be shifted to smart farming, smart enterprises or startups, producer of technologies, high value services, and knowledgeable workers or high skilled laborers. With all these “smart phenomena,” most information and knowledge available in cyberspace is in English, and businesses will be executed electronically in English with customers from various cultures and countries. Inevitably, English language teaching and learning in higher education will have a great burden both in producing high quality and skillful graduates ready for the Thailand economy 4.0 era and its own transformation to Education 4.0 where digital technologies have a greater role inside and outside the classroom.

Technological advancement has brought in new theories and approaches of teaching and learning. New theories and approaches are then set as policies to be followed. Evidently, with the teaching and learning of English, the roles of teacher and learner are transformed. This transformation may be considered a challenge. The challenge is to create ideal graduates who meet the needs of the workplace 4.0 era. Another challenge is the readiness of both teachers and students for such change. It is yet doubtful whether or not the English education system can even leap up to the next ladder of evolution of 4.0 successfully and equally throughout the country and be able to assist the country to reach Thailand 4.0. This paper, however, takes those challenges as an opportunity for positive change. It attempts to raise awareness of such evolution and the potential means for effective English teaching and learning, not for Thailand 4.0 per se but also for sustainable English teaching and learning.

2. Objectives

- (1) To explain the relationship among economy, education, and English language teaching and learning in terms of their evolution in different eras.
- (2) To explore the challenges of English language learning in Education 4.0.
- (3) To investigate the sustainable means of English teaching and learning in Education 4.0.

3. The evolutions of Thailand 4.0, Education 4.0, and English language teaching and learning

Thailand 4.0 was proposed by the government in order to develop Thailand as a high-income country through innovations based on the knowledge and application of science and technology (Languepin, 2016, p.1). Once the plan was announced, Education 4.0 has been mentioned and promoted at all levels, especially in Higher Education. Here it plays two crucial roles in (1) involving in research and development for the new body of knowledge and innovations and (2) empowering students to produce innovations, which eventually result in economic growth (Chaiyaroj, 2016). Based on the country’s policies, economy and education are co-existing and co-evolving while economic growth depends on education.

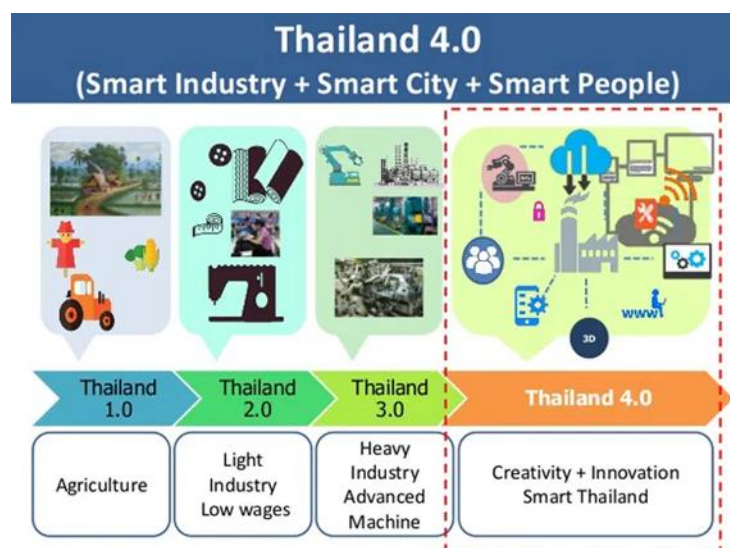


Figure 1: The model of Thailand 4.0 (Thailand Tech Show 2016)

Education policies respond to the needs of the society and country in various eras (Harkins, 2008). In the era of Economy 1.0, education 1.0 had emerged to respond to the needs of agricultural society with the so called “download” education 1.0 where a dictation method of teaching was heavily used. The interaction was performed in the linear means merely between teachers to students in a classroom. After this era, Economy 2.0 was introduced due to the industrial revolution and required Education 2.0 to help with this fast industrial and economic growth. The concept of teaching in this era was teaching to learn with the “open access” of the Internet in learning activities. The present era of Economy 3.0 is the derivation of globalization where people are quickly connected and information is rapidly exchanged through ICT. This fast development influences Education 3.0 where knowledge is co-constructed and transmitted through ubiquitous technology and interactive learning (Moravec, J.W. (2008) cited in Harkins, A.M. (2008)). The derivation of Economy 4.0 has brought Education 4.0 with it, which emphasizes learning from anywhere and at any time in the era of the Internet of Things (IoT). According to Harkins (2008, p.1), to achieve Education 4.0 where students are able to produce innovations, they need to be able to move away from memorizing what they have learned (Education 1.0) to being able to produce knowledge (Education 3.0) with the aid of the Internet (Education 2.0).

Similar to other fields of education, English language education in Thailand has been following the same policies. Based on Darasawang (2007), the history of English language education in Thailand shows that it has been playing an important role for the country’s economic and technological developments since the reign of King Rama V. The approaches employed in the teaching of English has been changed from rote learning and grammar/translation to communicative language learning considering English as a medium of international communication. Besides, English language education in the past decade has changed due to the fast growth and developments of information technology. Therefore, the products of the technology have been employed in-class and outside of class to facilitate the teaching and learning of English to suit the lifestyle of learners. It can be seen that English language education 2.0 in Thailand started during the education reform in 1996. English

language education 3.0 arrived with the National Education Act of 1999 when English was taught as a foreign language to help the country to develop its economy in the era of globalization. Technologies became part of English language education emphasizing learner-centeredness allowing learners to acquire knowledge and practice at their own pace and potential everywhere. Consequently, syllabus design, various educational approaches with the assisting ICT tools facilitate the teaching and learning of English and reinforce communicative language teaching methods. As for the Education 4.0, English is crucial. It is essential to then investigate the trends in English language teaching and learning in Higher Education in the era of Thailand 4.0, which is described in the next section.

4. Challenges of Online English teaching and learning in Thailand Education 4.0

Since Thailand Education 4.0 was launched by the government in 2016, ICT tools and educational applications have been heavily employed in classrooms in order to help elevate students' English proficiency. Many learning approaches have been implemented; and online language learning platforms have been promoted and reinforced. Hybrid or blended learning approaches and Massive Open Online Courses (MOOC) have been introduced to English language education around the world. The implementation of online learning ideally creates opportunities for students to learn and promote student centeredness; however, it also brings major challenges to both students and teachers. Are Thai teachers and students at tertiary level ready yet for the transition from Thai education 3.0 to Thai education 4.0? According to Wittayasin (2017), it is a challenging task which "can't be achieved through traditional thinking or conventional action" (p.30). Other challenges can be explained as follows:

For students, based on Kuama and Intharaksa's (2016) literature reviews, cognition, metacognition, technical anxiety, and learning styles and preferences of students are the four major areas of challenges to English language education. First of all, students need to know how to operate effectively in online courses with multi-dimensional learning tasks and complex content. Secondly, students need to possess self-regulation. Thirdly, students need to have Internet skills so that they will not feel anxious or frustrated when they encounter difficulty while studying online. Lastly, students need to have online learning strategies. Based on the authors' experience, Thai students seem to struggle with all of them. It is very challenging for Thai students to be able to study effectively through the online platform. As part of Thai culture, students are generally passive, like to study with peers and need a lot of assistance from teachers regardless of what educational level they are at. The most serious challenge is that Thai students have never been taught to learn independently (Pagram & Pagram, 2006). Another challenge is students' learning motivation. According to Kuama and Intharaksa's (2016) research findings, motivation for online learning, especially for low achieving students, is decreased, which affects their English proficiency. The possible answers to this low English proficiency and lack of motivation by low achieving students are "the overall course design and the quality of the online learning tasks" (p.71). Solihati & Mulyono (2017) suggested that the practice of online learning (such as Hybrid learning approach) and activities should not replace face-to-face instruction. Instead, they should be used as learning tools and resources for outside the

classroom. Fernández and Belmonte's (2017) research proved that blended learning is an effective alternative teaching approach to traditional face-to-face classroom instruction, which promotes autonomous learning in second language education. In the Thai context, however, students would either "sink or swim" in the online learning environment, especially when using teaching approaches that require students to independently work on their own. This can be explained in Barr's (2018) research study which pointed out that Thai undergraduate students were not ready for full online learning. Autonomous learning is truly a good concept to follow; however, as it seems, it takes time for Thai students to be able to learn independently due to the lack of self-regulation and discipline. Barr's (2018) research results revealed that face-to-face interaction was needed for the enhancement of students' language learning performance, motivation, engagement, and positive relationship between the teachers and students.

For teachers, teaching in the era of Thailand 4.0 requires them to be able to operate their teaching on a digital platform, and be innovative in terms of course design and instructional activities that can facilitate students' English language skills. The former is a fundamental requirement that online teachers should be able to handle technology effectively. As for the latter, the role of teachers will need to change. The design of a course in Education 4.0 will need to cater for the use of technology so that students can top up English language skills from anywhere at any time. Hence, teachers become facilitators, course designers, and mentors. With online instruction, assessment is also a challenging issue. Teachers need to change their usual assessment tool from summative assessment to that of formative in order for students to be regularly informed through feedback of their own learning when they study online.

With the aforementioned major challenges in English language teaching and learning in Thailand education 4.0, the authors believe that there is a possibility of change for the sustainability of English language education in Thailand.

5. The sustainable means of English teaching and learning in Thailand Education 4.0

To make English teaching and learning in Education 4.0 and beyond, or in the midst of any circumstances such as COVID-19 pandemic sustainable, the authors suggest that the aforementioned challenges are good opportunities for future change as follows:

(1) Change in the role of teachers. The role of teachers has evolved in the digital learning platform, from being sage on stage to facilitator, course designer, and mentor. Therefore, universities or institutes need to prepare teachers to be able to teach online. Training sessions, namely online course design and assessment, innovative teaching materials and activities, the use of technologies, and management of students' behaviors in an online learning environment are needed as English language teachers need to be up-to-date with the current trends, best practices and evaluative methods of English language teaching (Parab, 2015). An essential skill for teachers in online teaching is course development or course design, because they need to use both art and science or logic in making the online learning effective and meaningful to students, such as the flipped-classroom approach.

(2) Change in learners. First of all, students need to have an intrinsic motivation to learn. As mentioned previously, Thai students, even in higher education, are not self-regulated, responsible or disciplined for their own learning; therefore, it is important that Thai students need to be physically and emotionally ready for a hybrid or online learning environment. As stated by McCotter (2008), students can engage well in class activities and can do well academically when they are intrinsically motivated. They need to become an active agent of their own learning in order to achieve academically.

(3) Change in teaching and assessment approaches. This change includes teaching methods, content, and assessment. Planning is the key to successful teaching, especially in an online platform. To motivate students, Mayfield (2020) recommended in his talk during a webinar organized by Cambridge University Press on the topic of "Activities to Engage and Motivate Teenage Learners" that backwards planning of activities is needed. By setting students' learning outcomes, teachers begin their planning with what they want their students to achieve. Prof. Carla Messkill (2020) also suggested in a webinar entitled "Embracing Online Language Teaching" that authentic conversation between teachers and students is crucial in online language teaching. This could be individual, pair, or small groups of students. For content in language learning, it is suggested that the content is both interesting and practical for the students. According to the authors' hybrid teaching experience, Thai students will not benefit from the learning as much as with classroom face-to-face instruction. When online, Thai students prefer the off-camera mode; therefore, teachers cannot know if they are actively learning or not. Based on Banlue's (2015) research findings, online education should be merely an option because his study revealed that the learning outcomes of online teaching is the same as the outcome resulting from regular classrooms. In English language teaching, the authors believe that the majority of Thai students cannot improve their English skills merely from learning online on their own. For teaching and learning to be effective, a one-on-one or small group discussion either virtually or physically is needed. In addition, a variety of activities employed in an online classroom are essential because students will become more motivated to learn.

For English language assessment, formative assessment is highly recommended. There are many types of formative assessments that teachers can utilize in their classroom, for example, portfolio or quizzes offered electronically. According Puarungroj, Pongpatrakant and Phromkhot (2017), they recommended 10 online formative assessment tools, namely EDpuzzle, PadLet, Kahoot, Socrative, Quizlet, Prezi, PowToon, TodaysMeet, CodeMonkey, and GoFormative. Furthermore, the continuous use of these tools is necessary; hence, teachers need to plan the use of formative assessment tools effectively. These online tools can also be utilized inside the classroom or on an online platform. In the Thai context, as the authors have experienced, a formative assessment is highly recommended; however, it should be planned and managed carefully as Thai students are not necessarily honest with their learning. Copying and pasting from other students' work or online sources is commonly practiced among Thai students.

Based on the authors own online teaching experience and review of literature, an online teaching and learning model, adapted from Asst.Prof. Dr. Praweenya Suwannattachote (2020), is recommended.

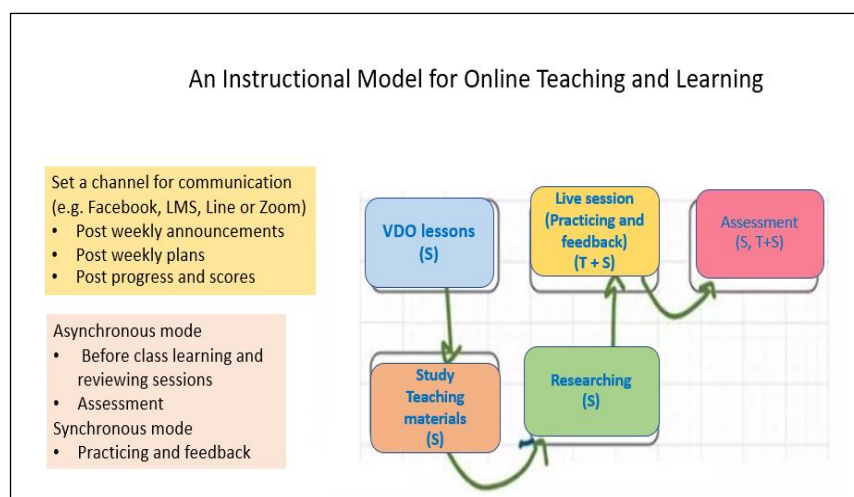


Figure 2: An Instructional Model for Online Teaching and Learning

5. Conclusion

English Language Teaching and Learning in the Era of Thailand 4.0 is challenging as it requires both teachers and students to have an understanding of the modern approaches of teaching and learning. Many digital instructional strategies and tools have been introduced. Most importantly, however, the authors believe that teachers and students are co-learners in the digital learning environment. It is essential that the teachers make the learning environment flexible, interesting, supportive and positive in order to build intrinsic motivation in the students. For students, self-regulated learning is a must in an online learning platform. Finally, a well-designed formative assessment is highly recommended in the Thai context.

6. Suggestion

The authors hope that the English language education in Thailand 4.0 will become fruitful and sustainable if all of the stakeholders are open to challenges and change. It is suggested that more action research is conducted regarding effective course development for an online platform, students' self-regulated learning, and formative assessment. In addition, best practices for online teaching should be investigated and shared in the Thai context.

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LEARNING STYLES OF UNDERGRADUATE STUDENTS IN BUSINESS ADMINISTRATION PROGRAM

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ABSTRACT

This study aimed to study learning styles of undergraduate students in Business Administration Program, King Mongkut's University of Technology North Bangkok and to study the relationship between learning styles and demographic. The sample were 1,412 undergraduate students. Questionnaire included demographic and learning style. Descriptive statistics and Chi-Square test were used to analyze data. The results showed that learning style of the respondents were mostly Reflector accounting for 58.60% followed by Theorist 18.40%, Pragmatist 15.70%, and Activist 7.30%. Learning styles of the students related to gender at the significance of .05. Learning style of males was Activist, learning by doing, whereas that of females was Reflector, learning by thinking.

Keywords: Learning styles, Undergraduate students, Business Administration Program

1. Introduction

Educational theorists have explained how the individual learn differently or simply said that each individual have differences in the ways they like to learn (Rushby, 2008). Learning style is behavior or learning method that each learner uses to learn or approach that each learner uses to search for knowledge. It influences the different responses or interaction with learning environment. Instructors must arrange learning process taking

into account of individual differences. A classroom consists of learners different in many aspects so if an instructor can arrange lesson suitable for each learner, it will definitely enhance one's learning.

The inquiry into how students can unify their needs of studying with the guidelines of the institution is one of the key points in today's Higher Education field (Kahl, 2014). Students in most courses are learners with different learning abilities and backgrounds. Some of them finished secondary schools (Mathematics- Science; Math- Sci program, or Language Arts- Social Studies; Lang- Soc program) while some finished Vocational certificate (Industrial mechanic or Commerce). The consideration of learners' learning styles is essential for effective learning management design.

Honey and Mumford learning styles were developed by Peter Honey and Alan Mumford in 1986. Their work is inspired from and built upon Kolb's learning styles model (Leaver, 2005). However, they produced their own Learning Styles Questionnaire (LSQ) because it was found that Kolb's LSI had low validity with managers. Therefore instead of asking people directly how they learn, as Kolb's LSI does, Honey and Mumford gave a questionnaire that probes general behavioural tendencies. The rationale behind this is that most people have never consciously considered how they really learn. And to be an effective learner, individuals must know about their learning styles or preferences and find ways to learn using those methods. To help with finding the correct learning style or preference, Honey and Mumford have developed a questionnaire built on a continuum. Knowing your learning style helps individuals to make smarter decisions in adjusting the learning opportunities and your preference of best learning, increases the range and variety of experiences which are potential learning opportunities, improves learning skills and awareness (Zwanenberg, 2016).

2. Research Objective

- (1) To study learning styles of undergraduate students in Business Administration Program
- (2) To study the relationship between learning styles and learners' demographic

3. Literature Review

3.1 Theory, Concept and Related Research

Kolb (1984) developed his model of Learning Style Inventory based on the Experiential Learning Theory where he outlined two related approaches toward grasping experience. They are Concrete Experience and Abstract Conceptualisation. The other approach is related to transforming experience. They are Reflective Observation and Active Experimentation. All four approaches can be useful depending on the situations and the resulting learning styles are combinations of the individual's preferred approaches. The four learning styles available in Kolb's model are converger, diverger, assimilator and accommodator.

Honey and Mumford (1986) adopted Kolb's model and created their own version to suit middle or senior managers in business. Two variations were created to the original model to address the business environment. Firstly, the authors renamed the stages as having an experience, reviewing the experience, concluding from the experience, planning the next steps. Secondly, as per stages they have renamed the learning

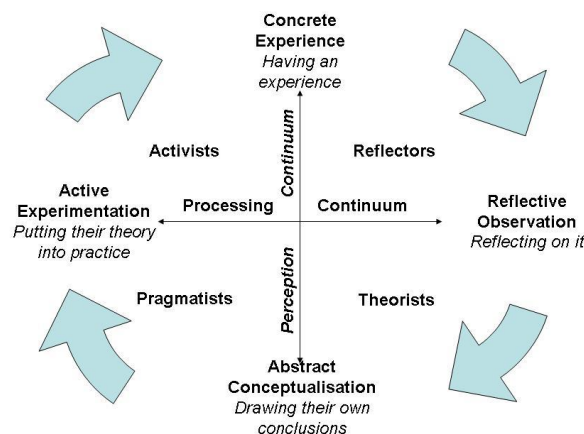
style as activist, reflector, theorist and pragmatist. Based on the learning style they developed Learning Styles Questionnaire (LSQ). This questionnaire was developed as self-development tool. The completion of question will help the managers to focus on strengthening the under utilised styles so that everyday learning experience can be enhanced.

Specific glossary for learning styles of Peter Honey and Alan Mumford (2000) is different from those of Kolb as shown in Table 1.

Table 1 Comparison between learning styles of Kolb and Honey & Mumford (2000)

| No. | Kolb | | Honey and Mumford |
|-----|---------------|---|-------------------|
| 1. | Divergers | Learners learning by thinking | Reflectors |
| 2. | Assimillators | Learners learning by understanding | Theorists |
| 3. | Convergers | Learners learning by applying knowledge | Pragmatists |
| 4. | Accommodators | Learners learning by doing | Activists |

From Table 1, Honey and Mumford classified learning styles into 4 types, same as Kolb, but used different glossary for each style to make them more understandable. In addition, they accepted the concept that each learner had more than one learning style depending of situation and experience. Therefore, learners could circulatory apply all four types more than use only one style. Honey and Mumford (2000) developed Kolb's learning cycle a little bit to create new learning cycle as shown in Figure 1.



Source (Honey and Mumford, 2000)

Figure 1 Honey and Mumford's learning style cycle

Learning styles were classified as 4 types as followed;

1. Activists are learners learning by doing, always getting ready to get new experience, preferring to do activities with others and activities that provide freedom to work, and learning that emphasizes on emotion/feeling not long-time lecture. In addition, they don't prefer to express their opinion.

2. Reflectors are learners learning by thinking. They spend time to review, like taking note, brainstorming, and attending lectures with explanation and analyzation. On the other hand, they do not prefer role play and accelerated work.

3. Theorists are learners learning by understanding. They created steps to work, are reasonable, like analogy and case study. Contrary, they do not like emotional situation.

4. Pragmatists are learners learning by applying knowledge. They like learning in laboratories or computer laboratory. In addition, they like applicable content, search for knowledge, and practice activities with feedback. On the other hand, they do not like to learn theories.

3.2 Research Framework

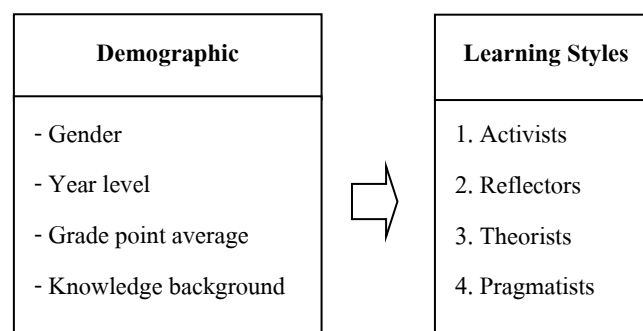


Figure 2 Research Framework

3.3 Research Hypotheses

Learning styles of undergraduate students in Business Administration program related to or depend on gender, year level, grade point average and knowledge background

4. Research Methodology

4.1 Research Design

This research is a correlation research.

4.2 Population and Sample

Population and sample were 1,874 undergraduate students in Business Administration Program, King Mongkut's University of Technology North Bangkok in the year of 2019. Of these, 1,412 students completed the questionnaire, accounting for 75.35% return rate. Among them, 485 students were freshman, 257 students were sophomore, 557 students were junior, and 113 students were senior.

4.3 Research Instrument

The instrument used in this study was a questionnaire consisting of two sections;

Section 1: Demographic including gender, year level, grade point average, and knowledge background

Section 2: Learning style questionnaire by Peter Honey and Alan Mumford (2006), The Learning Styles Questionnaire 80- item which queried about learning styles. The questionnaire went through translation/back-translation process. Then it was tried out with 40 samples to examine the content understanding and respondents' cooperation. The reliability of the questionnaire was calculated as Cronbach's coefficient alpha of 0.818.

4.4 Data Collection

In order to distribute the questionnaire to students, the researcher met the participants, introduced herself, explain the objectives and process of the study, and asked for the cooperation to do the study by answering every question which took 15-20 minutes to finish the questionnaire. The cooperation of the students was voluntary and anyone can refuse and/or withdraw anytime.

4.5 Data Analysis

Data was analyzed with the significance of .05 as follows;

1. Demographic including gender, year level, grade point average, knowledge background, and learning styles was analyzed using descriptive statistics.
2. The relationship between learning styles and demographic was analyzed using Chi-square test.

5. Research Findings

Table 2 Demographic of the sample (n = 1,412)

| Variables | Number of Students | Percentage |
|--------------------------|--------------------|------------|
| Gender | | |
| Male | 404 | 28.6 |
| Female | 1,008 | 71.4 |
| Year level | | |
| Freshman | 485 | 34.3 |
| Sophomore | 257 | 18.2 |
| Junior | 557 | 39.5 |
| Senior | 113 | 8.0 |
| Grade point average | | |
| below 2.00 | 54 | 3.8 |
| 2.01-2.50 | 351 | 24.9 |
| 2.51-3.00 | 463 | 32.8 |
| 3.01-3.50 | 381 | 27.0 |
| 3.51-4.00 | 163 | 11.5 |
| Knowledge background | | |
| (Secondary school) | | |
| - Math-Sci program | 447 | 33.8 |
| - Lang-Soc program | 754 | 53.4 |
| (Vocational certificate) | | |
| - Industrial mechanic | 37 | 2.6 |
| - Commerce | 144 | 10.2 |

The sample was 1,412 students in Business Administration program. The sample included 1,008 females (71.40%), 404 males (28.60%), 485 freshman (34.30%), 257 sophomore (18.20%), 557 junior (39.40%), and 113 senior (8.00%). In terms of grade point average, 54 students were below 2.00 (3.80%), 351 students were in the range of 2.01-2.50 (24.90%), 463 students were in the range of 2.51-3.00 (32.8%), 381 students were in the range of 3.01-3.50 (27.00%), and 163 students were in the range of 3.51-4.00 (11.50%). Students have a basic knowledge from secondary school in Math-Sci program accounting for 447 students (33.8%), Lang-Soc program accounting for 754 students (53.4%) and knowledge background from Vocational certificate in Industrial mechanic accounting for 37 students (2.6%), Commerce accounting for 144 students (10.2%).

Table 3 Learning styles of the respondents

| Learning styles | Number of Students | Percentage |
|-----------------|--------------------|--------------|
| A: Activist | 103 | 7.3 |
| R: Reflector | 828 | 58.6 |
| T: Theorist | 260 | 18.4 |
| P: Pragmatist | 221 | 15.7 |
| Total | 1,412 | 100.0 |

Learning style of the respondents were mostly Reflector accounting for 58.60% followed by Theorist (18.40%), Pragmatist (15.70%), and Activist (7.30%).

Table 4 The relationship between learning styles and variables

| Variables | Learning Styles | | | | Total | χ^2 | P-value |
|------------------------|-----------------|-------------|-------------|-------------|---------------|----------|---------|
| | Activist | Reflector | Theorist | Pragmatist | | | |
| Gender | | | | | | 21.103 | .00* |
| Male | 39 (37.9%) | 200 (24.2%) | 84 (32.3%) | 81 (36.7%) | 404 (28.6%) | | |
| Female | 64 (62.1%) | 628 (75.8%) | 176 (67.7%) | 140 (63.3%) | 1,008 (71.4%) | | |
| Year level | | | | | | 14.010 | .12 |
| Freshman | 47 (45.6%) | 271 (32.7%) | 82 (31.5%) | 85 (38.5%) | 485 (34.3%) | | |
| Sophomore | 13 (12.6%) | 155 (18.7%) | 52 (20%) | 37 (16.7%) | 257 (18.2%) | | |
| Junior | 34 (33.3%) | 335 (40.5%) | 100 (38.5%) | 88 (39.8%) | 557 (39.4%) | | |
| Senior | 9 (8.7%) | 67 (8.1%) | 26 (10%) | 11 (5%) | 113 (8.0%) | | |
| Grade point average | | | | | | 5.035 | .95 |
| below 2.00 | 6 (5.8%) | 31 (3.7%) | 11 (4.2%) | 6 (2.7%) | 54 (3.8%) | | |
| 2.01-2.50 | 31 (30.1%) | 197 (23.8%) | 65 (25%) | 58 (26.2%) | 351 (24.9%) | | |
| 2.51-3.00 | 31 (30.1%) | 274 (33.1%) | 86 (33.1%) | 72 (32.6%) | 463 (32.8%) | | |
| 3.01-3.50 | 23 (22.3%) | 231 (27.9%) | 68 (26.2%) | 59 (26.7%) | 381 (27%) | | |
| 3.51-4.00 | 12 (11.7%) | 95 (11.5%) | 30 (11.5%) | 26 (11.8%) | 163 (11.5%) | | |
| Knowledge background | | | | | | 12.922 | .16 |
| Secondary school | | | | | | | |
| Math-Sci program | 29 (28.2%) | 288 (34.8%) | 81 (31.2%) | 79 (35.7%) | 477 (33.8%) | | |
| Lang-Soc program | 59 (57.3%) | 438 (52.9%) | 139 (53.5%) | 118 (53.4%) | 754 (53.4%) | | |
| Vocational certificate | | | | | | | |
| Industrial mechanic | 5 (4.9%) | 15 (1.8%) | 13 (5%) | 4 (1.8%) | 37 (2.6%) | | |
| Commerce | 10 (9.7%) | 87 (10.5%) | 27 (10.4%) | 20 (9%) | 144 (10.2%) | | |

*p<.05

From Table 4, learning styles of the students related to gender at the significance of .05. Learning style of males was Activist, learning by doing while that of female was Reflector, learning by thinking.

In comparison of learning styles classified by other demographics, it was found that learning styles of students with different year levels, GPA, and knowledge background were not different at the statistical significance level of .05.

6. Discussion

The results would be discussed based on the analysis of data and summarizing the findings about the learning styles of students in Business Administration program according to the following objectives.

(1) study learning styles of undergraduate students in Business Administration program

According to this research, learning styles of the respondents were mostly Reflector accounting for 58.60%. The results of the study were consistent with the research of using a sample of first year pharmacy (275) and chemistry (127) students at the University of Manchester (UK), (Sharif and others, 2010) investigated the relationship between learning styles, attendance and academic performance. The results showed that pharmacy students had preferences for the reflector (15.1), theorist (11.7), pragmatist (10.7) and activist (8.7) learning styles. Similarly, chemistry students had preferences for the reflector (13.0), theorist (12.0), pragmatist (10.9) and activist (10.1) learning styles. The results further indicated a relationship between learning styles and attendance and between learning style and examination marks. Wilkinson and others (2014) investigated the influence of learning styles of first year medical and dental students at Queen's University Belfast on their academic performance in different forms of assessment. Results showed that the dominant learning style was reflector (14.70) followed by theorist (12.20), pragmatist (11.00) and activist (7.80). Result also indicated that the learning styles of students had little impact on academic performance. Therefore, learning designs should increase learning activities that promote learning of Reflector, who are good learners. The results of this study were inconsistent with the research of Carol (2015) studied learning model for the social science master's students (1: activist, 2: reflector, 3: theorist, 4: pragmatism) which might be because of different courses of study.

(2) study the relationship between learning styles and learners' demographic

Learning styles of the students were related to gender at the significance of .05. Learning style of males was Activist, learning by doing whereas that of females was Reflector, learning by thinking. The results of this study showed that learning styles of students with different genders were significantly different. This was consistent with the research of Yousef (2016) exploring the learning style preferences of undergraduate students at the United Arab Emirates University (UAEU). His results indicated that UAEU students preferred the reflector (16.7), theorist (15.4), pragmatist (15.0), and activist (12.3) learning styles. Furthermore, there were statistically significant differences in certain learning styles because of students' demographic and academic characteristics. It can be concluded that the dominant learning styles among undergraduate students in different educational context were reflector and activist. There were mixed results in terms of the relationship between learning style preferences and some demographic and academic variables.

7. Suggestion

Most undergraduate students in Business Administration Program are reflector. Instructors should organize teaching and learning activities in accordance with the learning style. Learning design should enhance Reflector's learning activity, who is a good learner by thinking. Reflectors react positively to e-learning, learning reviews, listening to lectures or presentations, observing role-plays, reading, self-study/self-directed learning (Grimmer-Somers, 2011).

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**FACTORS AFFECTING DISCIPLINES THROUGH ONLINE LEARNING
IN GENERAL EDUCATION COURSES FOR UNDERGRADUATE
STUDENTS AT KING MONGKUT'S INSTITUTE OF
TECHNOLOGY LADKRABANG (KMITL)**

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ABSTRACT

The objectives of this research are 1) to study the level of internal and external factors that affect the students' discipline in online learning, 2) to study the level of students' discipline in online learning, 3) to compare the study discipline in online learning of General Education courses with other external factors of undergraduate students. This is a survey research, and the research participants were 30,669 undergraduate students at King Mongkut's Institute of Technology Ladkrabang (KMITL) in first semester of academic year 2020, who studied General Education courses. The sample size was determined using the percentage criteria, and the population size is ten thousand, 1 percent sample size was taken. The sample obtained from the calculation was 306.69 or approximately 307 students. However, this research used the samples of 320 students. The stratified random sampling was used for the method of selecting samples in this research. To determine the proportion of the sample population, the enrolled students in General Education courses were divided by distribution among the 14 faculties. A questionnaire check list with 5 scale level was used for the research instrument. Research results found the level of opinions on internal factors, in high level ($\bar{x} = 3.84$, $S = 0.525$) then considered subtleties, was found at high level of attitude towards learning discipline ($\bar{x} = 4.05$, $S = 0.529$), study habits at a high level ($\bar{x} = 3.92$, $S = 0.640$), achievement motivation at a high level ($\bar{x} = 3.93$, $S = 0.604$), belief in self-power at a high level ($\bar{x} = 3.65$, $S = 0.638$), and attitudes towards online learning at a high level ($\bar{x} = 3.52$, $S = 0.824$). The level of the students' discipline in online learning showed a high level of discipline ($\bar{x} = 3.70$, $S = 0.709$) behaviors as the students put priority as not sending the assignments later than the deadline. ($\bar{x} = 4.10$, $S = 0.933$). Students

who own personal computers showed the higher average of online learning discipline than the students without personal computers, at the statistically significant level of 0.05. The students with income range of "more than 10,000 baht" had an average of online learning discipline higher than the students with income range of "below 5,000 baht" and "6,000-10,000 baht" at the statistically significant level of 0.05. The students with "planned studies" had average of online learning discipline higher than the students with "planned study at some time" and "no-planning", at the statistically significant level of 0.05.

Keywords: Disciplines, Online Learning, Discipline through online learning

1. Introduction

The advances in technologies have created competition in education resulting of the contemporary world of wisdom learning society. In order to move towards a quality knowledge-based society for countries, the most significant factor is the availability of quality human resources. It reflects the importance of the educational system that must be able to adapt to this new trend of change and paradigm. In particular, higher education has a duty to make people knowledgeable and able to compete with foreigners, as the National Education Act 1999, Section 66 states that *"Students are eligible for the development of their competence in the use of educational technology at the first possible opportunity in order to have the knowledge and skills sufficient to continuously use the educational technology in their pursuit of lifelong self-knowledge"*.

Online Learning is widely used today, using computer networks as a channel to broadcast content is a tool to access information and it is becoming a tool for creating knowledge. (Prachit, 1998) There are number of different names for Online Learning, such as e-Learning, online learning, web-based education, web-based instruction, tele-learning, virtual classroom and virtual university. Despite there are the various names to call it, it still has a similar method to provide opportunities to students to learn 'anywhere-anytime'.

In online learning, students need disciplines, an active learning, to learn know how to manage time, to understand the online teaching system, and especially the self-determination to succeed in their studies. (Supanee, 2000) Self-discipline is necessary and significant. The primary factor that will lead online learners to be successful in studies, students should be encouraged to seek knowledge for themselves other than shown in the curriculum. The reason is that knowledge is so abundant that it cannot be put into the curriculum. Therefore, the learner with self-control, self-discipline, and intelligent will find the additional knowledge. However, students can learn by themselves through media and activities, the successful results of learners in online learning depends on individual efforts. But many studies showed that students who study by online learning, lack of motivation and awareness, unable to control themselves, lack of discipline. So self-learning has been inefficient in general.

From the problems mentioned above, discipline is an important factor to make students to be successful in online learning. Even though, there are numerous researches in Online Learning, but the factors affecting self-discipline of online learning have never been studied. Therefore, Researcher was interested to study the factors influencing the discipline, by using two internal factors, namely psychological traits, and external factors in the

social environment, will be a guideline for improving or developing, such factors to make it suitable condition and quality, and it would enable a wide range of factors in online learning, and help student to achieve the goals of effective learning. Online Learning of General Education courses at KMITL in Semester 1/2020, is designed for study in a classroom together with online learning, in the proportion 50:50 each course. There will be online learning for the first 2 months of semester, and it will switch to study in the classroom for the last 2 months of semester. Students are allowed to download lessons, submit work, and communicate with teachers online.

2. Research Objectives

(1) To study the level of internal and external factors that affect the discipline of students in online learning General education courses of undergraduate students at King Mongkut's Institute of Technology Ladkrabang.

(2) To study the level of students' discipline in online learning General education courses of undergraduate students at King Mongkut's Institute of Technology Ladkrabang.

(3) To compare the study discipline in online learning General education courses with external factors of undergraduate students at King Mongkut's Institute of Technology Ladkrabang.

3. Literature Review

3.1 Theory, Concept and Related Research

3.1.1 Online learning

Nowadays, online learning is not a brand new way of education. Online Learning is widely known and accepted: the paradigm of educational management in the 21st century is to "*Teach Less, Learn More*" (Chakgrit, 2016). To design the requirements in Presentation and Teaching and Training Management on Internet, it is necessary to do a thorough analysis to gain knowledge and understanding, in terms of the potentials of the Internet and various learning resources on the Internet. Processes and methods for applying the theory of instructional design are necessary to extract the existing potential of the Internet (Ritchie & Hoffman, 1997)

3.1.2 External factors

External factors include the general condition of the students, such as gender, age, average income, own computer, online learning experience, media environment and educational environment.

Manus (2013) Studied the relationship between self-discipline and academic achievement, and it was found that female students had more self-discipline than male students. For the factor of age, Dennis (2009) studied the compositions affecting the student's failure, and it was found that the age, while studying at the university, is an important element. The older groups would be more successful in education than younger groups. In terms of the factor of average income while studying, Boonsri and others (2018) analyzed the reasons for the half-term resignation of Sukhothai Thammathirat Open University students, and found that the economy was one of the main reasons for their dropout. Martha (1995) found the variable influences in using internet network,

knowledge and the attitude about training of using the network. In addition, Jamaludin (1996) showed experiences and computer skills are related how frequently using the Internet.

3.1.3 Internal factors

Internal factors include Attitude towards Discipline Behavior, Study Habits, Achievement Motivation, Belief in Self-Power, and Attitudes towards Online Learning.

Thurstone (1967) mentioned that attitude is one of the psychological variables that cannot be easily observed. Rather, it is a psychological inclination that may be demonstrated by the external behaviors. It is a matter of likes, dislikes, bias, opinions, feelings, and beliefs about something. Maddox (1963) said "Habit" is behavior that a person exhibits on a regular basis. Until it becomes a habit, it is not caused by intuition. But it is the result of learning and practice. Therefore, habits are things that can be changed and improved. Study habits would be more energetic, when the study behavior has been successful, satisfactory, or able to solve problems. The action will be done repeatedly, until it became a habit. Atkinson (1964) defined the achievement motivation as the driving force. A person becomes aware that his or her actions must be evaluated by oneself or others in comparison with the excellent standard. The results of the assessment can be satisfied when it is completed, or unsatisfied when it is not successful. Rotter (1966) compiled some of the past works of psychologists, combined with his work and summarized the behavior of belief in self power as *'A person who has self-belief in power, It is a person who knows or believes that anything happened it is result of own actions or abilities'*

3.1.4 Discipline

There are two important theories involving the development of self-discipline. Mowrer's theory is on the origin of control the discipline and theory of Peck and Havighurst (Duangduen, 2002) is on the development of ethical motivation which mainly takes control of ego and superego.

Self-discipline theory of Mowrer (1960) can be summed up as the discipline of each person must have the foundation from birth until growing up. Starting point is the relationship between baby and mother. This will lead to the ability to reward themselves (Providing self-reinforcement) or ability to control oneself as they grow up.

Ethical motivation theory of Peck and Havighurst (1972) can be summed up as human beings may evolve into different types of mental traits. There are some types have self-discipline or control by ego, and it is evident in individuals for the conduct of behaviors. Peck and Havighurst believe the ego's control and joint superego's control provide a reasonable way to act to others.

3.2 Research Framework

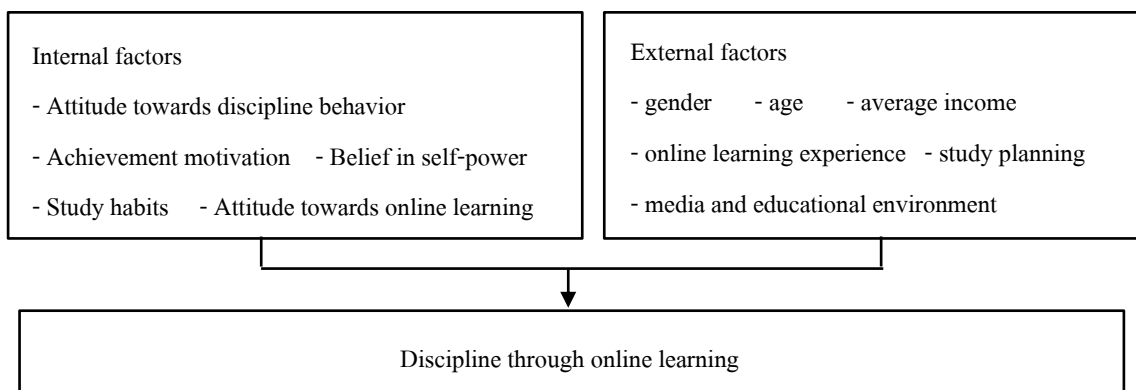


Figure 1 Research Framework

4. Research Methodology

4.1 Research Design

This research is a survey research. It is a study of the factors affecting disciplines in online learning General Education courses of undergraduate students in King Mongkut's Institute of Technology Ladkrabang (KMITL).

4.2 Population and Sample

4.2.1 Population: Students in General education courses. Undergraduate students at King Mongkut's Institute of Technology Ladkrabang, in first semester of academic year 2020, 30,669 students in total.

4.2.2 Sample: Determined the sample size by using the percentage criteria (Tianchai, 2004) main population size is ten thousand, 1 percent of the sample size is taken. The sample obtained from the calculation is 306.69 or approximately 307 students. But in this research, the sample of 320 students is used. The method of selecting samples in this research is stratified random sampling. The proportion of the sample is determined by the population of enrolled students in General Education courses from 14 faculties.

4.3 Research Instrument

The tool for this research is a questionnaire divided into 4 parts as follows:

Part 1 : Questionnaire about the status of students, check list questions. The information on the status of students is classified by gender, age, year, faculty, online learning experience, and average income.

Part 2 : Questionnaire about online learning environment. It divided the contents into media used online learning comprehensive about media design, quickness, and ease of access to media, stability of the support system. The institute's environment covers the opinions on the readiness of tools, equipment, buildings in the institute. It is measured in 5 scale level.

Part 3 : Internal factor survey. It covers the internal factors need to be studied, including attitude towards learning discipline, Study habits, Achievement motivation, Belief in self power, Attitude towards online learning. It is measured in 5 scale level.

Part 4 : The online learning discipline questionnaire. It is measured in 5 scale level.

Then, the questionnaire was presented to the advisor to consider the preliminary integrity factors to provide suggestions for the improvement. The questionnaire was then brought to the experts to examine the content validity by using the Index of Congruence (IOC) method for each questions and the definitions. Three experts had participated. The analysis results showed the IOC was between 0.6-1.0. The questionnaire was then used to try out on a group of 30 students, similar to sample group to confirm the reliability. Using the Cronbach's Alpha Coefficient, the reliability analysis of this questionnaire is equal to 0.97.

4.4 Data Collection

The content validity and reliability of the questionnaire was confirmed, and then then the questionnaire was converted to Google form format to collect data from the sample group. Also, it was reviewed by the teachers of General Education courses for the academic year 1/2020.

4.5 Data Analysis

Personal information was analyzed by frequency and percentage.

The opinions about the online learning environment, internal factors, external factors, were analyzed. The opinions were measured in 5 scale level by mean and standard deviation.

The data on online learning discipline was analyzed. The practices were measured by 5 scale level by mean and standard deviation.

The comparison of discipline through online learning with external factors of students is analyzed, using Independent Sample T-Test and One-way ANOVA statistics.

5. Research Findings

5.1 The results of the analysis level of internal and external factors that affect the discipline of students in online learning General education courses of undergraduate students

5.1.1 The results analysis of external factors.

Analysis results of personal information is composed by the sample consisted of 38.4% males, 61.6% females. Most of the students, 52.8%, were the first-year students. Most of the income level of the students, 51.6%, was between 6,000-10,000 baht per month. Most students, 68.8%, had more than 6 years of experiences, using computers and the Internet. In terms of online learning experiences, 70% of the students had experiences.

The most of students, 68.4%, had planned for their studies. In addition, it was found that the most of students, 97.2%, had personal computers, and 2.8% of the students had no personal computers for online learning. The results analysis of opinions on media and educational environment found that the students had overall opinion at a high level. (\bar{x} =3.62, S =0.771) The students put the most emphasis on the need of educational equipment suitable for online teaching and learning.

5.1.2 The results analysis of internal factors

The results analysis of the level of opinions on internal factors, overall, had opinion in high level (\bar{x} =3.84, S =0.525), then considered individually, it was found a high level of attitude towards learning discipline

(\bar{x} = 4.05, S = 0.529). In terms of study habits at a high level (\bar{x} = 3.92, S = 0.640) with the matter of pride in being able to study, trying to understand the story before making a report, and make full use of their abilities to work on assigned tasks. In terms of achievement motivation at a high level (\bar{x} = 3.93, S = 0.604) there are interesting points about the feeling of pride when ones have accomplished work or won competitions, and the desire to be have confidence in own abilities. In terms of belief in self-power at a high level (\bar{x} = 3.65, S = 0.638) there is an interesting point in the belief that, putting efforts is a huge factor to decide the academic success. The last one, attitude towards online learning at a high level (\bar{x} = 3.52, S = 0.824) has an interesting point, it was found that it is easier to find information from websites around the world than books.

Table 1 The results analysis level of internal factors

| Internal Factors | \bar{x} | S.D. | Level |
|--|-------------|--------------|-------------|
| Summary of attitudes towards discipline behavior | 4.05 | 0.529 | high |
| Summary of study habits | 3.92 | 0.640 | high |
| Summary of achievement motivation | 3.93 | 0.604 | high |
| Summary of belief in self-power | 3.65 | 0.638 | high |
| Summary of attitude towards online learning | 3.52 | 0.824 | high |
| overall | 3.84 | 0.525 | high |

5.2 The results analysis level of discipline's students in online learning General education courses for undergraduate students.

The results analysis level of discipline's students through online learning showed that, there are high level of discipline (\bar{x} = 3.70, S = 0.709) behaviors as students put priorities not to send assignments later than the deadline. (\bar{x} = 4.10, S = 0.933), always try to complete an assignment before the deadline. (\bar{x} = 4.10, S = 0.902), and attending classes on time, even though the instructor does not verify the attendance. (\bar{x} = 4.08, S = 0.958) In addition, the students have practiced at a moderate level of reviewing learning from the materials every day at least 1 hour per day. (\bar{x} = 3.09, S = 1.215) and contact the teachers for advices about learning (\bar{x} = 3.19, S = 1.219)

5.3 The results analysis comparison of discipline through online learning General education courses with external factors of undergraduate students.

The results analysis comparison of discipline in online learning with external factors was found, online learning discipline average of male students was not higher than female students at the statistically significant level of 0.05. In online learning experience, it was found that online learning discipline average of students with online learning experience is not higher than students who never had online learning experience at the statistically significant level of 0.05. About the availability of personal computer, it was found that the students who have their own personal computers had average of online learning discipline higher than students without personal computers at the statistically significant level of 0.05.

The results analysis comparison of discipline through online learning with income range of students shows that the students with income range of "more than 10,000 baht" had average of online learning discipline higher than students with income range of "below 5,000 baht " and "6,000-10,000 baht" at the statistically significant level of 0.05. In terms of student's grade level, it was found that all grade level had the same discipline through online learning at the statistically significant level of 0.05. In study planning, it was found that the students with "planned studies" had average of online learning discipline higher than students with "planned study at some time, intervals" and "no-planning" at the statistically significant level of 0.05.

Table 2 comparison of discipline in online learning General education courses with external factors of undergraduate students (n=320) Independent Sample T-Test

| external factors | Item | n | \bar{X} | S | Lavene's test | | t | df | sig |
|----------------------------|----------|-----|-----------|---------|---------------|-------|--------|-----|-------|
| | | | | | F | sig | | | |
| Gender | male | 123 | 3.7403 | 0.72678 | 0.440 | 0.507 | 0.789 | 318 | 0.215 |
| | female | 197 | 3.6760 | 0.69856 | | | | | |
| Online learning experience | have | 224 | 3.74 | .737 | 1.948 | 0.164 | 1.617 | 318 | 0.085 |
| | never | 96 | 3.60 | .632 | | | | | |
| Personal computer | have | 311 | 3.69 | 0.710 | .583 | .446 | -1.606 | 318 | 0.022 |
| | have not | 9 | 4.07 | 0.593 | | | | | |

Table 3 comparison of discipline in online learning General education courses with external factors of undergraduate students (n=320) One-way ANOVA

| External factors | Item | n | \bar{X} | S | Lavene's | sig | F | sig | Post Hoc |
|------------------|----------------------------|-----|-----------|--------|----------|------|--------|------|----------------------------------|
| Income range | Below 5,000 baht | 122 | 3.5879 | .75646 | 1.106 | .332 | 3.683 | .026 | more than 10,000 > 6,000 > below |
| | 6,000-10,000 baht | 165 | 3.7364 | .66742 | | | | | |
| | More than 10,000 baht | 33 | 3.9394 | .67234 | | | | | |
| Grade level | Year 1 | 169 | 3.7094 | .66063 | 1.175 | .319 | .403 | .751 | - |
| | Year 2 | 75 | 3.7222 | .72918 | | | | | |
| | Year 3 | 47 | 3.6005 | .82016 | | | | | |
| | Year 4 | 29 | 3.7567 | .76021 | | | | | |
| Study planning | Planned studies | 66 | 4.0126 | .68068 | 1.369 | .256 | 16.445 | .000 | Planned > sometimes, no planning |
| | Planned study at some time | 219 | 3.6859 | .65056 | | | | | |
| | No-planning | 35 | 3.2048 | .82146 | | | | | |

6. Discussion

6.1 The results of this research to study the level of internal and external factors that affect the discipline of students in online learning General education courses of undergraduate students that can be discussed as follows:

The students had a high level of attitude towards learning discipline. This shows that the students agreed discipline is important for online learning. Study habits factor was seen significant at a high level, motivation for achievement was at a high level, belief in self power was at a high level. It shows that the students believe they have abilities to learn and find a way to achieve successful online learning in high level. It is consistent with the research of Sirikorn (2015) about the factors affecting self-discipline of lower secondary school students, it was found that the overall level of self-discipline of the students was at a high level.

The students had a high level of attitude towards online learning. This shows that the students have positive preferences and opinions about online learning. Also, it has an interesting point. It is easier to find information from websites around the world than books. If the students fail to understand the contents from the teachers, they are allowed to review the lessons as many times as they want, until they are fully understood. Jamaludin (1996) stated that experience, knowledge, and skills in using computers and the Internet are the factors affecting attitudes that will change the learning behavior in Online Learning.

Most of the students had more than 6 years of experiences in using computers and the Internet, and had experiences in online learning. The students had planned to study at some time, intervals, also found most of them had personal computers for online learning. Which corresponds to Martha K. Davenport (1995), one of the variables that influences the use of the Internet is the knowledge of using the Internet and attitudes on the trainings to use the network. Furthermore, experiences and computer skills are related to how often the students use the Internet. In the opinions about online learning environment, it was found that the students had a high level at the overall opinions. It is consistent with the research of Sirikorn (2015). For the factors affecting self-discipline of lower secondary school students, the students' overall self-discipline and all the aspects were quite high. A school and environment, to train students to be self-disciplined, were important.

6.2 The results of this research to study the level of discipline's students in online learning General education courses of undergraduate students that can be discussed as follows:

The students had a high level of discipline online learning behaviors as they put priorities in not sending work late than the deadline, always trying to complete an assignment before the deadline, and attending classes on time although the instructor does not verify the attendance. It is consistent with the research of Benyapa (2017), who studied the factors affecting to self-discipline of students at opportunity expansion. It was found that the overall students at opportunity expansion school had a high level of self-discipline in every part.

6.3 The results of this research to compare the study discipline in online learning General education courses with external factors of undergraduate students that can be discussed as follows:

Personal computer was one factor. The students who have own personal computers had average of online learning discipline higher than students without personal computers. It is consistent with the research of

Manus (2013). He insisted that having a personal computer, place, time, frequency to use the internet will result in changing the opinions towards online teaching and learning with a computer system. The income range of students was found that the students with "over 10,000" income ranges have a higher level of discipline than lower income ranges. It is consistent with the research of Pradit (2013), it was found that income was a variable that is closely correlated with academic achievement, and it is one of the variables in the equation for predicting the students' achievement. For the term, study planning, the students with "planned studies" had average of online learning discipline higher than students with "no-planning. It is consistent with the research of Boonpiang and others (2010), who insisted that the enhancement of discipline on the aspect of responsibility for the students in grade 7- 9 would result in higher academic achievement for having planned time to review the important subjects required for entrance examinations, and set aside time for sleeping and getting enough rest more than students with low academic achievement.

7. Suggestion

(1) From the research results, it was found that the students who studied online have a high level of study discipline. Therefore, the online learning discipline questionnaire may be used to examine and assess the students to be more successful in online learning.

(2) Online learning is a form of learning that could reduce various educational problems, such as distance problems, pestilence problem, and problems in the standards of school management, etc. Therefore, we should focus on the development of the internal and external factors, which would affect the online learning discipline in order to develop student's readiness and have ability to successfully online learning.

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**THE ASSESSMENT OF PRIORITY NEEDS FOR STRENGTHENING WORKING
WITH OTHERS COMPETENCY OF UNDERGRADUATE STUDENTS IN 21st
CENTURY FOR WORK-BASED EDUCATION MODEL**

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ABSTRACT

The purpose of this research was to study expectations and to assess priority needs for strengthening working with others competency of undergraduate students in the 21st century for Work-based Education Model. This research is an evaluation research (Needs Assessment). It studied the expectations of lecturers and mentors and the actual practice of undergraduate students and then prioritized them in term of Priority Needs Index (PNI_{modified}). The population and sample groups were divided into two groups. The first group was 57 directors, lecturers and mentors, who were responsible for take caring students during internship, of Counseling and Career Development for Student Center, Panyapiwat Institution of Management. Based on the sample size setting of Tianchai Kiranan (sited in Leekitwattana, 2016) for hundred digit population size, the sample size of this population should be 25% or 14.25 people. However, this research set the sample size 30 people being selected by using Stratified Random Sampling technique according to the job position. Another group was 3,143 fourth-year undergraduate students of Panyapiwat Institution of Management. The sample size of this population was based on the proportioning from the finished table of Kanjanawasee (2018). From this group, 370 samples were chosen by using Multi-Stage random sampling with confidence level at 95%. The research instrument used was a five-rating scaled questionnaire. The data then were analyzed through percentages, means, standard deviation and the Modified Priority Needs Index of PNI_{modified}. The result showed that lecturers and mentors had overall expectation degree on working with others competency of undergraduate students such as Social and Cross-Culture Skills, Productivity and Accountability, and Leadership and Responsibility at the high level (\bar{X} =4.39, S.D.= 0.55, 0.61 and 0.66). On the other hand, the result showed that the working with others competency that undergraduate students actually practiced most was Social and Cross-Culture Skills (\bar{X} =4.31, S.D.= 0.65).

Finally, this research indicated that the priority needs index (PNI_{modified}) for strengthening working with others competency of undergraduate students in the 21st century for work-based education model was 0.03 in overall and the collaboration skills that urgently needed to be strengthening were Productivity and Accountability and Leadership and Responsibility ($PNI_{\text{modified}}=0.04$). Therefore, further study on methods for enhancing students' working with other s competency or organize training courses for development to strengthen this competency is recommended.

Keywords: Needs Assessment, Working with others competency, Work-Based Education

1. Introduction

Higher education institutions have significant roles in human resource development and people empowerment to be academic or professional expertise in response to a country's need for ensuring its global competition capacity. Therefore, higher education institutions should provide a variety of curriculums or learning model for people at any ages The goal is to lead students to be excellence in academic and profession, which will lead Thailand to have economic and social development and to have quality citizens (Higher education act, 2019). According to The Global Competitiveness Report 2019: World Economic Forum (WEF), the Thailand's economic competitiveness was ranked 40th out of 141 countries worldwide. The major reasons are the decrease of the skills of graduates and ineffectiveness in critical thinking teaching in Thailand. Therefore, the country's manpower development has to focus on knowledge, skills, expertise and high competencies relating to the needs of modern organizations, which need the people who are ready to work.

Collaboration with others is a success factor for undergraduate students to work and to live with other in the society. Hench, student development for undergraduate students must consist of hard skills and soft skills. These skills are 1) technology utilization skills, 2) collaboration skills, 3) innovative and creative skills 4) communication and interpersonal skills (Saidi, 2018).

Work-based Education (Suthamanon, 2020) is the education model that encourage lecturers and students to learn together through learning-by practice. It is the model that integrates learning theories or general principles in the classroom with actual practice in internship. Throughout a Bachelor curriculum (4 years) all students will study in classroom and alternately take an internship at a company every year. It is significantly different from other general education model that students have to study in classroom until the third year and have a chance to take an internship during the summer for three months. This education model is a model that can meet a country's need by develop its manpower both hard skills and soft skills. Panyapiwat Institute of Management is the higher education institute that use this model.

Needs Assessment is a problem-solving process for planning and developing students to be ready to work which needs to consider reliable information about actual practice of undergraduate students before planning how to develop students in the future (Wongwanich, 2015). By considering the problems of students during the internship, strengthening collaboration skills for undergraduate students is significant for Work-based

Education because in this model students have to study in the classroom and work at a business during the internship throughout their program, so they have to work together with people in different age groups as supervisors and colleagues. Therefore, the researcher would like to study the priority needs for strengthening working with others competency of undergraduate students in the 21st century for Work-based Education Model in order to acquire valuable knowledge that can develop students' competency to work with others in their future work-life.

2. Research Objective

- (1) To study the expectations towards working with others competency of undergraduate students in the 21st century for Work-based Education Model
- (2) To assess priority needs for strengthening working with others competency of undergraduate students in the 21st century for Work-based Education Model.

3. Literature Review

3.1 Theory, Concept and Related Research

Kaufman, R., Rojas, A. M., & Mayer, H. (1993) said that need assessment is a process used to identify the gap between current results with expectations to be achieved and prioritize those gap is selecting the most important as the point of further development. The result of the need assessment to known need requirement of target group. Based on this concept the needs assessment of information "Necessary needs" and how to fix or meet the needs.

Suthamanon (2020) states that Work-based Education is the model that integrates learning theories or general principles in the classroom with actual practice in internship. In this model, all students will study in classroom and alternately take an internship at a company every year throughout their 4-year curriculum period. During the internship, students will encounter several problems being similar to actual work-life problems. Therefore, it is necessary to have mentors to take care, give advice, and solve problems and at the workplace, a supervisor should also acts as a mentor in on-the-job training and giving advice to help students to improve themselves continuously.

This research focuses only on the expectations towards collaboration competency and assessment of priority needs for strengthening working with others competency of undergraduate students in the 21st century for Work-based Education model by using two methods: survey research and Priority Needs Index (PNI_{modified}) (Wongwanich, 2015).

The framework of working with others competency of Work-based Education model in this research is based on the conceptual framework Bellanca & Brandt (sited in Sinlarat, 2014) as followed:

1. Flexibility and Adaptability
2. Initiative and Self-Direction
3. Social and Cross-Culture Skills

4. Productivity and Accountability

5. Leadership and Responsibility

3.2 Research Framework

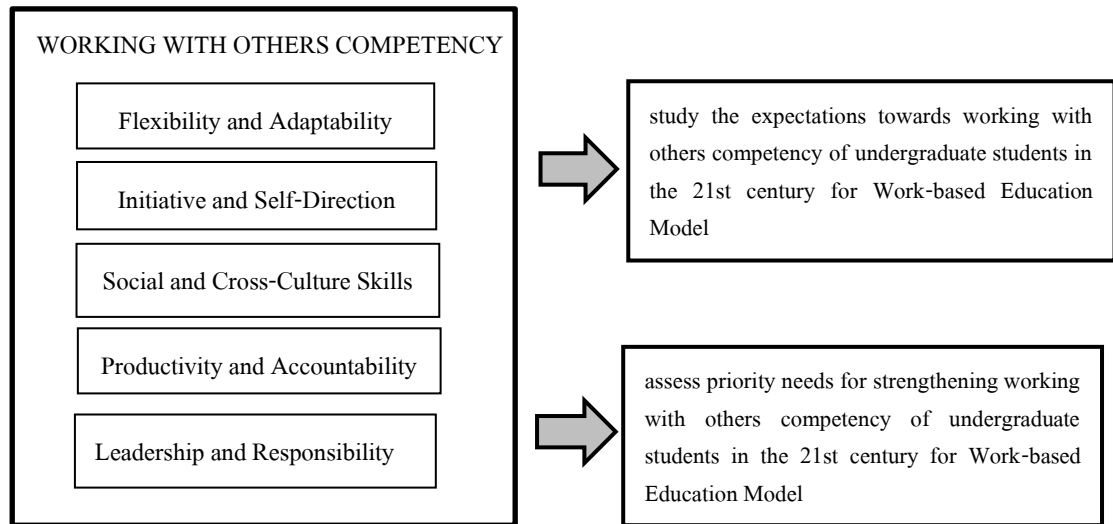


Figure 1 Research Framework

4. Research Methodology

4.1 Research Design

This research is a needs assessment research by assessing priority needs for strengthening working with others competency of undergraduate students in the 21st century for Work-based Education model.

4.2 Population and Sample

4.2.1 Population and Sample for Objective 1

Population : The population is 57 directors, lecturers and mentors, who were responsible for take caring students during internship, of Counseling and Career Development for Student Center, Panyapiwat Institution of Management.

Sample : The sample size from this population is based on the sample size setting of Tianchai Kiranan (sited in Leekitwattana, 2016). For the hundred digit population size, the sample size should be 25% or 14.25 people. However, this research has set the sample size 30 people. Then, Stratified Random Sampling technique was used to choose the sample according to the job position.

4.2.2 Population and Sample for Objective 2

Population : The population is 3,143 fourth-year undergraduate students of Panyapiwat Institute of Management.

Sample : The sample size of this population is based on the proportioning from the finished table of Kanjanawasee (2018) at a 95% confidence level, the tolerance of proportional approximation is allowed within

the ± 0.05 level. That is the sample size must not less than 359 people. Therefore, this research has set the sample size 370 people. After that, Multi-Stage Random Sampling was used for choosing the sample.

4.3 Research Instrument

The research tool is a questionnaire for studying the expectations and needs assessment towards working with others competency of undergraduate students in the 21st century for Work-based Education. There are two editions of questionnaire.

The first edition is for studying the expectations of lecturers and mentors of Counseling and Career Development for Student Center.

Another edition is for assessing priority needs for strengthening working with others competency of undergraduate students in the 21st century for Work-based Education Model.

Both editions consist of three parts as followed:

Part 1: General information of the respondents with check list questions

Part 2: Questions about expectations and working-with-others in the actual practice with five-rating scale questions

Part 3: Suggestions

After that, the draft of questionnaire was submitted to the advisor for the preliminary integrity check. Then, the questionnaire was modified according to advisor's suggestion and was submitted to the five experts for language use and content validity check. The content validity check is based on finding the Index of Congruence (IOC). The questions with IOC value at 0.5 or more were considered as having content validity (Leekitwattana, 2016) and the analysis of the questionnaire showed the IOC value between 0.6-1.0. After that, the questionnaire was try out with a group of 30 people being similar to the sample size to find the reliability using Cronbach's alpha coefficient analysis. The result of the confidence analysis of the whole questionnaire was 0.94. Then the complete version of questionnaire was done for collecting the data.

4.4 Data Collection

The letters from the Faculty of Industrial Education King Mongkut's Institute of Technology Ladkrabang were launched to ask for the permission to collect the data. Then, the online questionnaire was sent via E-mail to collect the data from 2 groups. The first group is directors, lecturers and mentor to study the expectations and the second group is fourth-year undergraduate students to assess the actual practice related to students' competency on working with others in the 21st century for Work-based Education Model. Both parts of the data were gathered and required demand analyzed according to the Priority Needs Index (PNI_{modified}) formula.

4.5 Data Analysis

The collected data was analyzed as followed. General information of respondents was analyzed by using Frequency and Percentage. Moreover, expectations and working-with-others in the actual practice were analyzed by using Mean and Standard Deviation. Additionally, priority needs were analyzed by Priority Needs Index (PNI_{modified}) (Wongwanich, 2015) with a value of 0.3 and above were considered as the high priority needs and

the values of Priority Needs Index were ranked as rank descending to show which priority needs were most essential for development sequentially.

$$PNI_{\text{modified}} = (I-D)/D$$

| | | |
|-------------------------|-----------|-----------------------------------|
| PNI_{modified} | represent | The Priority Needs Index |
| I | represent | Condition of expectation |
| D | represent | Actual condition/current practice |

5. Research Findings

The results of the priority needs assessment analysis of the needs to strengthen for strengthening working with others competency of undergraduate students in the 21st century for Work-based Education Model in table 1 can be concluded that lecturers and mentors have expectations on working with others competency in aspects of social and cross-culture skills, productivity and accountability, and leadership and responsibility. All three aspects are at the high level in overall ($\bar{X} = 4.39$, S.D. = 0.55, 0.61 and 0.66) respectively. The following aspect is initiative and self-direction ($\bar{X} = 4.38$, S.D. = 0.48). When considering in each sub-aspects, the result shows that the “able to manage their time between personal and professional life flexible without affecting the assigned work” has the highest average ($\bar{X} = 4.53$, S.D. = 0.63) and the second highest average is “dare to think, dare to express your own opinions to others” ($\bar{X} = 4.50$, S.D. = 0.68). On the other hand the sub-aspect with lowest average is “separation of personal feelings with in reality until the purpose of the work is achieved” ($\bar{X} = 4.23$, S.D. = 0.63).

As for working with others of undergraduate students in actual practice, it can be concluded that the aspect of working with others competency performing most is social and cross-culture skills with the high level in overall ($\bar{X} = 4.31$, S.D. = 0.65). It is followed by flexibility and adaptability and initiative and self-direction, which both are at the high level in overall ($\bar{X} = 4.28$, S.D. = 0.65, 0.62) respectively. When considering in each sub-aspects, the result shows that “accept the opinions and feelings of your colleagues” has the highest average ($\bar{X} = 4.36$, S.D. = 0.72). It is followed by “have human relationships to work with and work with others” and “discussing ideas with coworkers is polite and in kind words”, which both sub-aspects are at the high level in overall ($\bar{X} = 4.34$, S.D. = 0.75, 0.73) respectively.

In addition, from table 1, it can be concluded that priority needs index of enhancing working with others competency of undergraduate students in the 21st century for Work-based Education Model is 0.03 in the overall. By considering each aspects, the result shows that the priority needs index is between 0.01 and 0.04. The two aspects being most urgent essential for development are productivity and accountability and leadership and responsibility ($PNI_{\text{modified}} = 0.04$). Also, by considering each sub-aspects, it is found that the priority needs index is between -0.01 and 0.07. There are 12 sub-aspects being most urgent essential for development. The top three is “able to manage their time between personal and professional life flexible without affecting the assigned work” and “dare to think, dare to express your own opinions to others” ($PNI_{\text{modified}} = 0.07$); “bringing the knowledge from work to create the result of innovation” ($PNI_{\text{modified}} = 0.06$); and “good knowledge of listening and speaking, able

to present information to others”, “able to integrate knowledge in various disciplines for use in practice”, and “can be a model for working for others” ($PNI_{\text{modified}}=0.05$) respectively. The details are shown in table 1.

Table 1 mean (\bar{X}) standard deviation (S.D.) and priority needs index for strengthening working with others competency of undergraduate students in the 21st century for Work-based Education Model

| Item | Practice level | | Expectation level | | PNI _{modified} | priority |
|--|----------------|-------|-------------------|------|-------------------------|----------|
| | \bar{X} | S.D. | \bar{X} | S.D. | | |
| 1. Flexibility and Adaptability | | | | | | |
| 1.1 There is an adaptation to the changing corporate environment. | 4.3 | 0.7 | 4.33 | 0.61 | 0.01 | 2 |
| 1.2 There is a separation of personal feelings with in reality until the purpose of the work is achieved. | 4.29 | 0.761 | 4.23 | 0.63 | -0.01 | 4 |
| 1.3 There is a mood adjustment thoughts and behaviors to suit the situation. | 4.27 | 0.75 | 4.27 | 0.64 | 0.00 | 3 |
| 1.4 Able to manage their time between personal and professional life flexible without affecting the assigned work. | 4.25 | 0.76 | 4.53 | 0.63 | 0.07 | 1 |
| Total | 4.28 | 0.65 | 4.34 | 0.54 | 0.01 | 3 |
| 2. Initiative and Self-Direction | | | | | | |
| 2.1 Work plans are planned to achieve the specified goals. | 4.28 | 0.69 | 4.33 | 0.55 | 0.01 | 3 |
| 2.2 Able to manage the tasks assigned to achieve the specified goals. | 4.3 | 0.7 | 4.33 | 0.55 | 0.01 | 3 |
| 2.3 There is prioritization on the tasks assigned to be completed by the specified time without supervisors. | 4.29 | 0.69 | 4.47 | 0.68 | 0.04 | 1 |
| 2.4 Have an interest in learning and seeking knowledge on their own. | 4.22 | 0.74 | 4.33 | 0.6 | 0.03 | 2 |
| 2.5 Have consulted from knowledgeable people to be used in solving working problems. | 4.32 | 0.75 | 4.43 | 0.5 | 0.03 | 2 |
| Total | 4.28 | 0.62 | 4.38 | 0.48 | 0.02 | 2 |
| 3. Social and Cross-Culture Skills | | | | | | |
| 3.1 Have human relationships to work with and work with others. | 4.34 | 0.75 | 4.47 | 0.68 | 0.03 | 2 |
| 3.2 Good knowledge of listening and speaking, able to present information to others. | 4.21 | 0.75 | 4.43 | 0.73 | 0.05 | 1 |
| 3.3 Accept the opinions and feelings of your colleagues. | 4.36 | 0.72 | 4.3 | 0.6 | -0.01 | 4 |
| 3.4 Discussing ideas with coworkers is polite and in kind words. | 4.34 | 0.73 | 4.37 | 0.56 | 0.01 | 3 |
| Total | 4.31 | 0.65 | 4.39 | 0.55 | 0.02 | 2 |

Table 1 (continue)

| Item | Practice level | | Expectation level | | PNI _{modified} | priority |
|--|----------------|-------------|-------------------|-------------|-------------------------|----------|
| | \bar{X} | S.D. | \bar{X} | S.D. | | |
| 4. Productivity and Accountability | | | | | | |
| 4.1 Able to prioritize and manage project assignments. | 4.26 | 0.76 | 4.27 | 0.58 | 0.00 | 4 |
| 4.2 Apply professional knowledge in practice. | 4.24 | 0.77 | 4.43 | 0.63 | 0.04 | 3 |
| 4.3 Bringing the knowledge from work to create the result of innovation. | 4.18 | 0.78 | 4.43 | 0.73 | 0.06 | 1 |
| 4.4 Able to integrate knowledge in various disciplines for use in practice. | 4.22 | 0.76 | 4.43 | 0.73 | 0.05 | 2 |
| Total | 4.22 | 0.69 | 4.39 | 0.61 | 0.04 | 1 |
| 5. Leadership and Responsibility | | | | | | |
| 5.1 Dare to think, dare to express your own opinions to others. | 4.21 | 0.76 | 4.50 | 0.68 | 0.07 | 1 |
| 5.2 Have the ability to make small decisions that are within their own responsibilities. | 4.26 | 0.68 | 4.27 | 0.64 | 0.00 | 4 |
| 5.3 Able to work in his own duties alone with confidence and self confidence. | 4.26 | 0.73 | 4.37 | 0.76 | 0.03 | 3 |
| 5.4 Can be a model for working for others. | 4.18 | 0.77 | 4.40 | 0.77 | 0.05 | 2 |
| Total | 4.23 | 0.66 | 4.39 | 0.66 | 0.04 | 1 |
| Overview | 4.27 | 0.59 | 4.38 | 0.52 | 0.03 | |

6. Discussion

Lecturers and mentors have expectations on working with others competency in aspects of social and cross-culture skills, productivity and accountability, and leadership and responsibility. When considering in each sub-aspects, the result shows that they have expectations for their students on “able to manage their time between personal and professional life flexible without affecting the assigned work” and “dare to think, dare to express your own opinions to others”. It is because teaching and learning in Work-based Education model is the integration between learning theory in classroom and learning by practice during internship, so undergraduate students must be able to manage their work-life balance. Moreover, during the internship, they will interact with people with differences in age, opinion, other aspects. Hence, lecturers and mentors expect their students to be able to express their opinions in order to exchange points of view with others and apply those points of view in advance. This fact is consistent with Panich (2013), who points out that “the most important 21st century skills are working with others skill, knowledge applying for change skill, leadership skills, which the best way for students to learn these skills are to practice by themselves and to learn as a team”.

As for working with others of undergraduate students in actual practice, it is found that the aspect of working with others competency performing most is social and cross-culture skills. When considering in each sub-aspects, the result shows that “accept the opinions and feelings of your colleagues” has the highest average.

It is because students have been frequently assigned a project or group activity by the lecturers during their study in class in order to practice exchanging knowledge and accepting others' opinions. As a result, when students take internship and work with others, they can mostly accept others' opinions, which is consistent with Alan Novamner (Bellanca & Brandt, 2010), who states that "Collaboration skills are essential skills for students in the 21st century, so it is needed to prepare students to work as a team and listen others' opinions, which are important for their future work-life"

The result of priority needs assessment for strengthening working with others competency of undergraduate students in the 21st century for Work-based Education Model shows that in overall there are two aspects being most urgent essential for development: productivity and accountability and leadership and responsibility. The sub-aspects being most urgent essential for development are "able to manage their time between personal and professional life flexible without affecting the assigned work" and "dare to think, dare to express your own opinions to others". It is because students have to take internship and work with others in businesses, which are similar to their work-life in the future, so these skills are significant. On the other hand, there are sub-aspects, which their PNI_{modified} value is minus. They are "There is a separation of personal feelings with in reality until the purpose of the work is achieved" and "Accept the opinions and feelings of your colleagues". It is because under the Work-based Education model, students in all curriculums have learnt through practice during internship and learning theory in classroom since the first year and they have to continuously work in group activity, so they already have those two sub-aspects. This is consistent with Wattanakorn (2015), who points out that the skill to work with others is a process of engaging people who come to work together with their best efforts, recognition of the competencies that differ among individuals working together, and being able to adapt and adjust behaviors accordingly to lead to success in working.

7. Suggestion

The study on priority needs for strengthening working with others competency of undergraduate students in the 21st century for Work-based Education Model in the overall shows that productivity and accountability and leadership and responsibility are urgent essential for development. When considering in sub-aspects, there are some sub-aspects that are urgent essential for development. Therefore, this research suggested that the study on approaches for developing those sub-aspects is needed

8. Acknowledgement

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INFORMATION-SEEKING BEHAVIOR OF THAI HIGH SCHOOL STUDENTS

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ABSTRACT

This study aimed to examine information-seeking behavior of Thai high school students and to compare the behavior according to gender and programs of study. Data was collected from 2,746 high school students all over Thailand. The students gave information by filling out questionnaire and the data were analyzed using descriptive statistics and t-test. Information-seeking behavior and all of its aspects except using search strategies were at the intermediate level while using search strategies was at high level. Gender and programs of study were found to influence Thai high school students' information-seeking behavior.

Keywords: information-seeking behavior, high school students, gender, programs of study

1. Introduction

In the information age, students often seek information via technology for various purposes; to finish classroom report, complete the course, use in a classroom seminar, workshop conference, or write a final report (Ajiboye, 2007). Information is, therefore, an essential factor for decision making and achieving goals. In addition, Kadli (2015) mentioned that electronic information has been definitely available and made major changes in human information behavior.

The Office of the Basic Education Commission (2010) has determined guidelines to develop learners and bring it to practice. Among these guidelines, the proficiently use of technology is a competence and a skill focus point. It is an ability to apply concepts, principles, techniques, knowledge, and technological process as a tool to acquire and apply knowledge for completing tasks. High school students should be able to use computer

to transform information into decision-making information, and create word or project considering consciousness and culture, and use information technology to present their work.

To achieve the objectives of the curriculum and to enhance the quality of students, it is necessary to investigate high school students' information-seeking behavior in order to provide guidelines for suitable learning management.

However, students seemed to have problems when seeking for information. For example, students used only one keyword to search answers for all questions (Timmers and Glas, 2010), students did not always succeed to get relevant information which suit their needs at the first process off information seeking (Fadhli and Kurnia, 2016). O'Brien and others (2017) mentioned that "little is known as to which individual differences make a difference to search outcomes, ...". In addition, only few research was found to study about information-seeking behavior of Thai high school students.

This study; therefore, investigated information-seeking behavior of Thai high school students which can be used as guidelines to implement the learning management for developing information-seeking behavior to enhance the quality of students according to the objectives of the curriculum.

2. Research Objective

- (1) to examine information-seeking behavior of Thai high school students
- (2) to compare information-seeking behavior of high school students according to gender and programs of study

3. Literature Review

3.1 Theory, Concept and Related Research

Information seeking is a complex process composed of social, communicative and interactive behavior (Ikoja-Odongo and Mostert, 2006). It is a form of problem solving through problem perception, problem articulation, source selection, inquiry formulation, search execution, examination of results, extraction of required information, and reflection (Marchionini, 1995). Upon acquiring pertinent information, the seeker studies, analyzes and synthesized it with available ones, then the problem is solved (Ikoja-Odongo and Mostert, 2006). If the problem remains unsolved, the process may be repeated.

Information-seeking behavior arises as a consequence of a need perceived by the information user, who requests upon formal or informal information sources or services in order to satisfy it (Wilson, 1999). Information-seeking behavior is broadly conceptualized as activities in which a person may engage when identifying one's needs for information, searching for such information in any way, and using or transferring the information (Wilson, 1999).

According to Chuenwattana (2002), information-seeking behavior remarkably affected by following factors;

1. *Programs of study* or background and interest – Seekers always seek for information relevant to their background.

2. *Level of study* – Seekers with higher educated level may require more in-depth and definite information as well as international information sources.

3. *Information literacy*: understanding the important use of information for problem solving.

4. *Information technology literacy*: perceiving and basic skills in information technology usage.

5. *Personal environment* affecting seekers' living and working.

The study of Niu and Hemminger (2012) reviewed the factors affecting information-seeking behavior included academic position followed by gender but they found that programs of study did not affect the behavior.

Boonnu (2012) found that the problems correlated to information seeking behavior of high school students included

- inadequate background knowledge related to the topics, limited ability in English,
- lack of courage to meet with the outside advisors,
- limited time for seeking information, seeking teacher advice and conduction experiment
- inconvenience caused in doing projects outside school.

Sin (2015) found that top sources for everyday life information seeking (ELIS) were Web search engines, social networking sites, new friends, printed resources, and traditional mass media. Gender-study level differences were found; male undergraduate students were more influenced by their hesitation to ask personal questions.

The study of Boonlorn and Angchun (2017) revealed that students preferred to use online information. Factors affecting the selection of information sources were convenience and ease of accessing information.

3.2 Research Framework

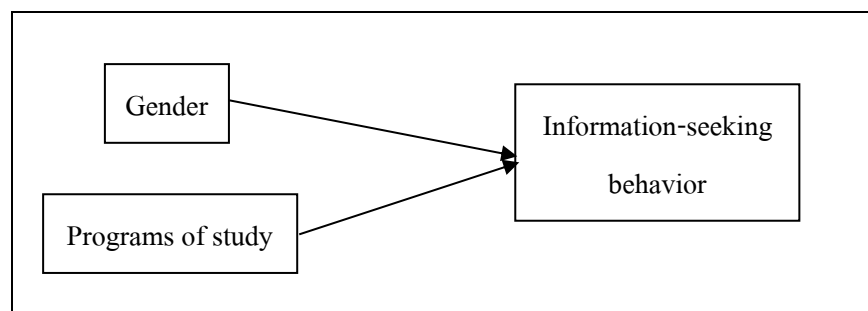


Figure 1 Research Framework

3.3 Research Hypotheses

1. Gender significantly influences information-seeking behavior
2. Programs of study significantly influence information-seeking behavior

4. Research Methodology

4.1 Research Design

This study applied a correlational study research design.

4.2 Population and Sample

The population in this study included 1,249,454 Thai secondary school students. Based on Taro Yamane's formula for sample size calculation, with 2% error, the sample size should be 2,500. However, 3,000 questionnaires were distributed to ensure the number of sample and the reliability of data. Of these, 2,746 questionnaires were returned, accounting for 91.53%.

4.3 Research Instrument

5-Likert scale questionnaire was used to collect data in this study. The questionnaire was composed of two parts: demographic and information-seeking behavior scale. Adopted information-seeking behavior scale in the study was originated by Timmers and Glas (2010) and was back-translated by Lerdpornkulrat and others (2017) including 44 items in four aspects of information-seeking behavior as follows; 11 items in using information sources, 13 items in using search strategies, 15 items in evaluating information and 5 items in referring information. The questionnaire had a Cronbach's Alpha coefficient of .864.

4.4 Data Collection

Researchers collected data by sending questionnaires via post office and walking in the school. Before sending questionnaires via post office, the researcher contacted and asked for assistance from a teacher in each school. To do the other way, the researcher asked for the permission to go to schools and directly handed the questionnaire to students.

4.5 Data Analysis

Descriptive statistics were used to analyze the data from questionnaires to get mean and sd for students' information-seeking behavior. In addition, t-test was used to compare students' information-seeking behavior to gender and program of study.

5. Research Findings

Mean and standard deviation of high school students' information-seeking behavior and its aspects, students' information-seeking behavior comparing gender and comparing programs of study were shown in Table 1, Table 2, and Table 3 respectively.

Table 1 Mean and standard deviation of secondary school students' information-seeking behavior

| Behavior | M | SD | Interpretation |
|------------------------------|------|------|----------------|
| Using information source | 3.21 | .526 | intermediate |
| Using search strategies | 3.57 | .546 | high |
| Evaluating information | 3.48 | .523 | intermediate |
| Referring information | 3.43 | .747 | intermediate |
| Information-seeking behavior | 3.42 | .465 | intermediate |

As shown in Table 1, means of information-seeking behaviour and all of its aspect, except using search strategies, were intermediate while mean of using search strategies was high.

An independent-samples t-test was conducted to compare Information-seeking behaviour means for males and females students, and for students in Mathematics-Science program and Language Arts-Social Studies program as shown in Table 2 and 3, respectively.

Table 2 Students' information-seeking behavior comparing gender

| Behavior | Gender | M | SD | t | Sig. |
|------------------------------|--------|------|------|--------|------|
| Using information source | Male | 3.10 | .568 | -6.43* | .000 |
| | Female | 3.26 | .502 | | |
| Using search strategies | Male | 3.48 | .585 | -5.13* | .000 |
| | Female | 3.60 | .525 | | |
| Evaluating information | Male | 3.43 | .525 | -3.24* | .001 |
| | Female | 3.50 | .520 | | |
| Referring information | Male | 3.34 | .745 | -3.78* | .000 |
| | Female | 3.46 | .746 | | |
| Information-seeking behavior | Male | 3.34 | .492 | -5.58* | .000 |
| | Female | 3.45 | .449 | | |

* $p < .05$

From Table 2, every aspect of information-seeking behavior and information-seeking behavior as a whole of male students were statistically lower than those of female students at the significance of .05. There was a significant difference in using information source means for male students ($M = 3.10$, $SD = 0.568$) and female students ($M = 3.26$, $SD = 0.502$) conditions; $t = -6.43$, $p = 0.000$. There also was a significant difference in the means of using search strategies for males ($M = 3.48$, $SD = 0.585$) and for females ($M = 3.60$, $SD = 0.525$) conditions; $t = -5.13$, $p = 0.000$. In addition, there was a significant difference in evaluating information means for males ($M = 3.43$, $SD = 0.525$) and for females ($M = 3.50$, $SD = 0.520$) conditions; $t = -3.24$, $p = 0.001$. Moreover, there was a significant difference in the means of referring information for males ($M = 3.34$,

SD = 0.745) and for females (M = 3.46, SD = 0.746) conditions; $t = -3.78$, $p = 0.000$. Totally, there was a significant difference in information-seeking behavior means for males (M = 3.34, SD = 0.492) and for females (M = 3.45, SD = 0.449) conditions; $t = -5.58$, $p = 0.000$. These results suggested that gender had an effect on information-seeking behavior of Thai high school students.

Table 3 Students' information-seeking behavior comparing programs of study

| Behavior | Programs of study | M | SD | <i>t</i> | Sig. |
|------------------------------|------------------------------|------|------|----------|------|
| Using information source | Mathematics-Science | 3.24 | .507 | 3.17* | .002 |
| | Language Arts-Social Studies | 3.17 | .558 | | |
| Using search strategies | Mathematics-Science | 3.62 | .514 | 7.02* | .000 |
| | Language Arts-Social Studies | 3.46 | .588 | | |
| Evaluating information | Mathematics-Science | 3.52 | .498 | 4.87* | .000 |
| | Language Arts-Social Studies | 3.41 | .561 | | |
| Referring information | Mathematics-Science | 3.46 | .754 | 3.36* | .001 |
| | Language Arts-Social Studies | 3.36 | .730 | | |
| Information-seeking behavior | Mathematics-Science | 3.46 | .439 | 5.56* | .000 |
| | Language Arts-Social Studies | 3.35 | .502 | | |

* $p < .05$

As shown in Table 3, students in Mathematics-Science program had statistically higher mean value of information-seeking behavior and all of its aspects than the mean value of students in Language Arts-Social Studies. There was a significant difference in using information source means for students in Mathematics-Science (M = 3.24, SD = 0.507) and those in Language Arts-Social Studies (M = 3.17, SD = 0.558) conditions; $t = 3.17$, $p = 0.002$. There also was a significant difference in the means of using search strategies for Mathematics-Science (M = 3.62, SD = 0.514) and for Language Arts-Social Studies (M = 3.46, SD = 0.588) conditions; $t = 7.02$, $p = 0.000$. In addition, there was a significant difference in evaluating information means for Mathematics-Science (M = 3.52, SD = 0.498) and for Language Arts-Social Studies (M = 3.41, SD = 0.561) conditions; $t = 4.87$, $p = 0.000$. Moreover, there was a significant difference in the means of referring information for Mathematics-Science (M = 3.46, SD = 0.754) and for Language Arts-Social Studies (M = 3.36, SD = 0.730) conditions; $t = 3.36$, $p = 0.001$. Totally, there was a significant difference in information-seeking behavior means for Mathematics-Science (M = 3.46, SD = 0.439) and for Language Arts-Social Studies (M = 3.35, SD = 0.502) conditions; $t = 5.56$, $p = 0.000$. These results suggested that programs of study had an effect on information-seeking behavior of Thai high school students.

6. Discussion

The objectives of this study were to examine information-seeking behavior of Thai high school students and to compare information-seeking behavior according to gender and programs of study. The results showed that high school students were in intermediate level of information-seeking behavior in terms of using information source, evaluating information, referring information, and information-seeking behavior as a whole. On the other hand, using search strategies was in high level.

The results of this study was consistent with Niu and Hemminger (2012) who found that factors often affect information behavior were gender and discipline. The behavior of males and females in this study were statistically different according to results of t-tests. Male's mean value were lower than female's in every aspect implying that gender affects information-seeking behavior for Thai high school students. This was inconsistent with the study of Puttichaikul (2016) and Singhanutta (2004) whose samples were graduate students that might be the reason for the inconsistent result. In addition, programs of study were found to affect information-seeking behavior; students in Mathematics-Science had higher mean value than those in Language Arts-Social Studies in every aspect and information-seeking behavior as a total. This is congruent with Ajiboye (2007) and Furi and Balog (2016). Furi and Balog (2016) mentioned that information science students in graduate level are supposed to be skillful searchers of any types of information. In addition, according to Case (2012, cited in Furi and Balog, 2016), the most common factor for the investigation of information seeking and information behavior is the occupations (disciplines).

7. Suggestion

According to the results of this study, teachers should enhance information-seeking behavior of high school students for them to get the most of and be aware of information on the internet by integrating into each subject.

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IMPROVING ENGLISH WRITING SKILLS WITH SPAM EMAILS

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ABSTRACT

Spam emails are increasing on a daily basis. They have both threats and benefits. Even though they are unsolicited emails, but as language learners, we can apply them as a resource for improving English writing skills since spam emails play a significant role in language education. They are sent in majority by emails. Users who receive them find that they are very annoying. They are also the cause of indescribable financial defeat to many users who have become victims of Internet scams and other fraudulent practices of spammers. Spam emails are related to Ads, Chain Letters, Email Spoofing, Hoaxes, Money Scams, Malware Warnings, and Porn Spam. There are some methods to avoid spam emails. Most importantly, receivers are suggested to keep their email addresses as private as possible. Some tips for responding to spam emails that language learners need to follow include learning if the message should be opened and adding the senders of spam messages to the blocked senders list. This causes all future messages from that sender to be deleted automatically. It is important to write emails that have components of effective emails. Writing effective emails, learners need to write each part carefully. Language learners are recommended to be aware of dealing with spam emails and well encounter with spam emails. Language learners need to realize all the time that we interact with the spam emails only for the purposes of English writing skills improvement.

Keywords: English Writing Skills, Spam Mails, Teaching English, Social Media

1. Introduction

Writing ability is a skill that writers are able to write down their opinions, thoughts, feelings, truths, stories etc. in a way which makes their thoughts clear and understandable to readers (Hossain, 2015; Kellera, *et al.*, 2020). Good writing needs to have good terminology, correct grammar and spellings along with faultless punctuations. Significantly, the written language can connect too many people, and it can be a basically permanent record. With a written record, you can reach all the people with whom you work. Written records can be studied, criticized, analyzed, and expanded. Good writing can be a support in the huge majority of jobs, and gaining the expertise makes you a more valuable employee. It also helps you write letters and send emails. Email is a method of writing used for communication. It is a valuable tool, and it generates some challenges for writers.

However, in writing emails, miscommunication can simply occur when people have different expectations about the messages that they send and receive. It is used for many different purposes, including contacting friends, communicating with instructors, supervisors, and outsiders requesting or giving information, and applying for jobs, internships, and scholarships. Depending on your determinations, the messages you conduct will vary in your smartness, intended audience, and desired outcomes. So, we should know when to send an email is the most effective way of accomplishing your communication goals, and when it is more appropriate to send a longer, more professional-sounding email. Dealing with emails, we often receive spam emails. Spam emails are unsolicited and unwanted junk emails sent out in bulk to an indiscriminate recipient list. Typically, spam emails are sent for commercial purposes. They can be sent in a massive volume by networks of infected computers (Rao & Reiley, 2012; Jaccard & Nepal, 2014). In teaching English writing skills, instructors can use spam email messages to practice so as to improve students' English writing skills as well.

The contents of this academic article cover the social media for language education, meanings of a spam email, types of spam emails, avoiding spam emails, responding to spam emails, important components of an effective email, writing effective emails, summary and suggestions respectively.

2. Social Media for Language Education

Spam email is one of the social media or social spam which is a factor influencing the teaching-learning process (Manasrah, Akour, & Alsukhni, 2015). It refers to the irrelevant messages sent over the network with the sole intention of attracting the attention of a large number of people. It may or may not be harmful to the intended person (Jain, *et al.*, 2017: 63). A study (Gideon & Folake, 2020: 5) found that its applications were appealing to learners in language education. The study further revealed positive relationship between the integration of social media into language education and performances; it helps students to improve English writing skills. Students can practice to respond to the spam emails. By responding to spam emails, students will have a chance to receive replies. This will provide a chance for students to interact with the spam email messages. By reacting to spam email messages habitually, students have a chance to improve their English writing skills.

3. Meanings of a Spam Email

In modern era, unwelcome emails named spam has caused enormous problems on the Internet. The senders of the spam email messages are called spammers (Rao & Reiley, 2012; Dada, *et al.*, 2019). Spam emails discontinue the users from making full and worthy use of time. The danger of spam emails is on the growth on annual basis worldwide. Users who receive spam emails that they did not wish find them very annoying. They are also a cause of indescribable financial defeat to many users who have become victims of Internet scams and other fake practices of spammers who send emails pretending to be from reputable companies with the intent to convince people to unveil sensitive personal data like passwords, bank verification number and credit card information. Spam emails refer to unwanted items which are unwelcome messages sent in majority by email. Spam emails are global, unavoidable, and repetitive. Spam email has steadily grown since the early 1990s, and by 2020, 306.4 billion emails are sent per day. The number is expected to reach 347.3 billion in 2023 (Radicati Group, Inc., 2019:3). Certainly, the number is expected to reach 694.6 billion in 2050. Also, 55% of all emails today are spam emails. Spam emails are considered to be electronic unwanted mails postings that spammers collect email addresses from chat rooms, websites, customer lists, newsgroups, and viruses that harvest users' address books. Real spam emails are usually emails publicizing for some merchandise directed to a mailing list or newsgroup. Spam email messages are annoying, and some spam email messages are definitely unsafe. Usually they are trying to get you to give up your bank details so that the cheaters can either withdraw money, or steal your individuality. Such messages contain phishing scams and advanced fee fraud. Spam emails are seldom sent openly by a company advertising itself. They are commonly sent by "spammers," the companies in the business of allocating unwanted emails. Promoters enter into a contract with a spammer, who generates email advertisements to a group of unsuspecting recipients. Gmail automatically identifies spam and doubtful emails and marks those emails as spam. When you open your Spam label, you will see any emails that were marked as spam by you or Gmail.

Each email will include a label at the top that explains why it was sent to spam. Just like opening a text file or web page in your browser should be safe, opening an email message should be safe too. Nonetheless, several spam emails try to infect you after you open them. Those spam emails can contain malicious programs as attachments or have links to malicious websites full of malware and scams. They are called spam mails because they are unwanted e-mail messages. Before the Internet became commercialized, unsolicited commercial email messages were sent the name spam to the same mail several times for no good reason (Moore, 2020). This was because of the Monty Python "spam, spam, spam" sketch. We can be hacked by opening an email. This repetitive action provides an entry for terrible hackers to take control of your device. By only opening or connecting a link in an email you can have your passwords changed, bank accounts hacked and identity taken.

As for checking whether an email is a spam or not, there are five ways which is in no particular order: (1) If it ends up in your spam folder, you might be reading this entry and analyze it. (2) Look at the email address. (3) Look at the content. (4) If it asks for personal information, it can be a spam. (5) Look at the greeting. Spammers will not know whether you open their email messages or not. Spammers frequently insert a "pixel" image, which

is a single URL directing at a very small image file, generally, 1x1. The spammer will not recognize whether you have removed their messages, however if it inserts a pixel, then the spammer may be able to know that you have opened the email message. There are numerous common means that they can get your email address such as using the @ sign. Spammers use sophisticated tools to test the network and gather email addresses, making good predicts and lots of them, cheating your friends, and buying lists.

As for avoiding spam emails, researchers (Comodo Cybersecurity 2018; Ossowski, 2020) suggested five ways (1) Train your filter. When you find spam in your inbox, do not open but just delete it. (2) Never reply to spam emails. If you know something as spam before you open it, do not open it. (3) Hide your email address. (4) Use a third party anti-spam filter, and (5) Change your email address.

4. Types of Spam Emails

Spam emails or unsolicited messages could vary from annoying but harmless junk mail to harmful frauds and viruses. A few of the categories of spam emails are: (1) Ads, (2) Chain Letters, (3) Email Spoofing, (4) Hoaxes, (5) Money Scams, (6) Malware Warnings, and (7) Porn Spam.

Ads are one of the most common types of spam emails. Everyone has already received several unsolicited emails offering products and services, such as looking for partners to marry with, inviting for paper publication, weight loss pills and other services offers. In many cases, it may be a scam, but the offer may also be real. *Chain Letters* tell exciting and thrilling stories and persuade you to pass the message along under penalty of having something very bad happen to receivers. Be careful or receivers are going to have a run of bad luck. *Email Spoofing* is related to phishing scams. They happen when spammers or phishers try to fool receivers by impersonating someone receivers know or a company that receivers have a relationship with. This is one of the most dangerous types of spam. *Hoaxes*, this type of spam include offers and miracle promises, such as, “get rich in less than a month” or “gain the body of receivers’ dream by eating more and working out less”. In general, this tactic is used by spammers to hold receivers’ attention and direct receivers to a malicious website. *Money Scams* are something like receivers have spam messages with easy money promises, such as the Nigerian prince scheme. In this case, receivers apparently only have to lend a small amount of money to receive a big reward in the future. Money spam also involves asking for money for hungry children in Africa or for families who have suffered losses as a result of a natural disaster. *Malware Warnings* involve receiving an email warning receivers about a malware infection on receivers’ device, such as ransom ware or virus, this is probably a malware warning spam. In some cases, the spammers say they have the solution to receivers’ problems, and that you just need to provide some information or download an attachment. *Porn Spam* is also a very common type of spam emails. Sending pornography through emails is widely used by spammers because the pornography market is very profitable, increasing people’s interest (Sullivan, & Leeuw, 2004). Of course, spammers know that and use it to create malicious emails using erotic images and videos.

5. Avoiding Spam Emails

If receivers want to avoid having spam emails, receivers have to keep their email addresses as private as possible. Do not give emails out unless receivers trust the source. While some spam email is unfortunately predictable these days, receivers can reduce most of them by just keeping email addresses isolated. Specialists agree that the best way to keep ourselves from spam emails is to not give our emails out, especially if it is for free gifts. Normally, every time we do that, we are selling our email addresses. If we do want to sign up for things like that, it is a good idea to have a junk email address, so we do not get all those spam mails sent to our private accounts. Another way is to keep our usernames different from our email addresses. For example, say that our tumblr handle is emailwritingHow123. If our email address is emailwritingHow123@gmail.com, we have basically given the whole world our address. Most spammers actually “test” thousands of guessed emails until they find those that work - so having differentiated emails and usernames can help keep them to stay away from us. Never tick the “Yes, I want to receive more information.” box when signing up for sites or deals. This signs our address up for regular, robotically sent emails, notifications, and spam. Unless we really love the site or band, avoid this box at all costs. Check to see if this box is pre-checked for us. Many sites make us opt-out of spam instead of in. Create multiple accounts, or change your email regularly. One of the best ways to avoid spam is to concentrate it in one account. For example, you might set up an account just for buying things online, and another for personal business. We use the first email whenever we are purchasing or giving out bank information, and then keep our personal emails in a more private account. We can give away one account at will, because we only really need it for specific functions. There are some other tips such as, do not click on any button or link that we may see in spam messages. This may either lead us to malicious websites or to download malwares to our computer that can infect it. Another example, if any of the flags above are met, do not open the email. Just quickly move it to the trash bin. Deleting messages inside the spam folder of our emails in the trash bin is also recommended. They will be permanently removed from our account.

6. Responding to Spam Emails

Dealing with spam email is not easy. You can block the automatic download of pictures from unknown senders. This helps prevent spam senders from knowing if the message was opened. Another way is to add the senders of spam messages to the blocked senders list. This causes all future messages from that sender to be deleted automatically. We should never click on a link in a spam message. Doing so tells the senders that the message was viewed and acted on. Also, we should never attempt to unsubscribe from a spam sender. Doing so only confirms that the message got through, and we read it. In addition to blocking senders, you should also use some rules to dispose of spam. We should try not to share those because doing so would only enable spam senders to craft messages that would get around them. If we have not seen the TED talks from someone on how he replies to spam, we are missing out, so you are recommended to see. We should find some video clips and listen to them so that we will be able to study some guidelines for responding to spam emails.

The author tried many times responding to spam emails. Every time the author responded to the spam emails, the author got the replies. The author found that interacting with the spammers were fun and they helped in learning new words, writing techniques and learning more on how to deal with messages.

7. Important Components of an Effective Email

When we write an email, we need to pay attention to important components so as to make our written email message effective. We should pay attention to Subject Lines, Greetings and Sign-offs, Cc: and Bcc:

Subject Lines are like newspaper headlines. They should convey the main point of our messages or the idea that we want readers to take away. Therefore, be as specific as possible. One-word subjects such as “Hello,” “Question,” or “Greeting” are not informative and do not give the readers an idea of how important our messages are. If our message is time sensitive, we might want to include a date in our subject line, like “Meeting on 14 Tuesday, February”. Think about the subject lines on the email messages we receive. Which ones do we think are most effective? Why?

Greetings and Sign-offs is another component in writing an email. We should use some kinds of greeting and some kinds of sign-off. Do not just start with our text, and do not just stop at the end without a polite signature. If we do not know the person well, we may be confused about how to address them (“What do I call my Manager/TA/professor/ HR Manager/ Personnel Manager?”) or how to sign off (Yours faithfully, Yours sincerely, Best wishes?). Nonetheless, it is always better to make some kind of effort. When in doubt, address someone more formally to avoid offending them. Some common ways to address our readers are: Dear Sir, Dir Sir or Madam, Dear Mr. Jones, Dear Miss Jones, Dear Linda, Dear John, Dear Lucy Jones, If we do not know the name of the person we are addressing, or if the email addresses a diverse group, try something generic, still, write politely: such as “To Whom It May Concern”, “Dear members of the selection committee”, “Dear Everyone”, Our closing is extremely important because it lets the readers know who is contacting them. Always sign off with our name at the end of our message. If we do not know the readers well, we might also consider including our title and the organization we belong to; such as Linda Jones, Marketing Manager. For our closing, something brief but friendly, or perhaps just our names, will do for most correspondence: such as “Thank you”, “Best wishes”, “See you tomorrow”, “Regards”, For a very formal message, such as a job application, use the kind of closing that you might see in a business letter like “Sincerely,” However, you should remember at least three sets on how to write salutation and complimentary closing: (1) Dear Sir, Dear Madam, Dear Sir or Madam/ Faithfully yours; (2) Dear Mr. Smith, Dear Miss Smith, Dear Ms. Smith/ Yours sincerely; (3) Dear John Smith, Dear Linda Smith, Dear John, Dear Linda/ Best wishes.

Cc: and Bcc: (‘carbon copy’ and ‘blind carbon copy’), copying individuals on an email is a good way to send our message to the main recipient while also sending someone else a copy at the same time. This can be useful if you want to convey the same exact message to more than one person. In professional settings, copying someone else on an email can help get things done, especially if the person receiving the copy is in a supervisory role. For example, copying our boss on an email to a non-responsive co-worker might prompt the co-worker to

respond. Be aware, however, that when we send a message to more than one address using the Cc: field, both the original recipient and all the recipients of the carbon copies can see all the addresses in the “To:” and “Cc:” fields. Each person who receives the message will be able to see the addresses of everyone else who received it. Blind copying emails to a group of people can be useful when we do not want everyone on the list to have each other’s addresses. The only recipient address that will be visible to all recipients is the one in the “To:” field. If we do not want any of the recipients to see the email addresses in the list, we can put our own address in the “To:” field and use “Bcc:” exclusively to address our message to others. However, do not assume that blind copying will always keep recipients from knowing who else were copied—someone who is blind copied may hit “reply all” and send a reply to everyone, revealing that they were included in the original message.

8. Writing Effective Emails

The average office worker receives around 90 emails each day. With that volume of mail, individual messages can easily get overlooked. Follow these simple rules to get your emails noticed and acted upon: (1) do not over communicate by email; (2) make good use of subject lines; (3) keep messages clear and brief; (4) be polite, (5) check your tone, and (6) proofread.

1. *Do not over communicate by Email.* One of the biggest sources of stress at work is the sheer volume of emails that people receive. So, before you begin writing an email, ask yourself: “Is this really necessary?” As part of this, you should use the phone to deal with questions that are likely to need some back-and-forth discussion. Use our Communications Planning Tool to identify the channels that are best for different types of message. Also, email is not as secure as you might want it to be, particularly as people may forward emails without thinking to delete the conversation history. So avoid sharing sensitive or personal information in an email, and do not write about anything that you, or the subject of your email, would not like to see plastered on a billboard by your office. Whenever possible, deliver bad news in person. This helps you to communicate with empathy, compassion, and understanding, and to make amends if your message has been taken the wrong way.

2. *Make Good Use of Subject Lines.* A newspaper headline has two functions: it grabs your attention, and it summarizes the article, so that you can decide whether to read it or not. The subject line of your email message should do the same thing. A blank subject line is more likely to be overlooked or rejected as “spam,” so always use a few well-chosen words to tell the recipient what the email is about. You may want to include the date in the subject line if your message is one of a regular series of emails, such as a daily project report, weekly project report or monthly project report. For a message that needs a response, you might also want to include a call to action, such as “Please reply by 15 January.” A well-written subject line delivers the most important information, without the recipient even having to open the email. This serves as a prompt that reminds recipients about your meeting every time they glance at their inbox. If you have a very short message to convey, and you can fit the whole thing into the subject line, use EOM which stands for “End of Message” to let recipients know that they do not need to open the email to get all the information that they need. For example, “Please send your monthly report. EOM.” However, this is only good if the recipients know the meaning of EOM.

3. *Keep Messages Clear and Brief.* Emails, like traditional business letters, need to be clear and concise. Keep your sentences short and to the point. The body of the email should be direct and informative, and it should contain all pertinent information.

4. *Be Polite.* People often think that emails can be less formal than traditional letters. But the messages you send are a reflection of your own expertise, values, and attention to detail, so a certain level of formality is needed. Unless you are on good terms with someone, avoid informal language, slang, and inappropriate abbreviations. Close your message with “Yours faithfully,” “Yours sincerely,” or “Best wishes,” depending on the situation. Recipients may decide to print emails and share them with others, so always be polite.

5. *Check the Tone.* When we meet people face-to-face, we use the other person’s body language, vocal tone, and facial expressions to assess how they feel. Using emails, we cannot tell when people have misunderstood our messages. Your choice of words, sentence length, punctuation, and capitalization can easily be misinterpreted without visual and auditory cues. In the first example below, Linda might think that John is frustrated or angry, but, in reality, he feels fine.

| Bad Example | Good Example |
|--|--|
| Linda, I need your report before noon today or I will miss my deadline. John | Hi Linda, Thanks for all your hard work on that report. Could you please get your version over to me before noon, so I do not miss my deadline? Thanks. John |

9. Summary and Suggestions

The use of spam emails as a means to improve English writing skills and student achievement is a move that educators and students support and value. Students will show tremendous interest in spoken emails. Almost all of spam emails for social communication are fun and educational learning future. Students will have a significantly more positive attitude toward English learning to develop their English writing skills. Spam emails usage enables students to concentrate, focus and dedicate to attain requisite language skills which lead to effectiveness of students’ writing skills. Students are concerned about the security of their personal data and private information; a concern acknowledged globally and would surely be addressed to shortly. Thinking of merging spam email into course specification, and course objectives may seem a relatively new field but surely have a great potential to carve positions in students’ English writing skill learning. The use of spam emails effectively supports students English writing skills learning. Effective methods that help instructors to successfully use spam emails for instructional delivery purposes need to be studied. Instructors should also provide students with training and workshops on how to utilize social media technologies; using spam emails for improving English writing skills in particular, for learning purposes.

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INVESTIGATING MOVES IN DISCUSSION SECTIONS OF SCIENCE AND TECHNOLOGY RESEARCH ARTICLES

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ABSTRACT

Disseminating research findings via research articles has increasingly gained significance. Scholars, researchers, and graduate students are required to write research articles since they are considered as a path of professional development and graduation requirement. However, after the completion of research projects, some novice researchers probably face obstacles in discussing their research findings to be published in international academic journals. The purpose of the study is to investigate the occurrence of moves, including optional moves and obligatory moves in English discussion sections in science and technology journals published in Thailand. The study examined 60 discussion sections in four international science and technology research journals from 2013-2017. The study used the framework posited by Yang and others (2003). The findings revealed the occurrences of three obligatory moves and four optional moves. The results provide insights into successful discussion sections of science and technology research articles and can be applied in course preparation and material design for EAP training courses.

Keywords: Discussion section, Research article, Obligatory move, Optional move

1. Introduction

Nowadays, English has become the international language and widely used in both private sector and business sector. As to academia, it is used as a medium of learning and teaching and research writing. As for experienced scholars and researchers, writing research articles to meet the demand of target discourse community does not cause any problems. However, novice writers and researchers with limited experience in probably face obstacles in composing research article to conform to the convention. Additionally, to meet the expectation of scholars in discourse communities, writers should possess both the linguistic or grammatical competence and the rhetorical patterns of a target discourse. Of all the parts in research article, discussion sections which appear as the last part are obviously an essential part that should not be overlooked.

2. Research Objective

The objective of the study is to study obligatory and optional moves in English discussion sections in international journals of Science and Technology published in Thailand.

3. Literature Review

Theory, Concept and Related Research

Writing discussion sections in research articles has been paid attention (Atai and others, 2004; Amnuai, 2017; Amnuai and others, 2013; Dobakhti, 2016; Yang and others, 2003). There has been little investigation of its move patterns in the field of science and technology to other field.

Move analysis in the field of science and technology has been the focus of empirical studies. Kanoksilpatham (2012) explored three engineering sub-disciplines—civil, software and biochemical. She identified the three-move model: *Move 1 (Review the present study)*, *Move 2 (Consolidation of results)* and *Move 3 (State limitations and possible further studies)*. Khorramdel and others (2017) studied research articles in the field of Dentistry and revealed that *Move 2 (Reporting results)* and *Move 1 (Background information)* were presented in a majority of both English and Persian dentistry research articles. *Move 4 Step 4 (Evaluating results)*, *Move 6 Step 2 (Indicating significance or advantage)*, and *Move 6 Step 3 (Evaluating methodology)* were absent in both corpora. Maswana and others (2015) studied research articles in five engineering fields and revealed that *Move 9 (Highlighting overall results and their significance)* was conventional for structural engineering, environmental engineering, chemical engineering, and computer science except for electrical engineering. As far as the context is concerned, the discussion sections in science and technology field in Thai context, have limited investigation. Due to the importance of the discussion section in research articles and the lack of empirical research studies, the present study therefore explores English discussion parts of research articles in international journals of science and technology published in Thailand.

4. Research Methodology

4.1 Data Collection

With simple random sampling, the study explored 60 discussion sections derived from four reviewed international research journals in the field of science and technology published in Thailand--*Chiang Mai Journal of Science*, *KMITL Science and Technology Journal*, *Science and Technology Asia*, and *Suranaree Journal of Science and Technology*. These four journals were deliberately selected since they met the criteria of representativeness. The corpus had a total of 38,360 words and an average of 639 words per discussion. The longest text was 1,955 words and the shortest only 141 words.

4.2 Data Analysis

The corpus was analyzed with Yang and others' (2003) move model. The model was chosen as an analyzing framework since it was posited by the analysis of discussion parts of empirical studies with clear and detailed description of communicative purposes. The model consists of seven moves and ten steps as shown in Figure 1.

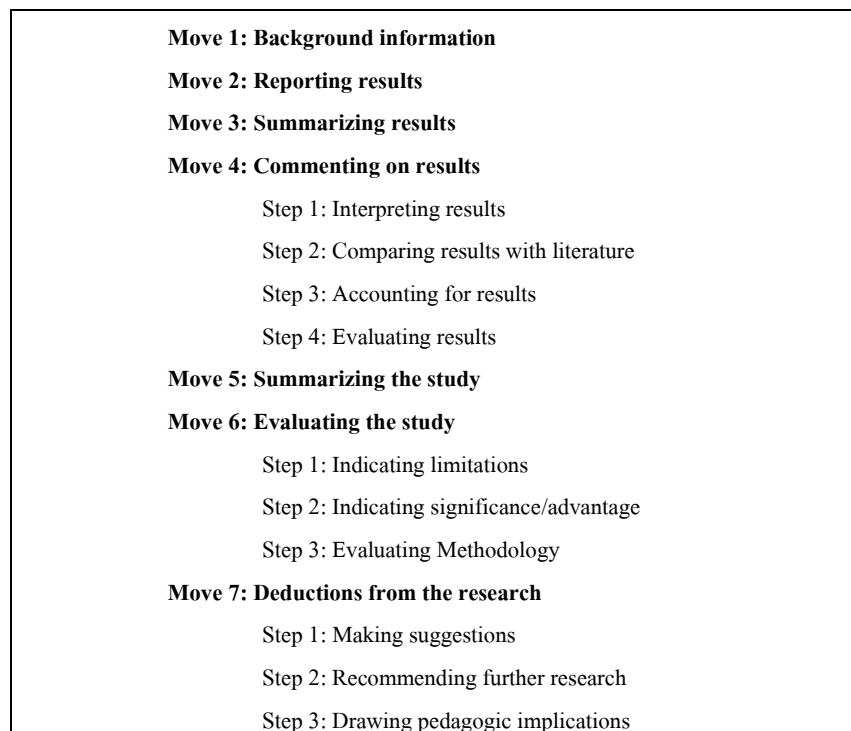


Figure 1 Yang and others' (2003) move model

To avoid subjectivity in analysis, inter-rater reliability and intra-rater reliability were used. Steps of the coding process are shown in Figure 2 below.

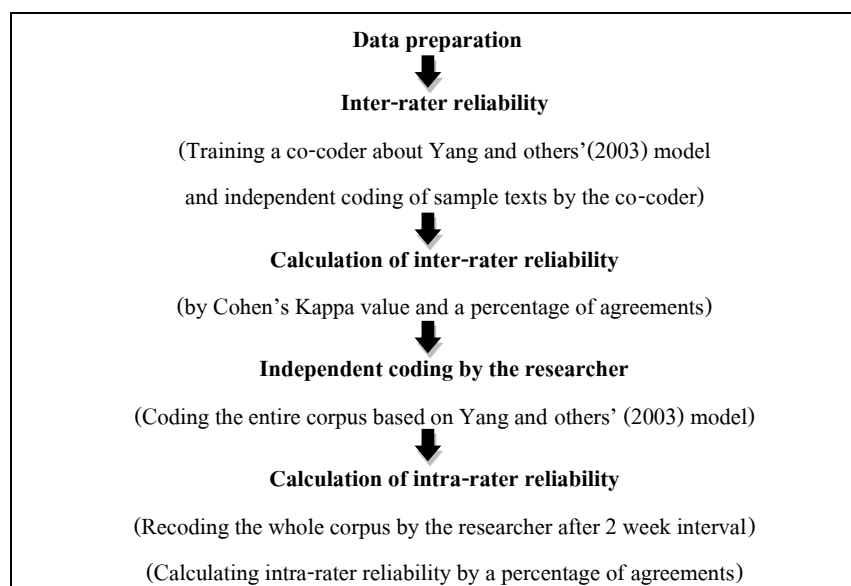


Figure 2 Steps of the coding process

To categorize an obligatory move and an optional move, the cut-off point posited by Kanoksilpatham (2005) was implemented. An obligatory move occurs in at least 60% of the corpus, whereas an optional one was used less than 60%.

5. Research Findings

The results showed that all seven moves of the analysis framework were used in the corpus. However, the occurrence frequency of moves varied a lot from below 10% up to more than 90%. *Move 2 (Reporting results)* was the most frequent move (93.33% or 56 instances) followed by *Move 4 (Commenting on results)* (88.33% or 53 instances) and *Move 1 (Background information)* (71.66% or 43 instances). The majority of authors did not only comment on results in the discussion section but also reported their findings and provided background information. *Move 5 (Summarizing the study)* was rarely used (3 instances or 5%). In terms of steps, authors did not mention pedagogic implications since *Move 7 Step 3 (Drawing pedagogic implications)* was not used.

According to the specified cut-off posited by Kanoksilpatham (2005), a move occurring with 60% or higher than 60% is obligatory and a move occurring less than 60% is optional. The data set had three obligatory moves--*Move 1 (Background information)*, *Move 2 (Reporting results)*, and *Move 4 (Commenting on results)*. The corpus had four optional moves-- *Move 3 (Summarizing results)*, *Move 5 (Summarizing the study)*, *Move 6 (Evaluating the study)*, and *Move 7 (Deductions from the research)*.

Table 1 Move frequency and percentage distribution

| Moves/ Steps | Frequency (N = 60) | Percentage |
|---|-----------------------|-----------------|
| Move 1: Background information | 43 | 71.66%* |
| Move 2: Reporting results | 56 | 93.33%* |
| Move 3: Summarizing results | 8 | 13.33%** |
| Move 4: Commenting on results | 53 | 88.33%* |
| Step 1: Interpreting results | 7 | 11.66% |
| Step 2: Comparing results with literature | 48 | 80%* |
| Step 3: Accounting for results | 15 | 25% |
| Step 4: Evaluating results | 1 | 1.66% |
| Move 5: Summarizing the Study | 3 | 5%** |
| Move 6: Evaluating the study | 28 | 46.66%** |
| Step 1: Indicating limitations | 9 | 15% |
| Step 2: Indicating significance/advantage | 16 | 26.66% |
| Step 3: Evaluating methodology | 6 | 10% |
| Move 7: Deductions from the research | 22 | 36.66%** |
| Step 1: Making suggestions | 4 | 6.66% |
| Step 2: Recommending further research | 18 | 30% |
| Step 3: Drawing pedagogic implications | 0 | 0% |

Note: * = Obligatory move

** = Optional move

N = the total number of texts in this study

% = the occurrence frequency of a move

The realization of some moves in the corpus is shown in Table 2 below. Recurrent phrases and word choices are italicized, underlined and marked in bold.

Table 2 Realization of moves

| Moves/Steps | Examples |
|--|--|
| Move 1: Background information This move explains research questions, aims, methodological and theoretical information. | This ethnographic research <u><i>aimed to</i></u> study the ways of life of... (Text#ST14, bold and italic added) |
| Move 2: Reporting results This move provides research findings. Frequently used word choices are “ <i>showed</i> ”, “ <i>The results showed that</i> ”, “ <i>The results revealed that</i> ”, “ <i>It is found that</i> ”, “ <i>Table</i> ” “ <i>Figure</i> ” and “ <i>Fig.</i> ”. | ... <u><i>it is found</i></u> that the flow is steady -state up to a large value... (Text#ST23, bold and italic added) The error comparisons of forecasting models were shown in <u><i>Table 9</i></u> and <u><i>Fig. 5</i></u> . (Text#ST29, bold and italic added) |
| Move 3: Summarizing results This move sums up research findings. Word choices/phrases signifying this move are “ <i>in summary</i> ”, “ <i>can be concluded that</i> ” and “ <i>was concluded</i> ”. | It <u><i>was concluded</i></u> from the study that both Advia 120... (Text#ST21, bold and italic added) |
| Move 4: Commenting on results This move aims to make comments on research findings and is divided into four steps. | However, our results <u><i>suggest</i></u> that ERIC-PCR was more discriminatory than RAPD... (Text#ST55, bold and italic added) |
| Step 1: Interpreting results | |
| Step 2: Comparing results with literature Recurrent word choices/phrases of this step are “ <i>similarly</i> ”, “ <i>similar to</i> ”, “ <i>similarly to previous reports</i> ”, “ <i>agree well with</i> ”, “ <i>contrast to</i> ”, “ <i>consistent with</i> ”, “ <i>confirmed the studies</i> ”, “ <i>reflected the studies of</i> ” and “ <i>Previous research reported that</i> ”. | These results were <u><i>similar to</i></u> those of Suriham et al. (2011) who reported... (Text#ST3, bold and italic added) The evidence in this work <u><i>agrees well with</i></u> the result of the previous study by Rattanachan (2007). (Text#ST8, bold and italic added) |
| Step 3: Accounting for results | <u><i>Another possible explanation</i></u> involves patterns of residence after marriage... (Text#ST56, bold and italic added) |
| Move 5 Summarizing the study This communicative purpose is employed to sum up the study. | <u><i>In conclusion</i></u> , this study obtained novel qualitative... (Text#ST35, bold and italic added) |

Table 2 (continue)

| Moves/Steps | Examples |
|--|--|
| Move 6: Evaluating the study <p>The function of this move is to demonstrate limitations, inform significance and evaluate research methodology.</p> Step 1: Indicating limitations <p>The word choices of this step are “<i>a limitation</i>” and “<i>some limitations</i>”.</p> | <p>There are some <i>limitations</i> in the current study.</p> <p>Reviewed film data were supplied by only... (Text#ST24, bold and italic added)</p> |
| Step 2: Indicating significance/advantage <p>Authors frequently used modal verbs like “<i>may</i>” and “<i>could be</i>” and the words “contribution” and “contribute” to inform the significance of the study.</p> | <p>Findings from this study <i>could be</i> useful for health organizations... (Text#ST30, bold and italic added)</p> |
| Step 3: Evaluating methodology | <p>These variables statistically significantly predicted pre-evacuation time, $F= 15.256$, $p < 0.05$, $R^2 = 0.871$, the regression model is a good fit of the data. (Text#ST26)</p> |
| Move 7: Deductions from the research <p>This move helps suggest the implementation of research results, further research studies and possible pedagogical implications.</p> Step 1: Making suggestions | <p>Future management efforts should also focus on also improving the condition of the Pinij weir pool... (Text#ST42)</p> |
| Step 2: Recommending further research <p>The authors directly mention further studies with the word choices like “<i>further studies</i>”, “<i>further study</i>”, “<i>further research</i>” and “<i>further work</i>”.</p> | <p><i>Further studies</i> should separate adults and the elderly... (Text#ST20, bold and italic added)</p> |

Move sequences in science and technology possessed a set of sequential moves ranging from two to five moves such as *M2-M4*, *M3-M4* and *M1-M2-M4-M6-M7*. The three- move sequence was prevalent; whereas the two-move pattern was the least popular one. The most frequent move pattern was *M1-M2-M4* which was used in 18 texts accounting for 30 %. It was followed by *M1-M2-M4-M7* with 15 instances or 25% and *M1-M2-M4-M6* with 12 cases or 20%.

6. Conclusion and Discussion

This study has been to explore the move frequency in English discussion sections of science and technology journals published in Thailand. The rhetorical move model posited by Yang and others (2003) was used as the analyzing framework. The findings showed the occurrences of three obligatory moves and four optional moves. *Move 1 (Background information)*, *Move 2 (Reporting results)*, and *Move 4 (Commenting on results)* were obligatory moves. *Move 3 (Summarizing results)*, *Move 5 (Summarizing the study)*, *Move 6 (Evaluating the study)*, and *Move 7 (Deductions from the research)* were optional. As for the move sequence, *M1-M2-M4* was the most frequent pattern in the corpus.

Like Amnuai (2017) and Amnuai and others (2013), the findings reveal the high frequency of *Move 2 (Reporting results)* and *Move 4 (Commenting on results)*. The findings revealed the importance of *Move 1*, *Move 2*, and *Move 4*. These three moves should be stated in discussion sections. The importance and frequency of *Move 2* was also in line with previous research studies (Holmes, 1997; Peacock, 2002; Swales, 1990). The findings also showed the co-occurrence and the cycling of *Move 2 (Reporting results)* and *Move 4 (Commenting on results)* in which *Move 2* preceded *Move 4*.

The findings ran counter to Yang and others' (2003) study since only *Move 2 (Reporting results)* and *Move 4 (Commenting on results)* were obligatory. In addition, as stated by Yang and others (2003), *Move 4 (Commenting on results)* outnumbered *Move 2 (Reporting results)*.

Further studies should be conducted to compare the textual organization of research article discussion sections in science and technology field with those in other fields. Lexical bundles and other linguistic features like personal pronouns, verb tenses, and active and passive voice structures found in each move and step should be explored.

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FORMATIVE ASSESSMENT: LIFELONG LEARNING ASSESSMENT

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ABSTRACT

Wherever learning takes place, assessment always comes along. This poses some interesting rhetorical questions. First, how can learners derive a benefit from assessment instead of perceiving it as an alien tool which merely provokes a final result? Furthermore, how can assessment be effectively and efficiently employed as learners' lifelong learning assessment for an ongoing language learning and skill development in the classroom in order that they are able to use it beyond the classroom context? Most significantly, how can we create the ideal opportunity where learners are able to apply the concept of assessment to support their lifelong learning in the real-world context? Accordingly, this article aims to discuss the notion of formative assessment as lifelong learning assessment for those who involve in the EFL or ESL writing pedagogy contexts to be aware of its virtue and to exploit its potential in order to establish a classroom platform to promote formative assessment as lifelong learning assessment to facilitate lifelong learning beyond such context.

Keywords: formative assessment, lifelong learning assessment, EFL writing pedagogy, ESL writing pedagogy, second language writing

1. Introduction

Sustainable development (SD) has been a long-running subject of debate in diverse fields for a certain length of time. Regarding the field of education, it is not an exception. A wide-ranging discussion of Education for Sustainable Development (ESD) has been continuing in different levels of academic institutions, including in higher education contexts. Higher education institutions play a prominent role in substantially contributing sustainability principles towards pedagogy (Disterheft, Caeiro, Azeiteiro & Filho, 2013). Unfortunately, although the principles are implemented into pedagogy in certain universities, the empirical evidence of effective pedagogical practice is rarely witnessed. To fill the gap being mentioned, this article proposes a notion of using formative assessment in EFL/ESL writing pedagogy to promote sustainable assessment or lifelong learning assessment for lifelong learning.

Summative assessment and formative assessment are the two familiar types of assessment in pedagogy. According to Tuttle (2013b), the former is assessment of learning, a tool being employed in pedagogy to give the grades or scores as the outcome of learning. Normally, it takes place at the end of a(n) lesson, unit, chapter,

semester, or academic year. The latter, on the other hand, is assessment for learning employed in the instructions to provide formative feedback to diagnose students' learning problems for learning improvement along the way. Whereas the final learning outcome is merely revealed without any practical virtues for learning development through summative assessment, both teachers and students derive benefits from the implementation of formative assessment into the classroom. That is, they share the mutual goals of learning they are achieving. With formative feedback they get from the formative assessment process, instructions are practical. That means, they are adjusted to meet learning goals and students' needs. Learning problems or learning gaps can be diagnosed and narrowed or even closed, so students can work towards the learning goals and their learning and skill can eventually be enhanced.

In EFL/ESL writing pedagogy where the process-based writing approach is employed, formative assessment can be used as one of learning tools in the writing process to promote students' L2 writing performance and to develop their L2 writing skill. It is also important to note that consistency of such writing classroom practice can create the development of learner autonomy which is a crucial characteristic to help develop lifelong learning assessment. Accordingly, students can apply this sort of assessment to promote lifelong learning beyond the classroom contexts. This discloses another valuable aspect of formative assessment implementation in EFL/ESL writing pedagogy.

2. Objective

This article aims to discuss formative assessment as lifelong learning assessment in EFL/ESL writing pedagogy that can promote lifelong learning

3. Formative Assessment in Pedagogy

Formative assessment is a continuing process of learning where both students and teachers share the mutual learning goal and work towards that goal through assessment-driven learning practice (Brookhart, 2010). The goal of the target of language learning gradually internalized in the students through formative assessment practice is a crucial feature to promote independent learning which creates a deep concept of self-assessment for initiating the development of a unique identity for lifelong learning of an individual student (Brookhart, 2010).

Since formative assessment is not a kind of assessment for grading, the goal of formative assessment is to assess students' performance of learning and skill development of their learning progress to employ the interventions in the instruction in order to bridge the gaps of those learning and skill development where they are not able to accomplish (Brookhart, 2010; Burns, 2017). Therefore, what students receive from this type of assessment is not grades, but formative information to build on their existing knowledge and sharpen their foreign or second language skill (Brookhart, 2010). In so doing, formative assessment is fundamentally embedded as a friendly language learning assessment tool, even for those less proficient language learners, particularly those students in the ESL or EFL contexts. That is, the results in the form of feedback help boost up students' attitudes towards foreign or second language learning as feedback is recognized as a useful source for their language and

skill improvement. On the part of teachers, formative assessment helps develop their classroom instructions, interventions, and activities that suit students' language learning style and current performance to promote a direct positive result of their L2 learning and skill development (Brookhart, 2010; Burns, 2017). Moreover, it can be a valuable source of diagnostic information for checking each student's learning progress and improvement (Brookhart, 2010).

Teachers use different methods for formative assessment at different times during the instructional period, but whatever method is adopted, it should be done consistently with a clear purpose (Burns, 2017). According to Burns (2017), formative assessment can be regularly carried out in different methods as follows:

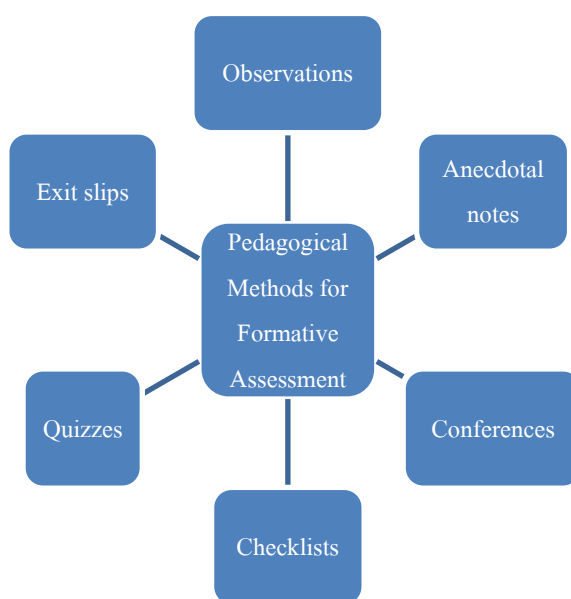


Figure 1: Pedagogical Methods for Formative Assessment

Figure 1 displays how students' learning and skill development progress can be kept and recorded by the teacher. It can be done in various ways; for instance, classroom observations, anecdotal notes, checklists, quizzes, and exit slips. For classroom observations, it takes place in the classroom while the instruction is happening or the activity is running. Teachers can observe the students' learning performance through their interactions and class or group participations. Anecdotal notes can be done to keep a record of each student's progress. Conferences can be held in order to allow discussions about the lessons or of some certain issues students are struggling to deal with. Checklists are a useful learning tool for assessment as the formative information not only teachers but also students gain from this tool can make them evaluate their performance and track their progress. For students, they can recognize their own learning performance, their learning progress, and the areas for improvement. For teachers, they can see the gaps of learning and L2 areas where students cannot master, so they can develop the instructional tools or interventions to help foster students' L2 learning and skill development. Next, quizzes can be given to students at the beginning or during the instruction to assess their

learning performance in order to diagnose their learning problems before summative assessment takes place. Finally, exit slips can be conducted at the end of each instructional period to assess what students can achieve and what is left to be fulfilled.

With an integration of formative assessment into the instruction, both teaching and learning is an ongoing process of improvement (Brookhart, 2010; Greenstein, 2010; Burns, 2017). This can be illustrated in Figure 2 which is adapted from The Cycle of Formative Assessment (Burns, 2017).

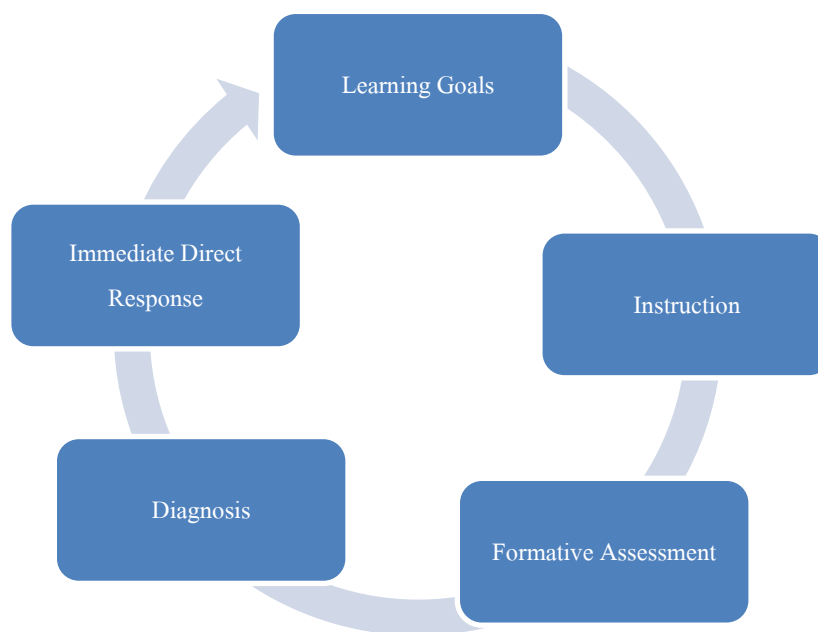


Figure 2: The Cycle of Formative Assessment in Pedagogy

Regarding Figure 2, this cycle reflects how assessment, specifically formative assessment, is used to report students' measurable learning growth. Meanwhile, the same cycle delivers measurable professional growth of teachers. With an implementation of formative assessment in the learning process, the formative information gained after the assessment is made can be used to diagnose students' learning problems or fill the learning gaps through the interventions in order to provoke an immediate and more direct response to the learning goal.

According to Brookhart (2010) and Greenstein (2010), when formative assessment is well integrated in pedagogy, not only a remarkable achievement in the foreign or second language learning, but students' motivation for learning the language is significantly increased. In addition, students are developed as active learners or self-regulated learners who focus on their language learning goal while learning through tasks and formative feedback (Brookhart, 2010). Self-regulation, one of the significant characteristics of students, can further facilitate their lifelong learning when it takes place beyond the classroom context.

4. Formative Assessment: Its Role in EFL/ESL Writing Pedagogy

As formative assessment is beneficial to not only teachers but also students in terms of professional and learning improvement (Greenstein, 2010), this kind of assessment, therefore, should be integrated into writing pedagogy, especially EFL/ESL writing pedagogy which is the main focus in this article. According to Figure 1 representing Pedagogical Methods for Formative Assessment and Figure 2 showing The Cycle of Formative Assessment in Pedagogy, formative assessment can be integrated into EFL/ESL writing pedagogy as displayed in Figure 3.

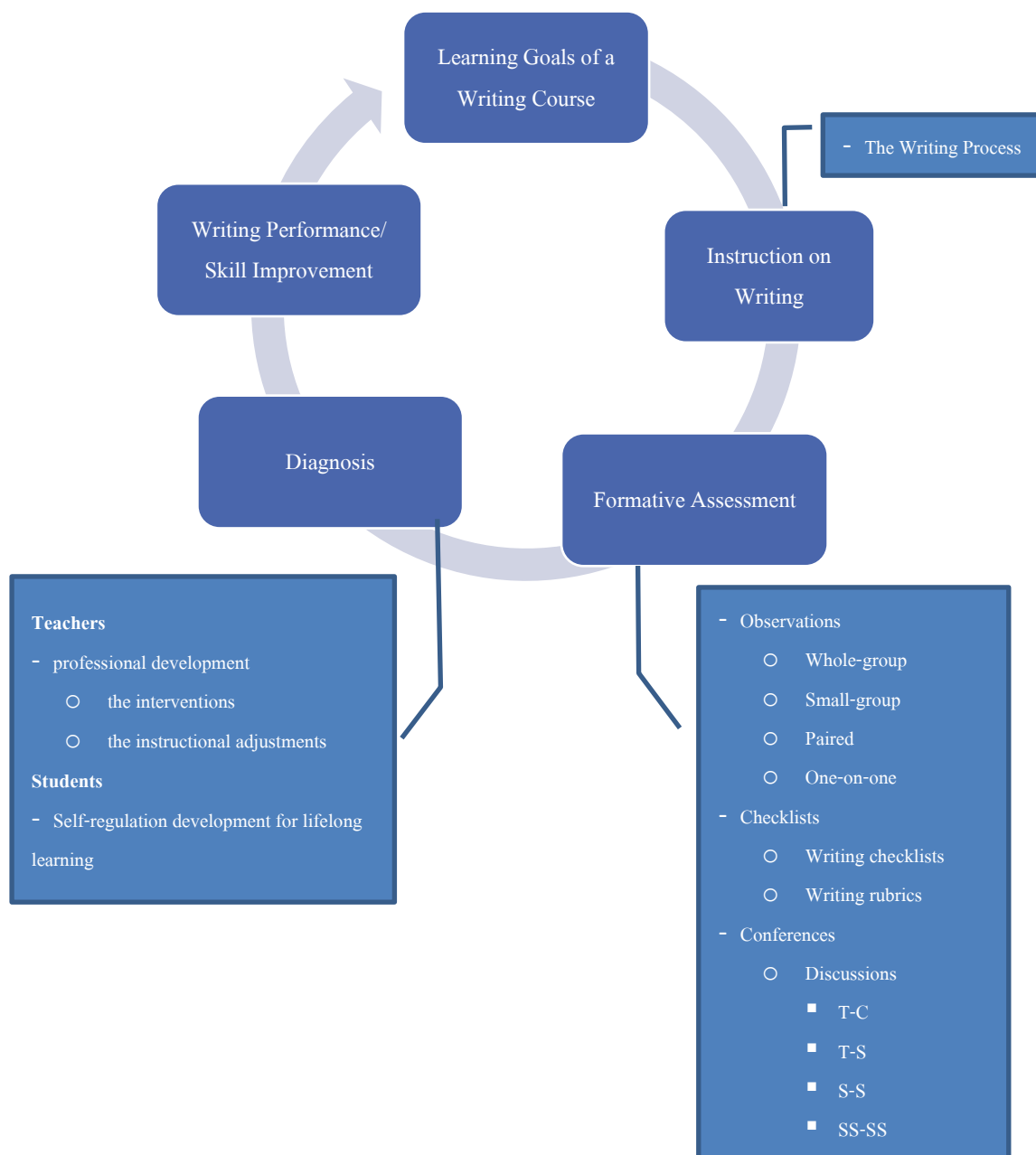


Figure 3: Formative Assessment in EFL/ESL Writing Pedagogy

Regarding Figure 3, formative assessment is integrated into writing pedagogy which is based on the process-based writing approach. The pedagogical methods being used as formative assessment in order to provide formative feedback for the next step, diagnosis, include observations which can occur in the whole-group, small-group, paired, or one-on-one instructions or activities. In so doing, teachers can track how far their students' L2 learning progress is, how they are developing their writing skill, which learning gaps can be discovered, and what can be done to bridge those gaps for diagnosis. Moreover, checklists which are the writing checklists or the writing rubrics should be employed to evaluate students' writing performance. With this writing instrument, both teachers and students themselves can recognize what students can or cannot achieve when they practice writing or do some writing assignments and assess with the use of this tool. The data that both teachers and students collect from observations and the use of checklists can be discussed for further development in the conferences which can be done in the form of a class discussion between the teacher and the students (T-C), a one-on-one discussion between the teacher and the student (T-S) or a pair of students (S-S), or a group discussion with the students themselves (SS-SS). After the data are analyzed, certain adjustments, for example, the intervention creation or the responsive instructional adjustments are made in the diagnostic process for both teachers' professional development and students' writing performance or skill improvement. Apart from that, students can develop self-regulation through formative assessment since this implementation requires an important engagement of students to customize their learning and diagnose their problems in order to enhance their own L2 writing ability and skill. This is a useful characteristic for lifelong learning. The whole process being presented is additionally in line with Tuttle (2013a) who also remarks that formative assessment can be carried out in four stages in the writing process: monitoring, diagnosing, providing feedback, and growing.

5. Formative Assessment: From EFL/ESL Writing Pedagogical Assessment to Lifelong Learning Assessment

According to the concept of learner autonomy, the development of learners is a part of their language learning development (Cooker, 2015). This means that as learners develop their language competency, autonomy is also developed whereas lifelong learning assessment is a significant learning tool learners employ to support their autonomy development. Due to the integration of formative assessment into EFL/ESL writing pedagogy, it is a miniature assessment model for developing lifelong learning assessment in learners beyond the classroom context. Figure 4 unveils the process how lifelong learning assessment is developed through an implementation of formative assessment in EFL/ESL writing classrooms.

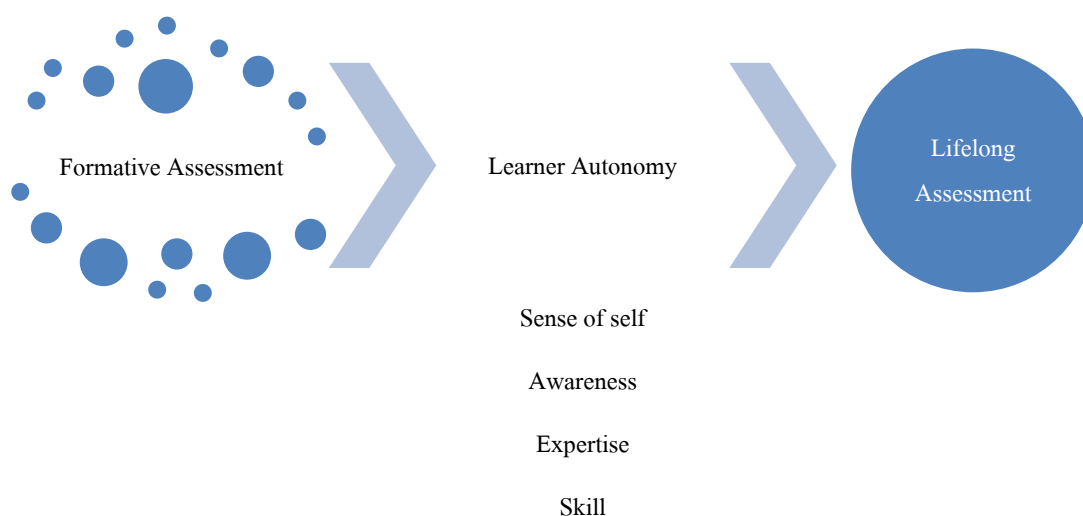


Figure 4: The Transformation from Formative Assessment to Lifelong Learning Assessment

As formative assessment is applied to EFL/ESL writing pedagogy as an assessment tool for language learning and skill development, it is considered as assessment for immediate learning. That means assessment is used as a benchmark for making judgement about learners' writing performance in order to recognize their language learning gaps or to track their writing skill development to diagnose the problems by providing feedback for their language learning and writing skill improvement. The process is related to the present. During the time of mastering the writing skill through the writing process integrated with formative assessment, learners' autonomy is gradually developed to acquire the skill and to have expertise, awareness, and sense of self which are carried on and sustained throughout their life to foster the development of lifelong learning assessment that can be exploited in any learning environments or even in the real world beyond the pedagogical context (Cooker, 2015). However, the whole process probably takes a long-time span and requires consistency of the practice in order to produce the promising concrete positive desired outcome in the long run. Therefore, when lifelong learning assessment is formed, learners can maximize its profits in their lifelong learning in various contexts.

6. Conclusion

Apart from a contribution to language learning and skill development, another vital role of formative assessment is clearly shown. That is, it can help develop learner autonomy in order to transform formative assessment being used in the pedagogical context into the kind of assessment that can be adapted in different learning contexts in the real world for lifelong learning.

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**INTERNSHIP EVALUATION OF THAI STUDENTS MAJORING IN
JAPANESE FOR BUSINESS COMMUNICATION
BY JAPANESE COMPANIES:
A CASE STUDY OF INTERNSHIP PROGRAM IN JAPAN
BY SRIPATUM UNIVERSITY**

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ABSTRACT

The purpose of this paper was to obtain evaluation of internship students by Japanese companies, to qualitatively review the preparatory education for internship program, and to promote industry-academia partnership as a case study of an internship program in Japan by Department of Japanese for Business Communication, Sripatum University in Thailand. As an evaluation method, a questionnaire survey with eight questions was adopted, consisting of closed-ended questions with single answer (Questions No. 1 to 6) and with multiple answers (Question No.7); and with free answer (Question No. 8). Questions No. 1 to 6 asked satisfaction level of student's attitude, skills, professional or general knowledge, etc. by four rating scales. There were answers from four companies (valid response rate: 66.67%), and a reliability coefficient was 0.75 (Cronbach's alpha) in Questions No. 1 to 6. Overall, the survey results showed a considerably high degree of satisfaction (83.34%). However, when viewed on an average-value, there were some high-low differences of satisfaction in each answer. In line with the answer results, further improvements in preparatory education before internship are required to make the internship worthy of evaluation or fruitful.

Keywords: Internship in Japan, Cooperative Education, Industry-academia partnership, Japanese company, Sripatum University

1. Introduction

Immigration Control and Refugee Recognition Act of the Ministry of Justice stipulates detailed rules regarding the status of residence of foreigners associated with their employment activities in Japan (Immigration Services Agency of Japan). At the same time, public notifications (one of the laws and regulations) regarding the employment of foreigners are also issued continuously. According to the public notification (Ministry of Justice), 46 types of activities (as of September 2020) have been designated as specific activities (Sekine, 2020). This specific activity called *designated activities* included *internship with reward* (No. 9). The following is the summary of the outline of the internship in the notification No. 9: 1) a system that a student can work in a company in order to gain

work experience, 2) if a student has a work experience at a Japanese company as an intern, recognition of credit by university or college will be required for the internship, and 3) participation in the internship is set for a period not exceeding one year (3, 6 or 12 months) (JISA). This provided an opportunity for students enrolled in the curriculum to undergo practical training course and Japanese language course providing credits to participate in internships in Japan at Thai universities. In fact, among the fourth-year university students enrolled in the Department of Japanese for Business Communication (hereinafter called JBC) as major course, College of Liberal Arts, Sripatum University (hereinafter called SPU), three students in 2018 and 15 students in academic year 2019 participated in the internship program in Japan. In the JBC Department, *JBC498 Pre-cooperative Education* is offered in the summer semester (June-July) of the third year of undergraduate course, and in the second semester (January-April) of the fourth year, *JBC499 Cooperative Education* as a practical training subject is implemented, and it requires 16 weeks of practical training. In addition, in the JBC Department, through taking subjects of *JBC229 Japanese Corporate Culture and Working Style* in the second-year student course, and *JBC321 Cross-Cultural Business Communication* and *JBC332 Japanese for Management* in the third-year student course, JBC students can learn how to work with Japanese business people, business culture in the workplace of a Japanese company and Japanese management organization or culture etc., and job-hunting activities for Japanese companies in Thailand. Literally, it can be said that JBC Department focuses on promoting industry-academia cooperative education. The researcher has conducted surveys on the students' job consciousness (Mori, 2018) and attitudes toward internship program (Mori, 2020), and since then, with these series of surveys, the researcher also has considered the necessity to investigate evaluation of students through multiple Japanese companies in internship program. This paper summarized the results of a questionnaire survey of Japanese companies that accepted Japanese major students who participated in internship program in Japan. The results of this survey can be useful for nurturing Thai professionals with business Japanese language proficiency and Japanese business skills, which are the goal of JBC's curriculum.

2. Significance of Research

It goes without saying that the implementation of the internship program in Japan, for JBC department, can be an opportunity to promote industry-university cooperative education or industry-academia collaborative education with Japanese companies. At one time, for Japanese major students who participate in this work experience program, 1) there are credits which can be recognized as practical training course, 2) it can be an opportunity to experience and directly learn about Japanese society and companies through working in Japan, and 3) experiential and practical learning through actual communication with Japanese colleagues in the workplace can also be an opportunity to improve proficiency in Japanese for business communication, understand Japanese business culture, and acquire the basics of business manners. On the other hand, even for Japanese companies that accept foreign interns as one of the personnel strategies, it is also an opportunity to promote the globalization of corporate employees and revitalize the workplace. With focusing on the advantages of the department, students, and companies and by enhancing the internship program in Japan in the future, a survey of Japanese companies that have accepted JBC students from SPU as interns should provide meaningful feedback to the JBC Department, students, and Japanese companies that are involved in the internship program. It will also be necessary to establish a cycle system (preparatory study and training for students/outbound students from SPU/inbound students by company) that allows

both JBC Department and Japanese companies to study closely together in order to maximize students' learning from the internship program through the results of this survey. This system is expected to be able to support appropriate recruitment for company side and effective cultivation of human resources for educational institution from the perspective of Thai professionals with business Japanese language proficiency and Japanese business skills.

3. Related Research

Questionnaire surveys related to internship programs are roughly classified into three categories, these are as follows: 1) survey of universities that provide internship programs to students under industry-academia collaboration as part of their career education, 2) students' awareness survey before and after the internship, and 3) survey of companies accepting internship students. Most of the questionnaire surveys for companies are involved with the planning, implementation, and evaluation of internship program projects. It seems that the evaluation of the interns by the host company is usually done individually as an educational evaluation activity or as feedback to the student. This evaluation activity for student can be divided into three categories: 1) basic evaluation (motivation/attitude/goal achievement, etc.) related to the student oneself, 2) behavior evaluation (ability/skill), and 3) personality evaluation (advantages/disadvantages). Regarding behavioral evaluation, many evaluation items that rely on the basic skills of working adults are used from the perspective of industrial human resource development in Japan. Basic skills for working adults, which consists of three skills as a general framework and 12-skill elements, is an item advocated and recommended by the Ministry of International Trade and Industry in 2006 (JIPC). On the other hand, through interview surveys with companies, there were also survey results that collected examples of nine companies implementing advanced internship programs (METI, 2020, pp.1-39).

Surveys on satisfaction with internship by companies, such as the research in this paper, seem to be treated as some question items in various questionnaire surveys. The following are three survey results regarding the *evaluation results for internship students on the corporate side*. First, in the Ministry of Economy, Trade and Industry survey, there was a question item that asked companies about their satisfaction with the internship students who participated, and regarding the satisfaction of the students who participated in the internship, it was asked about 4 items on a 5-point scale and calculated the satisfaction score by the weighted average. According to the survey results, *enthusiasm/independence/action* (21.7 points) and *communication skills* (18.9 points) were highly satisfied, however, *business manners* (13.0 points) and *pre-learning about the company and industry* (8.9 points) showed low satisfaction (MITI, 2014, p.9). Second, in Tomiyama's 2015 report, although no specific numbers or percentages are given, it was stated that the degree of satisfaction with the internship was *very satisfied* and *satisfied* at all companies in the questionnaire to companies (Tomiyama, p.17). A survey of 29 companies by the Kitakyushu Forum for Development of Human Resources and Industries showed that *very satisfied* and *somewhat satisfied* had the same rate (48.3%) respectively for internship students (KFDHI, 2011). While the survey reports were generally satisfactory from companies, some survey reports did not disregard the negative evaluation results. Lastly, the Ministry of Education, Culture, Sports, Science and Technology released the handouts at the *Survey and Research Collaborators' Meeting on Promotion of Internships (3rd)* held on February 2, 2017. According to the handout No.1, *Survey research on issues for promoting internships and specific effects/usefulness (summary version)*, it summarized the results of surveys conducted on students, companies, universities, etc., and showed that nearly

30% of companies, etc. were dissatisfied (Career square that connects learning and working, 2017). One of the factors was that the companies and students could not share their understanding of the purpose, significance, content, and method of the internship program.

The above were surveys mainly targeting Japanese university students in Japan, if any, targeting international students staying in Japan. In the literature, there was no survey targeted only on university students in foreign country as Thailand as in the theme of this paper. In the context of the number of questions and the content of the questionnaire survey, and in view of reliability and content validity, it was thought that the evaluation of students by person responsible for internship program was most appropriate, and it could also be applied and utilized in this questionnaire survey (cf. 5.2) with reference to questionnaire used in the survey of the Kitakyushu Forum for Development of Human Resources and Industries (KFDHI, op. cit.).

4. Research Objective

The objectives of this research are 1) to obtain a viewpoint-based evaluation and a comprehensive evaluation of internship students by Japanese companies that accepted the JBC students, 2) to qualitatively review the preparatory education (courses such as *JBC229* and *JBC498*) for internships in the career education of JBC Department based on the ex-post evaluation by the host company, and 3) to explore the content that promotes specific collaboration with Japanese companies (industry-academia partnership).

5. Methodology

5.1 Target Group

The target group comprised 6 Japanese companies that had accepted 15 fourth-year students (4 male and 11 female students) who participated in the internship program in Japan from January until April (Table 1). As a side note, there were 20 students who registered for a course in *JBC499 Cooperative Education* in the second semester of academic year 2019. The percentages in Table 1 were rounded to the second decimal place (the same applies to the below).

Table 1 Breakdown of 15 students in Japanese internship program

| Company | Number of students | Male students | Female students | Prefecture | Region |
|--------------|---------------------|-------------------|--------------------|----------------------|------------------|
| A | 5 (33.35%) | 2 (13.33%) | 3 (20.00%) | Nagano | Chubu |
| B | 2 (13.33%) | 1 (6.67%) | 1 (6.67%) | Gifu | Chubu |
| C | 2 (13.33%) | 1 (6.67%) | 1 (6.67%) | Ishikawa | Chubu |
| D | 2 (13.33%) | 0 (0.00%) | 2 (13.33%) | Ishikawa | Chubu |
| E | 2 (13.33%) | 0 (0.00%) | 2 (13.33%) | Shimane | Chugoku |
| F | 2 (13.33%) | 0 (0.00%) | 2 (13.33%) | Yamagata | Tohoku |
| Total | 15 (100.00%) | 4 (26.67%) | 11 (73.33%) | 5 Prefectures | 3 Regions |

5.2 Instrument

The questionnaire method was adopted because it could measure the psychological tendencies of respondent's mind and attitude in this survey, and it consisted of eight questions in total. Questions No. 1 to 6 were in a scale-based evaluation format with four levels of *extremely satisfied*, *slightly satisfied*, *neither* and *slightly dissatisfied*. That is, it was closed-ended questions that gave a single answer from four choices. In addition, a descriptive formula or open-ended questions for writing comments were also set in connection with the content of each of the questions from No. 1 to 6. Question No. 7 was a question format that multiple answers were possible. Question No. 8 asked overall opinions such as request, problem, suggestion, advice, impressions, etc. related to this internship program, and it was the so-called text open-ended question. In any case, it was a questionnaire survey that considered the explanatory variable and the response variable for the purpose of grasping the actual situation and the cause of this internship program. As for the reliability and validity of the questionnaire in this survey, it was already mentioned in Chapter 3.

5.3 Data Collection

The research was undertaken after informing 6 companies shown in Table 1 of the purpose and agreeing on the content and method of this survey by *Google form*, and it was used to collect the response data as survey administration application software. A hyperlink to the questionnaire survey (*Google form*) was sent to the companies that agreed to cooperate with this survey by e-mail during the period from late May until early June, 2020 after completing the internship in Japan. The results of collecting the answers were obtained from 4 out of 6 companies. These four companies accepted a total of eight students. The valid response rate was 66.67%, and as for the data aggregation method, statistical processing was performed according to basic or descriptive statistics (Casio, 2020). Incidentally, Question No. 8 was omitted in this paper because there were more comments on the acceptance system by the company side than on the description related to student evaluation of internship program.

5.4 Data Analysis

5.4.1 Response Behavior of Companies from Questions No. 1 to 6

Table 2 showed the response behaviors of the four companies that received answers. The answers to questions from No. 1 to 6 were all the results of choosing the evaluation for students from four satisfaction levels. The reliability of the response results was 0.75 in a reliability coefficient (Cronbach's alpha) of closed-ended question part from Questions No. 1 to 6 (Wessa, 2020). *Satisfaction* by companies was 88.34% in putting *extremely satisfied* (29.17%) and *slightly satisfied* (54.17%) together.

Table 2 Response behavior of each company in Questions No. 1 to 6

| Company | Extremely satisfied | Slightly satisfied | Neither | Slightly dissatisfied |
|--------------|---------------------|--------------------|-------------------|-----------------------|
| 1 | 1 (16.67%) | 4 (66.66%) | 1 (16.67%) | 0 (0.00%) |
| 2 | 0 (0.00%) | 3 (50.00%) | 3 (50.00%) | 0 (0.00%) |
| 3 | 1 (16.67%) | 5 (83.33%) | 0 (0.00%) | 0 (0.00%) |
| 4 | 5 (83.33%) | 1 (16.67%) | 0 (0.00%) | 0 (0.00%) |
| Total | 7 (29.17%) | 13 (54.17%) | 4 (16.66%) | 0 (0.00%) |
| Mean | 1.75 | 3.25 | 1.00 | 0.00 |
| SD | 2.22 | 1.71 | 1.41 | 0.00 |

5.4.2 Simple Tabulation Results from Questions No. 1 to 6

Table 3 is a simple summary of the answers to each of the questions No. 1 to 6 by companies. Three items of Question No. 1, 4 and 5 showed the ratio of 100.00% in *extremely satisfied* and *slightly satisfied*. Question No. 3 was the only item that showed the proportion of 0.00% in *extremely satisfied*. Although *slightly dissatisfied* was not seen in all the items, there were answers that chose *neither* in the three items of Questions No. 2, 3 and 6.

Table 3 Satisfaction with interns by the company

| Question | Extremely satisfied | Slightly satisfied | Neither | Slightly dissatisfied |
|--|---------------------|--------------------|-------------------|-----------------------|
| 1. Student's enthusiasm to participate in internship program | 2 (50.00%) | 2 (50.00%) | 0 (0.00%) | 0 (0.00%) |
| 2. Student's skills | 1 (25.00%) | 2 (50.00%) | 1 (25.00%) | 0 (0.00%) |
| 3. Professional/General knowledge including Japanese language knowledge of student | 0 (0.00%) | 2 (50.00%) | 2 (50.00%) | 0 (0.00%) |
| 4. Student's courtesy or working manners at workplace | 2 (50.00%) | 2 (50.00%) | 0 (0.00%) | 0 (0.00%) |
| 5. Student's Japanese communication skills | 1 (25.00%) | 3 (75.00%) | 0 (0.00%) | 0 (0.00%) |
| 6. Comprehensive evaluation for student | 1 (25.00%) | 2 (50.00%) | 1 (25.00%) | 0 (0.00%) |
| Total | 7 (29.17%) | 13 (54.17%) | 4 (16.66%) | 0 (0.00%) |
| Mean | 1.17 | 2.17 | 0.67 | 0.00 |
| SD | 0.75 | 0.41 | 0.82 | 0.00 |

5.4.3 Results of Response Behavior in Question No. 7

Question No. 7 was a multiple-choice answer, and Table 4 summarized the number of choices for each company. The number of choices was 7 items including an answer of *others*; however, no company chose 5 or more. The average number of choices was 2.5 choices per company (cf. Table 7 in 6.3 with respect to each content of the seven choices in Question No. 7).

Table 4 Response behavior of each company in Question No. 7

| | Company 1 | Company 2 | Company 3 | Company 4 | Average |
|-----------------------------------|-----------|-----------|-----------|-----------|------------|
| Number of selected answers | 4 | 3 | 2 | 1 | 2.5 |

6. Research Findings

6.1 Features on the Answer Results of Questions No. 1 to 6

Using Likert's rating scale method, Table 5 clarified the differences in response behaviors related to satisfactory degree of interns in each company. The evaluation scale scored qualitative data based on a four-level scale of *extremely satisfied* = 4 points, *slightly satisfied* = 3 points, *neither* = 2 points, and *slightly dissatisfied* = 1 point.

Table 5 Satisfaction level based on ordinal scale with four levels

| Question | Extremely satisfied | Slightly satisfied | Neither | Slightly dissatisfied | Sub Total | Mean (\bar{x}) |
|--------------|---------------------|--------------------|-------------|-----------------------|-----------|--------------------|
| 1 | 8 | 6 | 0 | 0 | 14 | 3.50 |
| 2 | 4 | 6 | 2 | 0 | 12 | 3.00 |
| 3 | 0 | 6 | 4 | 0 | 10 | 2.50 |
| 4 | 8 | 6 | 0 | 0 | 14 | 3.50 |
| 5 | 4 | 9 | 0 | 0 | 13 | 3.25 |
| 6 | 4 | 6 | 2 | 0 | 12 | 3.00 |
| Total | 28 | 39 | 8 | 0 | 75 | 12.50 |
| Mean | 4.67 | 6.50 | 1.33 | 0.00 | - | 3.13 |
| SD | 3.01 | 1.22 | 1.63 | 0.00 | - | 1.52 |

In totality, the average was 3.13 points, and occupied 78.25%. It showed a relatively high degree of satisfaction, and moreover, it could point out that there was no *slightly dissatisfied* in all the questions. On the other hand, when viewed from the mean value in respective question from No. 1 to 6, the items that showed 3.5 points (87.50%) were Questions No. 1 and 4, and it meant that *students' motivation and enthusiasm for internships* and *students' politeness and manners in the workplace* were highly evaluated. Satisfaction rating was also an item that *extremely satisfied* (8 points) accounted for more than *slightly satisfied* (6 points). Also, Question No. 5 that occupied 3.25 points (81.25%) was an evaluation of *students' Japanese communication skills*. However, it seemed to be worth considering the evaluation contents in the fact that *slightly satisfied* (9 points) was about twice as much as *extremely satisfied* (4 points). Items with an average point of 3.0 (75.00%) were Questions No. 2 and 6, and the degree of satisfaction was the same in *the student's skills evaluation* and *the comprehensive evaluation for students*. The lowest item was Question No. 3 with an average point of 2.5 (62.50%), that is, evaluation of *students' general knowledge and specialized knowledge including Japanese language knowledge*. In fact, it was also the only item that did not have rating of *extremely satisfied*. In addition, “*neither* (4 points)” was the most item among all evaluation items, in a sense, it could be said that Question No. 3 was a difficult evaluation for companies to judge.

6.2 Comments Related to Answers to Each Question from No. 1 to 6

Table 6 listed the comments for the single answers from Questions No. 1 to 6. To put it plainly, regarding students' attitudes and behaviors toward internship and human relationship in the workplace, descriptive answers received satisfactory comments in each question, nonetheless, there were comments pointing out the lack of knowledge and skills. With the evaluation points in 6.1 of the above-mentioned, it is considered that further discussion ought to be promoted in reference to the necessary knowledge and required skills. At the same time, in respect of these necessary knowledge and skills according to the curriculum contents of the JBC Department, it is also clear that methodological issues on how to make students acquire and learn them. It can be said that one of the essential skills is to acquire and improve the skills to deal with misunderstandings that occur in communication at workplace or customer service (communication strategic competence), and problems that occur in communication activity (problem-solving abilities).

Table 6 Comments from Japanese companies for each Question

| Question | Comment |
|----------|--|
| 1 | Attitude to learn positively/ Lack of goal setting and awareness/ Seriously working hard |
| 2 | Ambitious attitude to learn work content/ There were many areas in the skills that need to be developed |
| 3 | Occasionally, student made a mistake in using the particle, so it sometimes caused miscommunication with customer/ There was no problem in general Japanese, but a little lack of specialized knowledge such as customer service terms |
| 4 | Student could make honorific words, e.g. in the scene of appreciation and apology/There was no big problem |
| 5 | Student was able to communicate with the staff at work/No major problems were seen with the support of the store manager and staff members |
| 6 | Sometimes student could not understand a little about listening and talking/It was difficult to make a comprehensive evaluation with just this internship |

6.3 Abilities and Skills Required of Students in Question No. 7

Question No. 7 was the ability and skills required of students from companies when participating in internship program in Japan. The answers were, as they were, related to the answers from Questions No. 1 to 6, and it was seen to be items that host companies expected from foreign university students. Focusing on *motivation to learn, general knowledge, social manners, and communication skills*, it is presumed that ability or skill development is expected to be expanded to the expertise or skills required for occupations. Naturally, the qualification, abilities and skills required can differ depending on the type of industry or kind of job. However, since various items were selected in Table 7, discussions on the abilities and skills required for internships ought to be discussed more in the future in order to share understanding between university and company, and from the perspective of industry-academia cooperative education.

Table 7 Answer result of Question No. 7 (Multiple answers)

| Content of choice | Ability or Skill | Social manners | 2 (20.00%) |
|-------------------------|------------------|----------------------|---------------------|
| Motivation for learning | 2 (20.00%) | Communication skills | 2 (20.00%) |
| Skills | 1 (10.00%) | Others | 0 (0.00%) |
| Expertise | 1 (10.00%) | Total | 10 (100.00%) |
| General knowledge | 2 (20.00%) | | |

7. Conclusions and Suggestions

The number of companies that responded to this survey was only 4 companies, and it meant very few companies. Therefore, it seems difficult to conclude the survey results based only on the evaluations by the four companies. Although a considerably high degree of satisfaction was obtained (83.34%) as a whole, it was found that satisfaction level differed between *extremely satisfied* and *slightly satisfied* when viewed individually. In addition to

personal qualities, interpersonal skills like social or business manners, and interpersonal communication, it was also found that Japanese language expertise and business skills were required to some extent. Especially, as to specialized knowledge and general knowledge including Japanese knowledge of students, there were concrete comments pointing out those shortages. It can be said that there is a strong demand from Japanese companies. In keeping with this, it will be important to develop learning programs that aim to improve students' skills. In developing learning programs, it will also be necessary to carry out a posteriori or follow-up survey of students after the internship program. At any rate, it is understood that the results of this research showed the elements that enhance the internship program in Japan. In a sense, to develop a fulfilling internship program, the department will promote industry-academia cooperative education relying on active industry-academia partnership. It is expected to be an opportunity to bring about major changes in student's learning styles (discovery-based learning, problem-solving learning, experiential learning, learning by research, etc.), flexible operation of the curriculum of JBC Department, and globalization activities of companies. In concurrence with this, the department will focus to foster and develop Thai human resources with business Japanese language proficiency.

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A STUDY OF TEACHING DESIGN FOR INFORMATION TECHNOLOGY COURSE BASED ON STEAM EDUCATION CONCEPT CASE STUDY: CHINESE PRIMARY SCHOOL

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ABSTRACT

This study mainly uses the literature analysis method, survey research method, and action research method. There are three objectives: 1) To analysis the teaching status of the primary school curriculum, 2) To study the process of a successful STEAM education concept teaching design, 3) To study the feasibility process and implementation of primary school teaching design under the STEAM education concept.

The results of students' processing and expression ability, practical ability, and teamwork ability, SPSS paired sample test $P < 0.05$, indicating a significant improvement. It is helpful to the development of students' interdisciplinary problem solving ability, the cultivation of social responsibility, and the development of core literacy.

Keywords: Steam Education, Primary School Information Technology, Teaching Design

Introduction

For a long time, the curriculum in school education has been taught in different disciplines and is divided into segments. It is easy to ignore the needs, background and students life, which can easily lead to the neglect of the practical needs of contemporary social life, and it can easily lead to the separation of disciplines. It restricts the students' vision and restricts the breadth of students' thinking.

STEAM is an advanced educational concept originated in the United States, and it is an educational approach that uses science, technology, engineering, art, and mathematics as an opportunity to guide students' inquiry, dialogue, and critical thinking. Combining the knowledge of the five college subjects, we are committed to cultivating students' systematic thinking ability in STEAM education, let children learn knowledge in practice, cultivate practical ability in practice, and form scientific thinking, so that children can build up their understanding of the world, Through the cultivation of practical ability, help children improve their ability to solve problems in the future.

The 21st century is the challenge of the world's scientific and technological revolution and the knowledge economy. The wealth created by science and engineering accounts for a higher and higher proportion in the national

economy. Scientific and technological innovation is receiving more and more attention. Countries around the world are stepping up their technological innovation strategies. Cultivating students' innovative spirit and ability has become the consensus of the international community, and the cultivation of innovative talents depends on innovative education. For students, the entire school community and the whole society, the benefits and value of STEAM education are enormous. Therefore, it has become one of the important trends in global school education.

Literature Review

STEAM education

The learning process is a process in which learners themselves actively participate in the process of constructing knowledge and independently build their own knowledge system based on the original knowledge structure. Compared with traditional classroom teaching, teachers have become the mentors and supporters of student learning, or will become students' learning partners, encouraging students to trial and error and insight. It pays more attention to the process of students' independent exploration and hands-on practice, so it plays an important role in the implementation of project-based learning courses based on the STEAM concept and the design of information technology courses.

Teaching design

Teachers can recommend topics for project selection in the teaching design, starting from actual life experience or related to student life and combining school and student characteristics. The choice of subject should be dynamic and open, so that students can meet the requirements of teaching goals without losing their personality development.

Information technology

First of all, the primary school information technology education curriculum has a real situation. Starting from the real life and development needs of students, through the process of inquiry, design, production, experience, etc., to cultivate students' comprehensive quality. Second, the primary school information technology education curriculum is comprehensive. Pay attention to the mutual penetration and connection between knowledge, combine brain thinking with hands-on operation, and promote the comprehensive development of students. Finally, the primary school information technology education curriculum is a curriculum that focuses on comprehensive literacy. In project-based learning, combined with digital learning, the knowledge structure, way of thinking, and practical skills are fully utilized, using digital tools to solve problems and cultivating students' core literacy.

Chinese primary school

The Chinese primary school information technology curriculum is to improve each student's comprehensive literacy as the overall goal. Through the learning of the course, students can develop interest in the areas involved in the course, experience hands-on activities, gradually improve their ability to solve practical problems and hands-on skills, and gradually form correct values and necessary qualities.

Objective

This study is mainly aimed at the primary school curriculum, under the guidance of STEAM education theory, the primary research teaching design research, the main research contents are as follows:

1. To analysis of the teaching status of the primary school curriculum.
2. To study the process of a successful STEAM education concept teaching design.
3. To study the feasibility process and implementation of primary school teaching design under the

STEAM education concept.

Methodology

Population

Before the start of the experiment, Class 3 Grade 4(a total of 60 students) were selected to participate in the pre-investigation survey. After the experiment, we conducted a survey on the teaching effect of these 60 students. According to the survey results, the 60 students before and after the experiment were paired and verified.

Research design

This research mainly adopts the literature analysis method, investigation research method and action research method.

Research Instrumentation

Data collection

In order to collect more data and better analyzing, I prepared a test before the study and after study for better comparing.

Step one: Through observations and interviews with 5 teachers, we discover the existing problems in current information technology education.

Step two: Pre-test questionnaire for primary school students' information technology course study status survey, 13 multiple-choice questions.

Step three: Conduct STEAM interdisciplinary learning, learning evaluation form, a total of nine indicators, each with 5 points.

Step four: Project design and implementation post-test teaching satisfaction survey questionnaire.

Data analysis

Analysis of Comprehensive Interdisciplinary Learning Ability

Interdisciplinary comprehensive learning ability is a comprehensive analysis of the results of the three aspects of the investigation of students' information processing and expression ability, hands-on practical ability and teamwork ability. The information processing and expression ability investigated the subjects from three aspects: language expression, practical expression, and word expression. The hands-on practical ability evaluates the subjects from three aspects: project design, project completion, and result analysis. Teamwork ability comprehensively evaluates students from the sense of cooperation, cooperation skills, and spirit of cooperation.

For example, as shown in Figure 2, the students' comprehensive interdisciplinary learning ability is presented in the form of radar charts. In these three aspects, students will be scored under nine specific scoring dimensions. This comprehensive ability distribution map makes the formative evaluation given by the teacher to students clear, the advantages of the students in a certain aspect and the areas that need to be improved are obvious, and at the same time, the development tendency of the students' ability after learning through the project is fully collected.

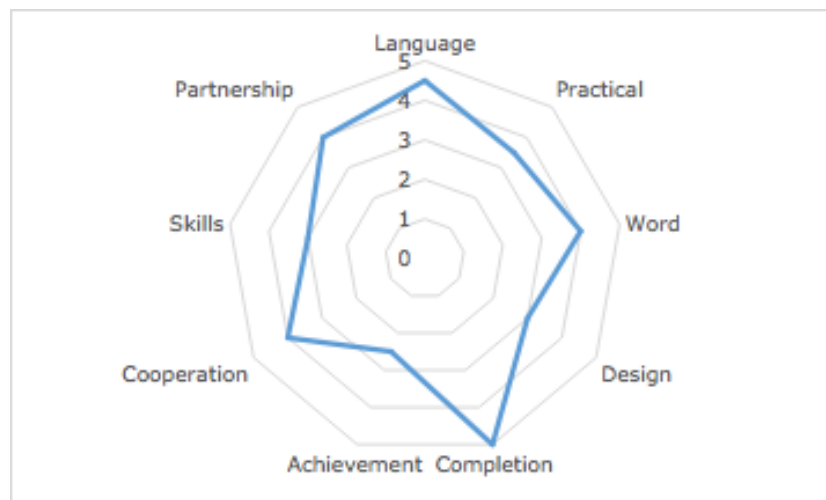


Figure 2 Student score radar chart example

Through the comprehensive analysis of the project or texts completed by the students and the performance of the collaboration, the highest score for each item is five points.

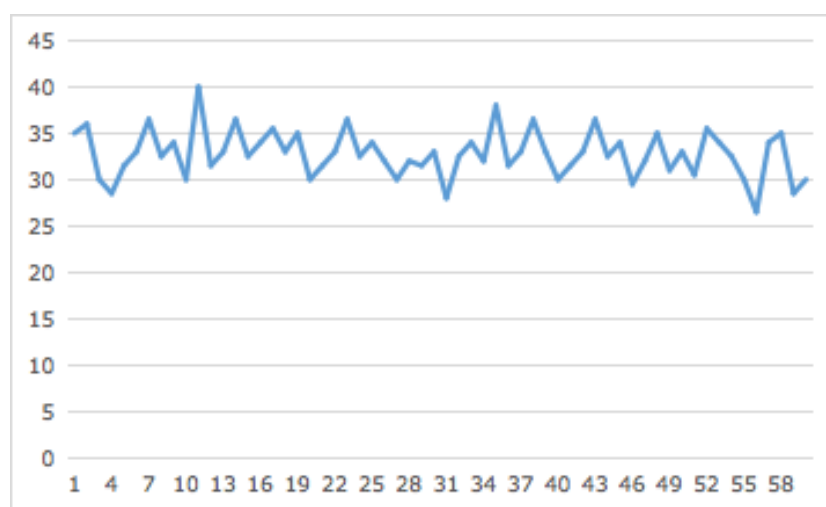


Figure 2 Class 3 Grade 4 all student score line chart

It can be seen from the figure above that the students' ability to process and express information, practice and teamwork skills have improved significantly, indicating that students have recognized the importance and necessity of comprehensive learning, and have a sense of collaboration in the process of project learning. The ability to collaborate has improved.

Table 1 Student learning ability pre-test and post-test results

| | Dimension | N | Mean | Standard deviation | t value | Sig |
|---|-----------------------------------|----|--------|--------------------|---------|---------|
| 1 | Processing and expression ability | 50 | -0.520 | 1.147 | -3.205 | 0.002* |
| 2 | Practical ability | 50 | -0.880 | 0.746 | -8.340 | <0.001* |
| 4 | Teamwork ability | 50 | -1.020 | 0.892 | -8.087 | <0.001* |

Therefore, after passing the project teaching design under the STEAM education concept, teachers should pay attention to adding group joint research tasks in reasonable circumstances in the project design to improve students' practical ability and information processing and expression ability. When conditions permit, it is recommended to add an evaluation of student group activities to the teaching evaluation. This will not only help students continue to cooperate and explore the motivation but also stimulate students' sense of self-efficacy and cultivate collective ideas through various evaluations.

Results

The goal of STEAM education requires that the development of primary school information technology courses start from real problems and transform the problems that you want to explore into projects. Through exploration, design, practice, etc., Cultivate students' comprehensive qualities such as problem-solving, practical ability, and creative thinking, and cultivate talents with global competitiveness for the future. Then, it is very necessary to explore and exhibit primary school information technology project teaching that not only meets the requirements of the new curriculum reform but also meets the development needs of students. Problems were found in the action research, and action research was used to solve and improve them. The following content was completed:

Part 1. To analysis of the teaching status of the primary school curriculum.

- 1) The choice of the theme of the teaching project is out of the real-life of the students
- 2) Lack of innovation in teaching activities
- 3) Students do not have enough time to practice their ideas
- 4) Single way to submission students' learning outcomes
- 5) A single way to carry out project teaching evaluation

Part 2. To study the process of a successful STEAM education concept teaching design.

Based on the analysis of the STEAM teaching design, in order to solve the problems in the STEAM teaching design and implementation process, the process and method of teaching design based on the STEAM education concept are initially constructed. The process includes identifying themes, interdisciplinary knowledge goals, creating scenarios, project design, activity implementation, achievement display, and communication evaluation.

- 1) Determine the theme
- 2) Interdisciplinary knowledge goals
- 3) Create a situation
- 4) Project design
- 5) Project implementation
- 6) Achievement display
- 7) Multiple evaluations

Part 3. To study the feasibility process and implementation plan of primary school teaching design under the STEAM education concept. 71% student think them learning from STEAM projects; 67% student agree them preference for STEAM projects; 71% student agree them get improvement from STEAM projects; 80% student like the STEAM classroom atmosphere; 80% student regarding continued STEAM project learning.

Discussions

First of all, education is a long and tortuous and complicated process, which requires not only time and energy but also support and cooperation from multiple parties. Due to the limitation of the hardware and software conditions of the practice site, the study only selected one class in the fourth grade for the study, which has limitations in sample selection.

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กลุ่มย่อยที่ 2

*Business, Management,
Tourism, Communication Arts*

THE STUDY OF FACTORS THAT INFLUENCE THE WOM AND REPURCHASE INTENTION TOWARDS USING 7 ELEVEN PHONE APP IN BANGKOK, THAILAND

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ABSTRACT

In various consumer behavioral studies, it is discerned that consumers these days make purchase decisions contingent on peer reviews. In contemplation of current business trends, organizations must keep up with consumer changing behavior in terms of their purchasing decisions. Online businesses must also learn to keep existing customers as opposed to earning a new one for its high costs. This paper aims to study the factors influencing word of mouth and repurchase intention of 7 eleven delivery phone App in Bangkok, Thailand. A total number of 105 respondents were surveyed to measure their word of mouth and intention to repurchase. Both simple and multiple linear regression methods for data analysis were applied. Final results showcased that trust positively influenced customer satisfaction, attitude towards App, word of mouth, and repurchase intention. Additionally, customer satisfaction and attitude towards 7 delivery App have a positive influence on both word of mouth, and repurchase intention. These findings could be used as a benchmark to build trust, improve customer satisfaction, understand customer attitude to encourage positive word of mouth, and repurchase intention.

Keywords: repurchase Intention, word of mouth, phone App

1. Introduction

Consumers day-by-day make purchase decisions depending on their peer reviews instead of interaction with the business itself (Smith *et al.*, 2005). This phenomenon has been favorable to consumers due to online interactions such as., social media (e.g., Facebook, WordPress, Myspace) as well as communal materials (e.g., email, attachments, message forwards) predominantly affecting their purchase decisions (Herring *et al.*, 2005; Bernoff and Li, 2010). However, the consumers traditionally spread the word with a limited number of social contacts, whereas; today, smartphones offer consumers to forward messages in split seconds with larger audiences (Zhang *et al.*, 2017). With that account, the emergence of social networks drastically transformed the idea of word-of-mouth transmission (Balaji *et al.*, 2016). Thereby, studies in this respect have dealt with the visibility of growth and need for consumer-to-consumer and consumer-brand interactions rather than business-to-consumer (Popp *et al.*, 2016; VanMeter *et al.*, 2015).

Accordingly, repurchase intention is one of the most significant consumer behaviors in the context of online business. Ahmed *et al.*, (2010) observed that consumer retention is necessary for businesses, not just that repeat-consumers purchase more, but because getting new ones is much more expensive than retention. It requires the cost of five times the original to build a new customer than to retain an existing one (Fenn, 2010). Likewise, the average purchase of a repeat-customer reaches 67 percent more than a new one. Chiu *et al.*, (2005) asserted that one of the successful elements in online business is customer repurchase intention. Thus, it is of utmost importance for any online business to analyze the factors that influence customer repurchase intention.

Previous studies, fortunately, guide us to discover the factors that affect online repurchase intention and word of mouth, such as trust, customer attitude towards online App, and customer satisfaction. Fang *et al.*, (2011) stated that the more trust customers gain from the online App the more they are willing to repurchase. Besides, satisfaction consequently drives consumers to repurchase in the future (Kuo *et al.*, 2012). Amin (2009) identified two factors of behavioural intention; trust and satisfaction, as the key motivators to repurchase online. In parallel, customer attitude significantly influences online behavioral intention. In addition to that, customer attitude has a significant relation with online behavioral intention in terms of repurchase intention. Besides, Agustin *et al.*, (2005) asserted that consumer trust judgments are more effective letting them spread positive words. Also, Customer satisfaction has a significant influence on word of mouth (Tzetzis *et al.*, 2014). Furthermore, Angst *et al.*, (2009) stated attitude is the key source for the adaptation of information technology. Apparently, consumers' cognitive attitude on Facebook positively influences word of mouth adoption and sharing (Aghakhani *et al.*, 2018). However, this research is aimed at giving recognition to the word of mouth and repurchase intention from 7 eleven App users' perspectives in Bangkok, Thailand.

7 eleven phone App topped the overall App store charts after its launch and has remained a staple top 20 feature on both ios and Android in Thailand (Peter, 2018). Its addition of a delivery App in providing convenience to its existing customers seeks for repurchase and word of mouth from its customers. Thereby, the researcher intriguingly aims to study the influencing factors that lead to using 7 eleven phone App with positive word of mouth and repurchase intention.

2. Research Objective

The objective of this research is to identify the influencing factors towards the word of mouth and repurchase intention of 7 eleven shopping App in Bangkok, Thailand. The study emphasizes word of mouth, repurchase intention, trust, customer attitude towards App, and customer satisfaction.

- (1) To evaluate the influence of trust on customer satisfaction.
- (2) To analyze the influence of trust on attitude towards App.
- (3) To find the influence of trust on word of mouth.
- (4) To test the influence of trust on repurchase intention.
- (5) To evaluate the influence of customer satisfaction and attitude towards App on word of mouth.
- (6) To analyze the influence of customer satisfaction and attitude towards App on repurchase intention.

3. Literature Review

3.1 Theory, Concept and Related Research

The researcher retrieved and analyzed the theoretical framework to draw a conceptual framework. The researcher then designed the research framework to identify the affecting factors of phone App shopping behaviour. Accordingly, the researcher redesigned the conceptual framework based on five research models. The first model was developed by Fang *et al.*, (2011) in “Understanding customers’ satisfaction and repurchase intentions”. The research showed trust positively and significantly affects customer satisfaction and repurchase intention. The second model was developed by Limbu *et al.*, (2012) in “Perceived ethics of online retailers and consumer behavioural intentions - The mediating roles of trust and attitude”. The findings demonstrate to have a significant impact on trust, attitude, and repurchase intention. The results stated that consumers with trust on the website hold a positive attitude towards websites, and are expected to repurchase.

The third research model was developed by Vlachos *et al.*, (2011), in an article titled “Too much of a good thing: Curvilinear effects in the evaluation of services and the mediating role of trust “. The findings corroborated that consumer trust has a positive direct effect on word of mouth. Besides, the fourth research model was developed by Bigne *et al.*, (2005), in a journal titled “Relationship amongst residents’ image, evaluation of the stay, and post-purchase behaviour”. Its results indicate that customer satisfaction has a direct influence on repurchase intention and word of mouth. Moreover, the fifth research was developed by Abedi *et al.*, (2019) in an article titled “Influence of eWOM information on consumers’ behavioral intentions in mobile social networks”. The results display that attitude has a moderate relation between Purchase intention and word of mouth.

3.2 Research Framework

The purpose of this research is to study the factors influencing word of mouth and repurchase intention of 7 eleven phone App shopping behaviour in Bangkok, Thailand. The factors drawn to the study are trust, customer satisfaction, and attitude towards the phone App. The researcher customized the conceptual framework as shown in Figure 1.

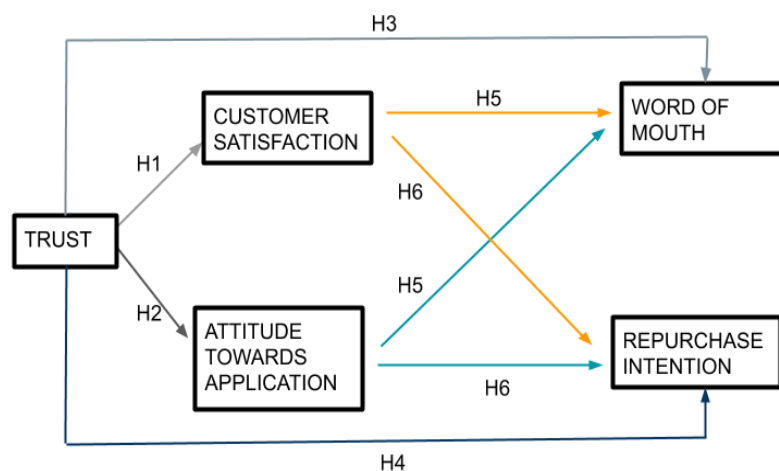


Figure 1 Research Framework

3.3 Research Hypotheses

Based on the conceptual framework, six hypotheses were formed to indicate the association between independent and dependent variables. Each hypothesis was tested to verify the possible significance.

H1: Trust influences customer satisfaction.

H2: Trust influences attitude towards App.

H3: Trust influences word of mouth.

H4: Trust influences Repurchase intention.

H5: Customer satisfaction and attitude towards App influence word of mouth.

H6: Customer satisfaction and attitude towards App influence repurchase intention.

4. Research Methodology

4.1 Research Design

The primary objective of the study is to analyze the customer trust, customer satisfaction, customer attitude towards phone App and discern if they influence word of mouth and repurchase intention of 7 eleven phone App. The researcher applied descriptive research to analyze the characteristics of the population. Griffin *et al.*, (2013) defined descriptive research as to “paint a picture” of any provided situation by who, what, when, where, and how questions.

Besides, the researcher also exercised survey methods. McDaniel *et al.*, (2000) stated that a survey is the research approach in which a researcher generates a questionnaire to obtain facts, opinions, and attitudes of the respondents in terms of inexpensive, quick, efficient, and accurate means. The researcher built the survey in a questionnaire form and dispatched. Similarly, the questionnaires were translated from Thai to English for the convenience of the respondents.

4.2 Population and Sample

Zikmund *et al.*, (2013) stated that the target respondents must be defined so that the proper sources of information can be identified. In accordance with that, the target population of this research includes both males and females who have used 7 eleven phone App for delivery purpose. Depending on the previous studies, the researcher determined the sample size based on managerial judgments. Likewise, Babin *et al.*, (2013) asserted that using a sample size similar to those used in the prior studies outfits the amateur researcher with a comparison with other researchers' judgments. The researcher, therefore, accumulated 5 supporting previous studies to determine the sample size.

4.3 Research Instrument

In this research, questionnaires are used as a research instrument to collect primary data from the respondents. This is to study the word of mouth and repurchase intention of target respondents toward 7 eleven phone delivery App.

4.4 Data Collection

The target population of this research covers both males and females who have used 7 eleven phone App for delivery. 150 questionnaires were dispatched to individuals in Bangkok, whereas 105 questionnaires were valid. The researcher divided the questionnaire into 4 parts; screening, independent variables, dependent variables, and demographic factors to ensure clarity. In order to analyze the screening question, the researcher applied the simple category method. The independent and dependent variable questions are adopted and placed from the previous studies in the form of a five-point Likert scale method. The scale defines different numbers presenting different opinion levels; 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. The respondents were asked about general points such as gender, age, education status, and career for covering demographic questions.

4.5 Data Analysis

After collecting the necessary data, the researcher coded the completed questionnaires (n=105) with statistical software. Statistical software is a unique solution for applications with a fully integrated survey analysis system (Vanishbancha, 2007). The researcher used descriptive and inferential analysis in which Simple Linear Regression (SLR) and Multiple Linear Regression (MLR) were used. All these procedures were conducted using the Statistical software.

5. Research Findings

Descriptive statistics were used to analyze the demographic characteristics of the target population who use 7 eleven phone App for delivery in Bangkok, Thailand. Gender, age, education, and career were used as applicable demographic characteristics. The highest frequency and percentage of the analysis obtained by collecting 105 valid samples are shown in Table 1.

Table 1: Demographic Participant

| Demographic Factors | Characteristics | Frequencies (<i>f</i>) | Percentage % |
|---------------------|-------------------|--------------------------|--------------|
| Gender | Female | 71 | 67.6% |
| Age | 19-30 Years | 98 | 93.3% |
| Education | Bachelor's Degree | 94 | 89.5% |
| Career | Student | 49 | 46.7% |

Table 2: The summary of results hypotheses analysis, using simple and multiple linear regression

| Model Summary | | | | | | |
|--|--|-------------------|----------|-------------------|----------------------------|-------------------|
| Model | | R | R Square | Adjusted R Square | Std. Error of the Estimate | |
| 1 | a.Predictors: (Constant), MEANTRUST | .689 ^a | .474 | .469 | .55731 | |
| 1 | a.Predictors: (Constant), MEANTRUST | .724 ^a | .525 | .520 | .53687 | |
| 1 | a.Predictors: (Constant), MEANTRUST | .692 ^a | .479 | .474 | .55347 | |
| 1 | a. Predictors: (Constant), MEANTRUST | .726 ^a | .527 | .522 | .53098 | |
| 1 | a. Predictors: (Constant), MEANCS, MEANATT | .760 ^a | .577 | .569 | .50134 | |
| 1 | a. Predictors: (Constant), MEANCS, MEANATT | .906 ^a | .820 | .817 | .32899 | |
| ANOVA ^b | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 28.875 | 1 | 28.875 | 92.9678 | .000 ^a |
| | Residual | 31.991 | 103 | .311 | | |
| | Total | 60.865 | 104 | | | |
| a. Predictors: (Constant), MEANTRUST b. Dependent Variable: MEANCS | | | | | | |
| 1 | Regression | 32.749 | 1 | 32.749 | 113.6213 | .000 ^a |
| | Residual | 29.688 | 103 | .288 | | |
| | Total | 62.437 | 104 | | | |
| a. Predictors: (Constant), MEANTRUST b. Dependent Variable: MEANATT | | | | | | |
| 1 | Regression | 29.047 | 1 | 29.047 | 94.8219 | .000 ^a |
| | Residual | 31.552 | 103 | .306 | | |
| | Total | 60.599 | 104 | | | |
| a. Predictors: (Constant), MEANTRUST b. Dependent Variable: MEANWOM | | | | | | |

Table 2: (continue)

| ANOVA ^b | | | | | | |
|---|------------|-----------------------------|------------|---------------------------|---------|-------------------|
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 32.321 | 1 | 32.321 | 114.636 | .000 ^a |
| | Residual | 29.040 | 103 | .282 | | |
| | Total | 61.361 | 104 | | | |
| a. Predictors: (Constant), MEANTRUST | | | | | | |
| b. Dependent Variable: MEANRI | | | | | | |
| 1 | Regression | 34.962 | 2 | 17.481 | 69.551 | .000 ^b |
| | Residual | 25.637 | 102 | .251 | | |
| | Total | 60.599 | 104 | | | |
| a. Predictors: (Constant), MEANATT, MEANCS | | | | | | |
| b. Dependent Variable: MEANWOM | | | | | | |
| 1 | Regression | 50.321 | 2 | 25.161 | 232.465 | .000 ^b |
| | Residual | 11.040 | 102 | .108 | | |
| | Total | 61.361 | 104 | | | |
| a. Predictors: (Constant), MEANATT, MEANCS | | | | | | |
| b. Dependent Variable: MEANRI | | | | | | |
| | | | | | | |
| Coefficients ^a | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | .544 | .338 | | 1.611 | .110 |
| | TRUST | .840 | .087 | .689 | 9.642 | .000 |
| a. Dependent Variable: MEANCS | | | | | | |
| 1 | (Constant) | .423 | .325 | | 1.301 | .196 |
| | TRUST | .895 | .084 | .724 | 10.659 | .000 |
| a. Dependent Variable: MEANATT | | | | | | |
| 1 | (Constant) | .467 | .336 | | 1.393 | .167 |
| | TRUST | .843 | .087 | .692 | 9.738 | .000 |
| a. Dependent Variable: MEANWOM | | | | | | |
| 1 | (Constant) | .367 | .322 | | 1.139 | .257 |
| | TRUST | .889 | .083 | .726 | 10.707 | .000 |
| a. Dependent Variable: MEANRI | | | | | | |

Table 2: (continue)

| | | Coefficients ^a | | | | |
|--------------------------------|------------|-----------------------------|------------|---------------------------|-------|------|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | .744 | .256 | | 2.907 | .004 |
| | CS | .222 | .131 | .223 | 1.690 | .094 |
| | ATT | .549 | .130 | .558 | 4.232 | .000 |
| a. Dependent Variable: MEANWOM | | | | | | |
| 1 | (Constant) | .225 | .168 | | 1.340 | .183 |
| | CS | .623 | .085 | .628 | 7.310 | .000 |
| | ATT | .305 | .086 | .304 | 3.540 | .001 |
| a. Dependent Variable: MEANRI | | | | | | |

6. Discussion

Based on the descriptive analysis of the demographic factors from 105 respondents collected from the survey, most of them were females aged between 19-30 years old. Most of the respondents' current status is students pursuing bachelor's degree studies. From the overall analysis, the researcher could conclude that most of the students are frequent App users. From the perspective of 7eleven, they should consider being more courteous to this group. They need to focus on trying to understand the needs of these customers to make them satisfied, spread their positive word, and keep a positive attitude towards the App. Students have the highest potential in terms of purchasing power as most of the students live alone for their studies, for instance, at dorms, apartments, hostels, etc. Likewise, 7 eleven or competitors should intensify their marketing strategies targeting them in internet marketing.

Hypothesis one (H1) found that trust positively influences customer satisfaction in terms of 7 eleven phone delivery App. In Table 2, the result from the Model Summary indicated that the correlation coefficient (R) is equal to .689 having strong statistical significance influencing customer satisfaction. In addition, the coefficient of determination is equal to .474 referring to customer satisfaction to increase or decrease by 47.4%. Moreover, the result of the ANOVA (Analysis of Variance) table displayed that the significance is equal to .000, meaning that trust remarkably influences customer satisfaction.

In concern of the results obtained by hypothesis two (H2), the result showcased that the correlation coefficient (R) is equal to .724 forming strong statistical significance influencing customer attitude towards App. Also, the coefficient of determination is equal to .520 stating attitude to increase or decrease by 52%. In addition, the result from the ANOVA table indicates that the significance level is equal to .000, construing that trust significantly influences attitude towards 7 eleven phone App. On the other side, referring to results from hypothesis three (H3) showed that the correlation coefficient is .692 indicating strong statistical significance on influencing word of mouth. The results also display that the correlation of determination is .479 denoting word

of mouth to increase or decrease by 47%. The ANOVA table resulted in stating that trust positively influences word of mouth.

Hypothesis four (H4) result stated that correlation coefficient being .726 assert that trust notably influences repurchase intention. Additionally, the ANOVA table represents the significance of .000 as trust measurably affecting repurchase intention. Based on the results obtained by hypothesis five (H5), customer satisfaction and attitude towards App positively affect word of mouth with the correlation coefficient being .760. The outcome supports the ANOVA table that attitude towards 7 eleven phone App highly affects word of mouth with .000 significance level. Whereas, customer satisfaction is not significant to word of mouth. Hypothesis six (H6) results indicated that the correlation coefficient of .906 positively affects repurchase intention. Similarly, the ANOVA table showcases that customer satisfaction and attitude towards 7 eleven phone App affect repurchase intention with .000 significance level.

7. Suggestion

E-commerce is rapidly growing worldwide, especially in Thailand. Almost 70% of the Thai population use the internet on their mobile phones. It is accepted that consumers tend to depend on peer reviews online as the e-word of mouth is prompt. It is opportunistic for Thai online businesses to expand their market. On the other hand, Thai online businesses are growing like mushrooms causing extremely competitive situations. 7 eleven phone App, being one of the top leading delivery service App in Thailand should reach out to gain more competitive advantages in order to maintain and improve their existing customers. Based on the findings of this research, the phone App servers could better design appropriate marketing strategies to keep customers entertained.

7 eleven App server or other related delivery App servers must acknowledge customers' responses and feedback when they face issues with the delivered products to build customer trust and satisfaction. 7 eleven must provide appropriate information about the product since the customers can't see or touch the product. Product description, therefore, is the most notable factor to consider on customers' purchasing attitude. They must remove any vague and unclear information to avoid misunderstanding. Meaning that, the App administrators must find easy product names with correct spellings for the customers to have easy access to products via App. A language choosing option could predominantly add value for convenience. In addition, the App administrators should use multiple ways to present the products they want to promote including three major factors; features, attributes, and benefits. Thereby, an appropriate introduction and recommendation of products are quite significant in building a trustworthy relationship with customers to gain satisfaction as well as a positive attitude towards the App. Thereafter, 7 eleven could definitely increase their online presence with online rewards to entertain their existing customers leading to positive word of mouth and intention to repurchase.

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DEVELOPMENT OF A NETWORK MANAGEMENT MODEL FOR ELDERLY CLUBS

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ABSTRACT

The research aims to 1) to form a network of seniors in Bangkok. 2) to study the management of the network of the Elderly in Bangkok and 3) lessons learned and success brings a managed network seniors in Bangkok. The population in this research, including the club president or representative Elderly Club 30, a total of 54 instruments wear used to collect data from a questionnaire. It is a scale estimates by the concept of Kirtland (Likert Five's Rating scale) statistics used in data analysis were mean, standard deviation.

The study indicated that

1. To found respondents that the majority were female (83.33%) wear younger than 69 years (81.48%) and had a Bachelor's degree (59.25%), marital status (59.26%) and unemployed (90.74 per cent) respectively.

2. To develop a network of management clubs seniors Consider the overall level. Sorted by average, in descending order Which is as follows: Relationship between formal and informal. Exchange resources, Exchange information and co-operation, formal and informal, were at a the same level

Keywords: Development , Elderly Clubs

1. Introduction

The National Statistical Office states that Thailand has been classified as an aging society since 1995, that is, at that time, Thailand had 10.4 percent of the population. The Office of the National Economic and Social Development Board has forecasted that the Thai population structure is transitioning to an aging society that Thailand will have one-fourth of the population to be a complete aging society between 2008 and 2028. Entering an aging society is a major challenge in economic and social development. In the past, the state realized the importance of the elderly in the development plan, the National Economic and Social Development Plan, as well as the national research policies and strategies, and in practice in accordance with the government's workload. It has transformed policies and strategies into action in response to the problems and needs of the elderly. By taking measures for action based on human rights concepts and UN policies.

Currently, the promotion and development of the elderly, the part that has not been successful, is the elderly organization, especially the elderly club. Still lacking strength and not having regular activities Including the elderly who are members of the audience Did not regularly participate in the club's activities either

As a result of this problem, there is a need to accelerate action with an good plan in order to support the rate of transformation into an aging society. This makes the researcher interested in studying the development of a strong elderly club management model.

2. Research Objective

- (1) To study the model of network of elderly in Bangkok
- (2) To study the management of elderly networks in Bangkok

3. Research Framework

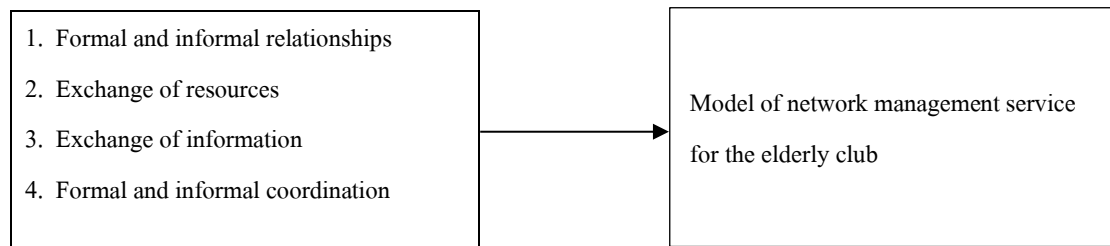


Figure1 Research Framework

4. Research Methodology

4.1 Research Design

A qualitative research method was used in this study, starting with a review of documents, ideas and theories, and performing a specific sampling. Only for the senior management Operator group Representatives of the Elderly Network Club Club in Bangkok How to conduct an in-depth interview Three- wire inspection method Data analysis and writing research reports Key informants were:

1. Chairman of the Association of the Elderly Council of Thailand
2. Chairman of the Federation of Thai Elderly Association of Bangkok
3. President of the Elderly Club Elderly health group Bureau of Health Promotion, Department of Health, Ministry of Public Health
4. Chairman of the Pundit Association for Older Persons, Bangkok
5. The Elderly Club of Bangkok Considered from the number of members from descending to 5 clubs
6. Director of the Elderly Empowerment Group Office of Welfare Promotion and Protection of Children, Youth, the Disadvantaged and the Elderly Ministry of Social Development and Human Security

4.2 Population and Sample

The population used in this research was the club president or representative of the elderly comprising 54 people.

4.3 Research Instrument

The study authors define the scope and question in questionnaire construction, which was divided into 2 parts as given below:

Part 1 was the personal characteristics of the respondents, ie gender, age, education level, marital status, and occupation. Which is a question with answers to choose from Respondents can choose the answers that have been set.

Part 2 was information on the development of the elderly club management model. It was a closed-end questionnaire. Which had a question with answers to choose from Respondents could choose the answers that had been set.

4.4 Data Collection

1. The student collected the data by himself. To collect information by collecting data by distributing questionnaires and collecting questionnaires from respondents

2. Took the questionnaire to check its accuracy and completeness.

4.5 Data Analysis

The statistics used for data analysis are: mean , percentage , standard deviation

5. Research Findings

1. Most of the respondents were female (83.33 percent), under 69 years old (81.48 percent), had a bachelor's degree. (59.25 percent), marital status (59.26 percent) and jobless (Representing 90.74 percent), respectively

2. The results of analysis of the development of management model of the elderly club are presented in the overall table as follows:

Table 1 The development of management model for the elderly club network as a whole

| Management | \bar{X} | S.D. | results |
|--|-----------|-------|----------|
| 1. Formal and informal relationships | 4.196 | 0.755 | The most |
| 2. Exchange of resources | 3.993 | 0.791 | most |
| 3. There is an exchange of information | 3.975 | 0.799 | most |
| 4. Formal and informal coordination | 3.791 | 0.858 | most |

From Table 1, it was found that the development of management model for the elderly club Considering the overall is at a high level Sorted out by the descending order of mean as follows: Formal and informal relationships There is an exchange of resources and an exchange of information. And there is a formal and informal coordination respectively

Table 2 Formal and informal relationships

| Formal and informal relationships | \bar{X} | S.D. | results |
|--|-----------|-------|----------|
| 1. There is an activity | 4.667 | 0.566 | The most |
| 2. There is a monthly meeting | 3.862 | 0.691 | most |
| 3. There is a support of money or items to the club according to the ability | 4.086 | 0.760 | most |
| total | 4.196 | 0.755 | most |

From Table 2, it was found that the development of the management model of the elderly club in relation to formal and informal relationships. Considering overall is at a high level Sorted in descending order of mean as follows: There is an activity There is a support of money or items to the club according to the ability And have monthly perforations in order

Table 3 Exchange of resources

| Exchange of resources | \bar{X} | S.D. | results |
|--|-----------|-------|---------|
| 1. There is a meeting and exchange of knowledge | 4.044 | 0.796 | most |
| 2. Help each other in terms of both physical and mental health | 4.095 | 0.761 | most |
| 3. Have continued health promotion activities for at least 1/month | 3.888 | 0.764 | most |
| total | 3.993 | 0.791 | most |

From Table 3, it was found that there was an exchange of resources. Considering overall is at a high level Sorted in descending order of mean as follows: There is a meeting and exchange of knowledge. They help each other in terms of both physical and mental health. And having continued health promotion activities at least 1 per month, respectively

Table 4 There is an exchange of information

| There is an exchange of information | \bar{X} | S.D. | results |
|-------------------------------------|-----------|-------|---------|
| 1. Have Public Relations Programmer | 3.827 | 0.759 | most |
| 2. There are various news releases | 3.981 | 0.781 | most |
| total | 3.975 | 0.799 | most |

From Table 4, it was found that the exchange of information considering overall is at a high level sorted in descending order of mean as follows: Different news is published and there are Public Relationships respectively

Table 5 Formal and informal coordination

| Formal and informal coordination | \bar{X} | S.D. | results |
|--|-----------|-------|---------|
| 1. There are regulations for the elderly club | 3.546 | 0.939 | most |
| 2. The annual event is planned | 3.860 | 0.857 | most |
| 3. Staff who have knowledge of making work plans are provided with knowledge | 3.772 | 0.810 | |
| total | 3.791 | 0.858 | most |

From Table 6, it was found that formal and informal coordination overall is at a high level Sorted in descending order of mean as follows: The annual event is planned , staff who have knowledge of making work plans are provided knowledge and there are regulations for the elderly club

6. Discussion

Development of the Diabetes Association Management Model Overall is at a high level. Which is consistent with the research of Chon Nipat Prasertphan (2015) Did research on Activities and results of activities of the elderly club in urban communities: The case study found that the majority of elderly club members (65.9%) were female with an average age of 67.4 years. The elderly club consists of 2 main activities. Including social activities (Monthly meeting Important day events) and health activities (Health check Exercise Home visit) Results of activities of the elderly club almost all members (95.2%) They were satisfied with the activities of the elderly club at a high level. In terms of health status, 68.3% were found. To have a high blood sugar level After fasting 80 percent had high systolic blood pressure And about half of the samples Had a body mass index of 61% over the threshold Have normal diastolic blood pressure Almost half (43.9%) Recognize that well-being, screening for depression Found that most (61 %) No depression Further testing in the risk group found that half had no symptoms of depression or had very mild depression, most (70.7%). Have moderate quality of life as a whole The success of Conduct activities It arises from the cooperation of members of the elderly club, community and health team. For problems and obstacles of participating in activities It is a Problem Concerning the health of the elderly. Environmental management and materials and equipment Suggestions for the activities of the elderly club The followings are as follows: 1) The assessment of health conditions in both physical aspects such as the assessment of blood glucose, blood pressure and body mass index 2) continuous health promotion of the elderly, both physical and mental health; And 4) In-depth study of depression among elderly people in the community, consistent with the research of the Indochina Intersection Institute Development Institute (2002: 72). Having done research on the establishment of an elderly club, it is important to ensure the existence of the club, whether the group can survive or not depends on the purpose of the group

7. Suggestion

Suggestions for further research

1. This research study is to study the development of the elderly club management model. This information can be applied in research development for the management of the elderly club.

2. A research project to develop knowledge should be developed to promote the development of a management model for the elderly club on a continuous basis and in line with the community context.

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THE INFLUENCE OF TRAVEL COGNITION AND MOTIVATION ON THEIR TRAVEL INTENTION TO THAILAND AMONG CHINESE TOURISTS AFTER WATCHING THAI TV SERIES “BUPPESANNIVAS” (LOVE DESTINY)

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ABSTRACT

This survey examined the influence of Chinese tourists' travel cognition and motivation on their travel intention to Thailand after watching Thai TV series “Buppesannivas” (Love Destiny). The study involved 200 participants, selected by purposive sampling and snowball sampling. The samples were Chinese audiences between 15 and 45 years old who have watched the Thai TV series “Buppesannivas” (Love Destiny) from 2018-2020. Hypotheses were analyzed using Multiple Regression with the significance is 0.05 and found the following results: Firstly, Chinese tourists perceived natural state as the most influential factor influenced their travel motivation, followed by comfort and security, cultural distance, interest and adventure, resort atmosphere and climate, inexpensiveness, and lack of language barrier. Tourist facilitation was negative predictor of their travel motivation. Secondly, Chinese tourist perceived inexpensiveness as the most influential factor that influenced their travel intention, followed by comfort and security, natural state, lack of language barrier, and cultural distance. Resort atmosphere and climate, interest and adventure, and tourist facilities were negative predictors of their travel intention. Finally, Chinese tourists perceived cultural enrichment as the most influential factor that influenced their travel intention, followed by ego- enhancement, fulfilling prestige, and novelty and knowledge- seeking. Socialization, rest, and, relaxation were negative predictors of their travel intention. The study will increase the knowledge about the role of TV series as a publicity tool to promote Thailand's tourism overseas which will stimulate Tourism Authority of Thailand to cooperate with TV and film industry to produce more induced-tourism TV series in the future to promote travel cognition and motivation to travel to Thailand.

Keywords: Thai TV series “Buppesannivas” (Love Destiny), travel cognition, travel motivation, travel intention, Chinese tourists

1. Introduction

According to previous research, film and TV works have a certain impact on the tourist destinations and tourism activities chosen by the audience, thus producing the film and television tourism (Mei, 2010). Tourism motivation is influenced by the situation of the popularity of the film and TV drama (Ling & Wu, 2010). According to a report by the National Economic and Social Development Commission of Thailand (NESDC), the number of foreign tourists visiting Thailand has increased to 39.8 million in 2019, it also shown the first major tourist imported country is China (NESDC, 2020). Kamolthamwong (2015) pointed out that China's outbound tourism originated in

1998, Thailand is the first destination. Chen (2018) mentioned that Chinese tourists are traveling to Thailand, because of Thailand's unique location and beautiful natural scenery, and more importantly, Chinese tourists are influenced by Thai TV series.

Thai TV series "Buppesannivas" (Love Destiny) was selected as a case study. Super Poll surveyed the TV series "Buppesannivas" (Love Destiny) in March 2018, showing that 80.8% of Thai people said they were watching this TV series (Chen, 2018). The popularity of this Thai TV series in Thailand triggered a craze for locals to travel to locations where the series was filmed (Jia, 2018). Talsatit (2018) said that "Buppesannivas" (Love Destiny) is not only popular in Thailand, but also popular in ASEAN countries, China, and East Asia. Chinese audiences were watching through the Internet with Chinese subtitles on video streaming websites (Talsatit, 2018). When the first intimate contact between the male and female characters in the TV series caused Chinese audiences pushed the keyword "终于亲上了 (finally kissed)" to the headlines on Weibo (China's micro-blogging social platform) (Shi, 2018). With the increasing popularity of this Thai TV drama, it is necessary to study its social impact, especially in the field of film and television.

This study aimed to examine the determinants that affect tourists travel to Thailand. It is also challenging to study the media's influence on tourists' perceptions, trying to find out whether Thai TV series will affect Chinese tourists' decision to visit Thailand. At present, research on the impact of after watching "Buppesannivas" (Love Destiny) on the audience's travel cognition and travel motivation are the gaps of study. So, this study will enrich the results of previous studies on film and TV tourism and to understand the impact of Chinese tourists on their travel behavior after having watched this TV series. The finding unveiled the predictors of their travel intention of participants who have travel experience in Thailand. The research helps promote Thai TV series production industry to better use the media to spread Thai culture and enrich Thailand tourism resources. Understanding the tourist behaviors and travel motives of Chinese tourists will have a constructive benefit in promoting the Thai tourism industry.

2. Research Objectives

1. To examine the influence of cognition about tourism in Thailand on Chinese tourists' motivations to travel to Thailand after watching the Thai TV series "Buppesannivas" (Love Destiny).
2. To examine the influence of cognition about tourism in Thailand on their intention to travel to Thailand after watching Thai TV series "Buppesannivas" (Love Destiny).
3. To explore whether travel cognition and motivations about Thailand are significant predictors of Chinese tourists' intention to travel to Thailand after watching Thai TV series "Buppesannivas" (Love Destiny).

3. Literature Review

3.1 Theory, Concept and Related Research

3.1.1 Assumptions of Use and Gratifications Theory (UGT)

Jin (2013) found that in the process of the spread of Korean drama, producers attach great importance to Korean culture, often in the series to inject a large number of Korean characteristics of the content. Producers are trying to get audiences to notice these Korean features while watching the drama and even try to bring broader economic benefits. This study examined the influence of travel cognition and motivation to travel to Thailand on their intention to travel to Thailand after they have watched the Thai TV series "Buppesannivas" (Love Destiny), because they have gained tourist gaze after exposing to the contents in TV series which was shaped by their personal background and life experience (Li and others, 2012).

3.1.2 Concept of Tourist Gaze

Li and others (2012) defined tourist gaze is different from visual viewing in people's perception of the world is influenced by personal background and their life experience. Urry & Jonas (2013) pointed out that gaze is the most fundamental visual feature of the travel experience, but it is not limited to the visual experience, it can also be expressed as behavior. The aim of this study is to examine how to turn the tourists' gaze into the process of travel cognition, travel motivation, and tourism behavior after watched the Thai TV series "Buppessannivas" (Love Destiny).

3.1.3 Tourist Behavior Theory

Chen (2015) analyzed the internal factors affecting tourists' behavior. The external factors that affect the behavior of tourists include the attractiveness of the tourist geographical environment, the new attraction of tourist destination, and the cultural or political factors of the local tourism. This study examined the impact of Thai TV series "Buppessannivas" (Love Destiny) on Chinese audiences travel cognition, travel motivation, travel intention, and their travel behaviors. And investigate what factors affect their travel intention to Thailand.

3.2 Research Framework

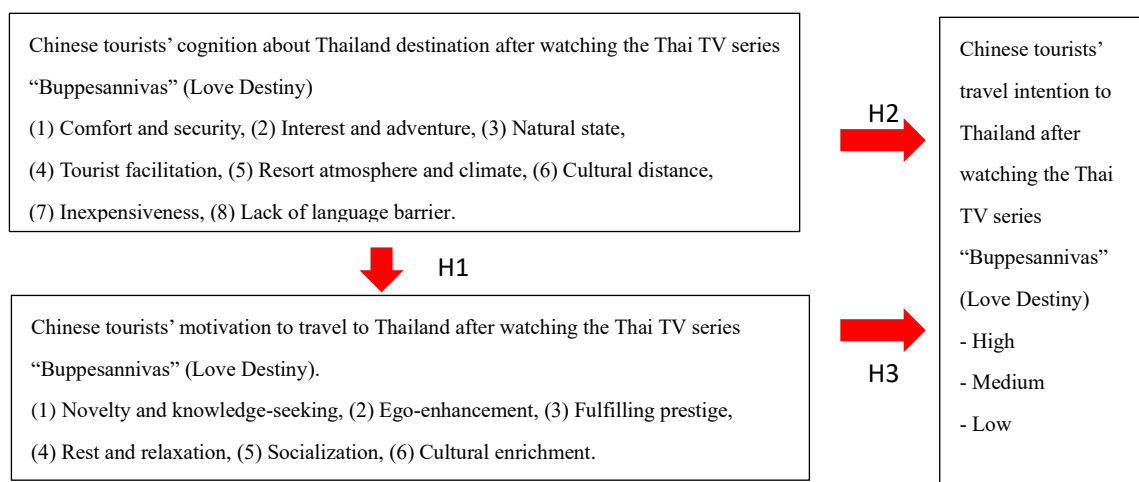


Figure 1 Research Framework

3.3 Research Hypotheses

Hypothesis 1: After the Chinese tourists have watched the Thai TV series "Buppessannivas" (Love Destiny), their travel cognition significantly influences their travel motivation to Thailand.

Hypothesis 2: After the Chinese tourists have watched the Thai TV series "Buppessannivas" (Love Destiny), their travel cognition significantly influences their travel intention to Thailand.

Hypothesis 3: After the Chinese tourists have watched the Thai TV series "Buppessannivas" (Love Destiny), their travel motivation significantly influences their travel intention to Thailand.

4. Research Methodology

4.1 Research Design

This is an online survey research focused on the process of producing travel cognition and travel motivation of Chinese tourists in Thai TV series "Buppessannivas" (Love Destiny) and studied the relationship between TV series and audience' travel intention. Also, the study also examined how this TV series can make the Chinese tourists formed Chinese tourists' travel cognition and explored how their travel cognition about Thailand tourism affect Chinese tourists' travel motivation and travel intention. The online survey was sent to respondent via online platforms including WeChat, Weibo, and Baidu Tieba.

4.2 Population and Sample

Ge (2019) has publicly stated that 15 to 45 years old female are the main Chinese audience of Thai drama. As a result, the study participants were male and female online users between the ages of 15 and 45. 200 participants selected by purposive sampling and snowball sampling because the study required questionnaires from people who had watched the Thai TV series “Buppessannivas” (Love Destiny) via online platforms. And, the researcher also requested respondents to recommend friends who they knew that have watched the TV series as well.

4.3 Research Instrument

Part I asked about the participants’ background information, including age, gender, education, occupation, monthly income, travel needs, media channel, and have watched the Thai TV series “Buppessannivas” (Love Destiny) or not. Part II inquired about respondents’ travel cognition after watched the Thai TV series “Buppessannivas” (Love Destiny). Basically, the scales of cognitive image were derived from Echtner and Ritchie (1993), which summarized the attributes commonly used by previous researchers to measure destination images. The scale has 24 five-likert scale questions. Part III asked about Chinese tourists’ travel motivation about Thailand after watching the Thai TV series “Buppessannivas” (Love Destiny). This part used the scale of motivation factors of European senior tourists measured by Seyanont (2017) to investigate the travel motivation of Chinese audience after watching Thai TV series “Buppessannivas” (Love Destiny). The scale has 18 five-likert scale questions. Part IV asked about Chinese tourists’ travel intention about Thailand after watched the Thai TV series “Buppessannivas” (Love Destiny). This part used the scale suggested by Qin (2019), which has 6 five-likert scale questions.

4.4 Data Collection

The questionnaire was distributed on social networking sites to collect data because the study involved cross-regional in China. Online platforms included WeChat, Weibo, and Baidu Tieba. The questionnaire was translated into the Chinese version to make sure that participants understand and easy to answer. The data collection was conducted from 1 June, 2020 to 15 June, 2020. All questions had reliability higher than 0.70.

4.5 Data Analysis

Regression analysis was used to analyze three hypotheses.

For hypothesis 1, the independent variable is Chinese tourists’ cognition about tourism in Thailand after watching the Thai TV series “Buppessannivas” (Love Destiny) and dependent variable is Chinese tourists’ travel motivation to Thailand after watching the Thai TV series “Buppessannivas” (Love Destiny).

For hypothesis 2, the independent variable is Chinese tourists’ travel motivation to Thailand after watching the Thai TV series “Buppessannivas” (Love Destiny) and dependent variable is Chinese tourists’ travel intention to Thailand after watching the Thai TV series “Buppessannivas” (Love Destiny).

For hypothesis 3, the independent variable is Chinese tourists’ travel motivation to Thailand after watching the Thai TV series “Buppessannivas” (Love Destiny) and dependent variable is Chinese tourists’ travel intention to Thailand after watching the Thai TV series “Buppessannivas” (Love Destiny).

5. Research Findings

5.1 Summary of Descriptive Results

The descriptive findings revealed that respondents’ travel cognition about Thailand agreed with all travel cognition statements and had high travel cognition about Thailand (Mean= 4.14, SD= 0.794) after watching the Thai TV series “Buppessannivas” (Love Destiny). The highest cognition were natural state (Mean= 4.41, SD= 0.761) and tourist facilitation (Mean= 4.41, SD= 0.752), followed by cultural distance (Mean= 4.38, SD= 0.791), interest and adventure (Mean= 4.35, SD= 0.7841), resort atmosphere and climate (Mean= 4.28, SD= 0.8051), comfort and security (Mean= 4.24, SD= 0.810), inexpensiveness (Mean= 3.99, SD= 0.879), and lack of language barrier (Mean= 3.82, SD= 0.9511), respectively.

The descriptive findings revealed that the respondents' travel motivation about Thailand agreed with all travel motivation statements and had high travel motivation about Thailand (Mean= 4.06, SD= 0.811) after watching the Thai TV series "Buppessannivas" (Love Destiny). The highest motivation was ego- enhancement (Mean= 4.34, SD= 0.805), followed by fulfilling prestige (Mean= 4.32, SD= 0.785), rest and relaxation (Mean= 4.29, SD= 0.848), socialization (Mean= 4.25, SD= 0.772), novelty and knowledge-seeking (Mean= 4.15, SD= 0.846), and cultural enrichment (Mean= 4.15, SD= 0.832).

The descriptive findings revealed that the respondents travel intention about Thailand agreed with all travel intention statements and had high travel intention about Thailand (Mean= 3.93, SD= 0.900) after watching the Thai TV series "Buppessannivas" (Love Destiny).

5.2 Summary of Hypothesis Testing

Hypothesis 1 was supported. As shown in Table 1, the findings revealed that Chinese tourists' cognition about tourism in Thailand can significantly predict their travel motivation to Thailand after watched the Thai TV series "Buppessannivas" (Love Destiny) at the rate of 65.1% which is considered to be medium prediction (Adjusted $R^2 = .651$, $p < .05$). The statistic revealed that all key constructs can significantly influenced their travel motivation ($F_{(8,191)} = 47.375^*$, $p < 0.05$). The results found that Chinese tourists perceived natural state (Beta = .235*, $p < .05$) as the most influential factor, followed by comfort and security (Beta = .188*, $p < .05$), cultural distance (Beta = .154*, $p < .05$), interest and adventure (Beta = .139*, $p < .05$), resort atmosphere and climate (Beta = .139*, $p < .05$), inexpensiveness (Beta = .072*, $p < .05$), and lack of language barrier (Beta = .070*, $p < .05$), respectively. However, the results found that tourist facilities is a negative predictor of their travel motivation (Beta = -.021*, $p < .05$).

Table 1: Regression analysis of Chinese tourists' cognition about tourism in Thailand and travel motivation to Thailand

| Coefficients ^a | | | | | |
|---|-----------------------------|------------|---------------------------|-------|------|
| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| | B | Std. Error | Beta | | |
| (Constant) | .095 | .211 | | .449 | .654 |
| Comfort and security | .188 | .082 | .188 | 2.297 | .023 |
| Interest and adventure | .144 | .105 | .139 | 1.363 | .174 |
| Natural state | .250 | .132 | .235 | 1.888 | .060 |
| Tourist facilitation | -.023 | .121 | -.021 | -.187 | .852 |
| Resort atmosphere and climate | .084 | .100 | .083 | .836 | .404 |
| Cultural distance | .158 | .084 | .154 | 1.886 | .061 |
| Inexpensiveness | .066 | .084 | .072 | .792 | .429 |
| Lack of language barrier | .060 | .070 | .070 | .853 | .395 |
| a. Predictors: (Constant), comfort and security, interest and adventure, natural state, tourist facilitation, resort atmosphere and climate, cultural distance, inexpensiveness, lack of language barrier | | | | | |
| b. Dependent Variable: Travel Motivation | | | | | |
| c. Adjusted R Square = .651, $p < .05$, $F_{(8,191)} = 47.375^*$, $p^* < 0.05$. | | | | | |

Hypothesis 2 was supported. As shown in Table 2, the findings revealed that Chinese tourists' cognition about tourism in Thailand significantly predicted their travel intention to Thailand after watching the Thai TV series "Buppesannivas" (Love Destiny) at the rate of 62.3% which is considered to be medium prediction ($\text{Adjusted } R^2 = .623^*, p < .05$). The statistic revealed that all key constructs of travel cognition significantly influenced their travel intention ($F_{(8,191)} = 42.153^*, p < 0.05$). The results found that Chinese tourists perceived inexpensiveness ($\text{Beta} = .555^*, p < .05$) as the most influential factor, followed by comfort and security ($\text{Beta} = .224^*, p < .05$), natural state ($\text{Beta} = .128^*, p < .05$), lack of language barrier ($\text{Beta} = .120^*, p < .05$), and cultural distance ($\text{Beta} = .014^*, p < .05$), respectively. However, the results found that resort atmosphere and climate ($\text{Beta} = -.021^*, p < .05$), interest and adventure ($\text{Beta} = -.043^*, p < .05$), and tourist facilities ($\text{Beta} = -.122^*, p < .05$), are negative predictors of their travel intention.

Table 2: Regression analysis of Chinese tourists' cognition about tourism in Thailand and travel intention to Thailand after watching Thai TV series "Buppesannivas" (Love Destiny)

| Coefficients ^a | | | | | | |
|---|-------------------------------|-----------------------------|------------|---------------------------|--------|------|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | .405 | .243 | | 1.663 | .098 |
| | Comfort and security | .249 | .094 | .224 | 2.636 | .009 |
| | Interest and adventure | -.050 | .122 | -.043 | -.409 | .683 |
| | Natural state | .151 | .153 | .128 | .990 | .323 |
| | Tourist facilitation | -.147 | .139 | -.122 | -1.054 | .293 |
| | Resort atmosphere and climate | -.024 | .115 | -.021 | -.208 | .835 |
| | Cultural distance | .016 | .097 | .014 | .164 | .870 |
| | Inexpensiveness | .569 | .097 | .555 | 5.889 | .000 |
| | Lack of language barrier | .114 | .081 | .120 | 1.405 | .162 |
| a. Predictors: (Constant), comfort and security, interest and adventure, natural state, tourist facilitation, resort atmosphere and climate, cultural distance, inexpensiveness, lack of language barrier | | | | | | |
| b. Dependent Variable: Travel Intention | | | | | | |
| c. Adjusted R Square = .623**, $p < 0.05$, $F_{(8,191)} = 42.153^*, p < 0.05$. | | | | | | |

Hypothesis 3 was supported. As shown in Table 3, the findings revealed that Chinese tourists' motivation about tourism in Thailand significantly predicted their travel intention to Thailand after watching the Thai TV series "Buppesannivas" (Love Destiny) at the rate of 53% which is considered to be medium prediction ($\text{Adjusted } R^2 = .530, p < .05$). The statistic revealed that all key constructs of travel motivation significantly influenced their travel intention. ($F_{(6,193)} = 38.390^*, p < 0.05$). The results found that Chinese tourist perceived cultural enrichment ($\text{Beta} = .404^*, p < .05$) as the most influential factor, followed by ego-enhancement ($\text{Beta} = .353^*, p < .05$), fulfilling prestige ($\text{Beta} = .139^*, p < .05$), and novelty and knowledge-seeking ($\text{Beta} = .050^*, p < .05$), respectively. However, the results found that socialization ($\text{Beta} = -.050^*, p < .05$), rest and relaxation ($\text{Beta} = -.110^*, p < .05$), are negative predictors of their travel intention.

Table 3: Regression analysis of Chinese tourists' motivation about tourism in Thailand and the travel intention to Thailand after viewing the Thai TV series "Buppesannivas" (Love Destiny)

| Coefficients ^a | | | | | | |
|---|----------------------------|-----------------------------|------------|---------------------------|--------|------|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | .227 | .261 | | .870 | .386 |
| | Novelty/ Knowledge-Seeking | .053 | .096 | .050 | .550 | .583 |
| | Ego-Enhancement | .395 | .107 | .353 | 3.679 | .000 |
| | Fulfilling Prestige | .160 | .141 | .139 | 1.133 | .259 |
| | Rest/Relaxation | -.117 | .097 | -.110 | -1.201 | .231 |
| | Socialization | -.058 | .166 | -.050 | -.350 | .726 |
| | Cultural Enrichment | .442 | .138 | .404 | 3.210 | .002 |
| a. Predictors: (Constant), novelty and knowledge-seeking, ego-enhancement, fulfilling prestige, rest and relaxation, socialization, cultural enrichment | | | | | | |
| b. Dependent Variable: Travel Intention | | | | | | |
| c. Adjusted R Square = .530, p<0.05, F = 38.390, p, 0.05 | | | | | | |

6. Discussion

All research hypotheses proposed in this study were supported. The findings found that watching TV series can affect the audience's travel cognition and travel motivation of the tourist destination image. The results suggested that the majority of the respondents gained the tourist gaze or positive experience watching the Thai TV series, which formed their travel cognition about Thailand. The TV series formed the tourist gaze and stimulated the Chinese tourists' interest in Thailand after they saw the scenery and natural state presented in the Thai TV series "Buppesannivas" (Love Destiny). Hypothesis 1 results showed that this TV series well presented the unique natural scenery of Thailand to the Chinese audience, and helped the Chinese tourists to form the cognition of Thailand. However, tourist facilitation was the negative predictor of their travel motivation. This result is determined by the plot and background of this Thai TV series, because it presented scenes from ancient Thailand, which did not intensify or show the travel facilities available in contemporary society in Thailand. This is why the factor of tourism facilities has not been able to have a positive impact on the motivation of Chinese tourists to travel to Thailand.

Hypothesis 2 results suggested that the Chinese tourists perceived inexpensiveness as the most influential factor influences their travel intention. Since the TV series takes place in ancient Thailand, the Chinese audience thought the cost of life in Thailand is not expensive. Some participants who have experience in Thailand thought that travelling in Thailand is cheaper than other destinations. In addition, after watching the TV series, Chinese tourists had a significant cognition of Thailand in relations to comfort and security, natural state, lack of language barrier, and cultural distance. However, the reason why resort atmosphere and climate, interest and adventure, and tourist facilities were negative predictors of their travel intention was because this Thai TV series took place in the time of King Narai. Therefore, the TV series cannot present modern facilities in the TV series. Hence, abstinence of these modern facilities made Chinese tourists had less motivated for tourist facilities, resort atmosphere and adventure activities after watching the TV series.

Hypothesis 3 results suggested that the Chinese tourist perceived cultural enrichment as the most influential factor influences their travel intention after watching the Thai TV series. They believed that understanding

Thai culture is the most desirable part of their trip to Thailand. Experiencing the lives of local people and making local friends can enrich their travel experience and it is also the main motivation for them to travel to Thailand. This showed that the choice of TV series theme and story affects the audience different travel motivations. Since this TV series narrated the story of the ancient Kingdom of Siam, more of the information transmitted is traditional Thai culture and customs. It is necessary to enrich the types of film and TV works, and different angles and levels have different impact on the the audiences' travel motivation and intention. For Chinese tourists, it can help them understand Thai cultural traditions and customs and satisfy their curiosity. The findings supported the assumption of the Uses and Gratifications Theory which posited that as long as the media can meet the needs of the audience, the audience will become more dependent on the media (Shintaro & Morikazu, 2016).

The findings shown that after watching Thai TV series "Buppesannivas" (Love Destiny), Chinese tourists had high intention to travel to Thailand, and they will share and recommend Thai tourism to their friends and family. They are willing to visit Thailand and revisit to Thailand in the future, even if the cost is higher than other destinations, because they had formed tourist gaze which shaped their cognition and motivation to travel to Thailand, generating Thailand as their travel preference and favorite destination.

7. Suggestions

(1) The Tourism Authority of Thailand can strengthen the contact and cooperation with the TV series production industry. Tourism destinations are endowed with new cultural connotations through the presentation of TV series, allowing overseas audiences to develop some new understandings of tourism destinations in Thailand.

(2) The Tourism Authority of Thailand can use the unique Thai culture as a communication strategy to launch induced-tourism TV series which will promote cultural tourism and enhance the added value of local culture that can be shared with other foreign countries offering tourist opportunities to Thailand.

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**THE RELATIONSHIP AMONG IDOL PERSONALITY, FAN CLUB'S
SELF-IDENTITY, AND GROUP COHESIVENESS ON CHINESE
FAN CLUB'S WORSHIP BEHAVIOR: A CASE STUDY OF
WANG YIBO FAN CLUB**

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ABSTRACT

This survey research aimed to examine the influence of Wang Yibo's idol personality on Chinese youth fans' self-identity and group cohesiveness and to examine the influence of Wang Yibo's Chinese youth fans' self-identity and group cohesiveness with his fan club on their worship behavior. The survey was participated by two hundred Wang Yibo Chinese youth fans, who were selected using purposive sampling and convenience sampling methods. The mean and standard deviation were being tabulated and analyzed using Multiple Regression to test the hypotheses with the significance of 0.05. The findings found that: (1) Wang Yibo's idol personality in fan culture significantly influenced his Chinese youth fans' self-identity and group cohesiveness. The significant positive predictors of Wang Yibo's idol personality that influenced Chinese youth fans' self-identity were sincerity and competence, respectively. And, the highest positive predictor of idol personality was sincerity but sophistication was found to be a negative significant predictor of group cohesiveness. (2) The self-identity of Wang Yibo's fans club was a significant predictor of group cohesiveness with Wang Yibo's fan club. However, only appreciation significantly predicted group cohesiveness while enthusiasm and social interaction had an insignificant effect on their group cohesiveness; and (3) Self-identity of Wang Yibo's fan club and group cohesiveness were significant predictors of his Chinese youth fans' worship behavior.

Keywords: Idol personality, Self-identity, Group cohesiveness, Worship behavior, Chinese idol industry

1. Introduction

Fan culture phenomenon can be seen everywhere, from sports to art, fashion to science and film to entertainment, and so on. Many cultures, media studies, and marketing research have examined the impact of the

fan phenomenon on fan club's worship behavior. Fiske defined fans as crazy readers with strong emotions. He believes that fan culture is related to social business interests (Taalas & Hirsjärvi, 2013). Fans create and use cultural capital to make up for some gaps in popular culture and also get a deep sense of social identity from it.

Our society has entered the entertainment age, many people's life and entertainment are inseparable. When the idol industry is combined with the fan economy, fans become a key factor in the idol market. Therefore, based on the traditional fan culture, a fan culture based on idols is branched out. In the traditional fan culture, fans project their idealized images and personalities on their idols to meet their inner self-identification needs for idealized images (Sobur and others, 2018). In the idol fan culture, many fans regard their idol as the ideal partner in the future, so this also reflects the importance of the idol's image and personality in the idol fan culture (Cahyani, & Purnamasari, 2018). As a youth culture, coupled with a large number of young people in China, there is a large demand for idols.

Youth audiences dare to show their personality, and the idol fan culture just can meet their needs. The star idols chosen by the fans reflect the self-image, personality, and values they want to present to the world. Fan culture provides them with an arbitrary space, allowing them to freely release their pressure, express their ideas, and actively seek like-minded friends. More perfectly shape their fan image and personality (Theodorakis and others, 2017). Youth audiences feel a strong sense of belonging in the idol fan culture. During communicating with other fans, many young audiences will feel happy and confident, which also improves their self-esteem (Ray and others, 2017). The idol's positive personality will have a great impact on youth fans. Karry Wang (王俊凯), a member from one of the Chinese idol groups "TFBOYS". His fan, an 18-year-old girl, thinks that Karry Wang is her role model. His fan group is also constantly spreading his positive image and promoting his outstanding deeds. She thinks it is the idol's positive personality that fills her yearning for a better life. So she kept changing herself and finally admitted to Peking University, one of the top-rank universities in China.

In 2014, Wang Yibo made his official debut as a member of the idol group UNIQ. In June 2019, he became popular in Asia because of the TV series "The Untamed (Chen Qingling)". After he became famous, his fans rose rapidly and often became hot topics on social media. Most of his fans are young fans, always paying attention to every move of him. As the number of fans grows, a series of negative problems will follow. According to the white paper on the idol industry and fan economy in 2019, it is estimated that by 2020, the total scale of the Chinese idol market can reach 100 billion RMB. When the idol fan economy and idol fan culture are combined, China's idol fan culture has begun to show some negative phenomena while prospering and developing. Fans have a high degree of self-identity with their fan groups. Strong self-identity creates a highly cohesive fan group. Highly cohesive groups are prone to group polarization and have some negative effects. Therefore, studying the self-identity and group cohesiveness of fans will help to better develop the Chinese idols' economic market.

Brooks (2018), revealed that the idol's personality will affect the fan's worship behavior, but limited research examined whether the idol's personality affects the fan's self-identity and the group cohesiveness. And, if the idol's personality influences the fan's self-identity and group cohesiveness. Do these two factors affect each

other again, and is the fan worship behavior related to these two factors? And also few studies have used specific idols as a case. Due to this knowledge gap, the researcher has posited the problem statements as follows: (1) Is Wang Yibo's idol personality positively influence his Chinese youth fans' self-identity? (2) Is Wang Yibo's idol personality positively influence his Chinese youth fans' group cohesiveness? (3) Is Wang Yibo's Chinese youth fans' self-identity a significant predictor of group cohesiveness with his fan club? (4) Are Wang Yibo's Chinese youth fans' self-identity and group cohesiveness the significant predictors of their worship behavior?

2. Research Objectives

- (1) To examine the influence of Wang Yibo's idol personality on his Chinese youth fans' self-identity.
- (2) To examine the influence of Wang Yibo's idol personality on his Chinese youth fans' group cohesiveness.
- (3) To examine the influence of Wang Yibo's Chinese youth fans' self-identity on group cohesiveness with his fan club.
- (4) To examine whether Wang Yibo's Chinese youth fans' self-identity and group cohesiveness are significant predictors of their worship behavior.

3. Literature Review

3.1 Theory, Concept and Related Research

Celebrities refer to people from all walks of life who have attracted public attention because of their outstanding appearance, personality, or excellent personal talent. With the media's publicity reports, people's attention to celebrities has gradually increased. The phenomenon of worshiping celebrities is related to the personality, beliefs, and psychological state of the audiences. In the process of worshiping celebrities, the audience's self-identity is established and individual satisfaction is obtained. Hollander (2010) suggested that due to the lack of security in society and confusion about their own lives, the audiences try to find other audiences with the same interest through celebrity worship and identify with them. From a psychological point of view, the image and personality of celebrities satisfy the audience's construction of their ideal image. Some scholars pointed out that mild celebrity worship can be regarded as a normal phenomenon, which is conducive to enhancing the social and learning ability of young audiences and increasing entertainment in the daily heavy life. But excessive celebrity worship may develop into morbid celebrity worship, and young audiences are prone to lose impulsive irrational worship behavior (Reeves and others, 2012).

Idol worship is related to audience idealized personality factors. Idol worship by youth audiences is an expression of self-seeking. The idols' personality and temperament are the primary conditions for idol worship. The five-factor model of personality is the most widely used personality structure model today (Smith and others, 2019). This five-personality model was divided into five dimensions, namely openness, conscientious, extroversion, agreeableness, and neuroticism. Hence, the researcher used this model to analyze idol personality.

Idols' public personality can be divided into two types. One is relatively similar to the idol's personality. There is also a certain difference from the idol's personality.

The idol fan culture is a subculture. It is easy for young audiences to have a sense of belonging to idol fan culture. Identity largely depends on a sense of belonging. Youth audiences can easily find a sense of presence and identity in the fan culture (Williams, 2016). Social identity theory was proposed by Tajfel and Turner in 1979. Tajfel and Turner (1979) used the minimum group paradigm to test the cognitive differences among social groups. The results showed that the minimum condition for prejudice among groups is to identify with the identity of group members. As major participants in the idol fan culture, young audiences use the new media platform to carry out a series of practical activities, such as expressing opinions, exchanging information, producing texts, etc. And in turn, through the social-categorization, social comparison, and positive distinctiveness of three psychological processes to build their own group identity.

Group cohesiveness refers to the united force of group members to achieve group goals. It is one of the main components of group activities, which is usually expressed as the centripetal force of group members. The gathering of fans was originally due to the attraction of idol personality. Fans form a group with idols as the main direction because of their love for idols. This preference forms an emotional bond, which enables fans to quickly obtain satisfaction in the group, and also accelerates the progress of fans to build their identity.

How people become fans? People worship the appreciated person or thing that will make them feel relaxed and resulting in a sense of identity. Some scholars said that fans like their idols because their idols have unique personalities that inspired their identity. They have an intensely personal feeling with idols and they will imagine the idol as the ideal type of their future partner (Cahyani & Purnamasari, 2018).

3.2 Research Framework

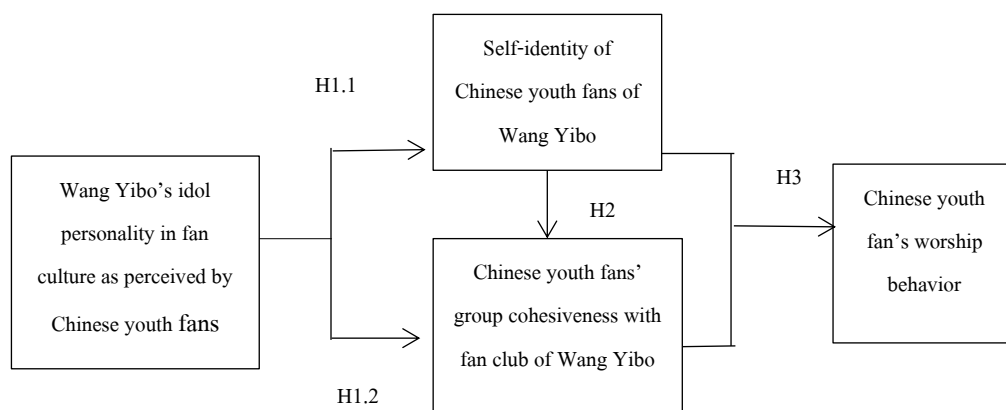


Figure 1 Research Framework

3.3 Research Hypotheses

Hypothesis 1: Wang Yibo's idol personality in fan culture significantly influences Chinese youth fans' self-identity and group cohesiveness.

Hypothesis 2: Self-identity of Chinese youth fans of Wang Yibo is a significant predictor of group cohesiveness with his fan club.

Hypothesis 3: Self-identity of Chinese youth fans of Wang Yibo and group cohesiveness are significant predictors of Chinese youth fans' worship behavior.

4. Research Methodology

4.1 Research Design

This is online survey research aimed to examine the influence of idols' personality in idol fan culture and their self-identity and group cohesiveness among Chinese mainland youth audiences. The researcher used a quantitative research approach by constructing an online questionnaire. The researcher disseminated the questionnaire link to the audience through Weibo. The target population of the study is Chinese youth audiences who have joined Wang Yibo's fan club. The sample for this study was 200 Chinese youth audiences aged from 15 to 25 years old.

4.2 Population and Sample

The population of this study was Chinese youth audiences who were the fans of Wang Yibo, the popular Chinese idol of the UNIQ group. The primary group of the samples was between 15 and 25 years old who are current Wang Yibo's fan club. According to the fan data report, Wang Yibo had more female fans, roughly 86.73%, and was born in Generation Y (Ifan, 2020). This age group was selected using purposive sampling and convenience sampling.

4.3 Research Instrument

The questionnaire has 5 sections. Section 1 has 7 nominal-and-ordinal questions that asked about personal characteristics of the sample, including gender, age, educational level, occupation, personal income, how they have worshiped the Wang Yibo, and channel receiving information about Wang Yibo. Section 2 has 15 statements that asked respondents' perceptions of Wang Yibo's personality. The 5-point Likert scale was adopted by Lunardo and others (2015), which has 5 key constructs—sophistication, sincerity, competence, excitement, and rudeness. Section 3 has 9 statements that asked about respondents' perceived self-identity. The 5-Likert scale was developed by Vinney and others (2018) having 3 key constructs—enthusiasm, appreciation, and social interaction. Section 4 has 17 statements that asked about respondents' group cohesiveness. The 5-point scale was adopted from Eys and others (2009), having 2 key constructs—social aspects of cohesiveness, and task aspects of cohesiveness. Section 5 has 15 statements that asked about respondents' worship behavior. The 5-point-Likert scale was developed from Cheung and Yue's (2011), having 5 key constructs-- identification of the idol, romanticization of the idol, idealization of the idol, intimatization of the idol, and commodification of the idol. All 5-point-Likert questions used an interval scale, arranging from 1 "Strongly disagree to the statement" to 5 "Strongly agree to the statement".

4.4 Data Collection

The data collection was conducted from July 15- July 30, 2020, via Weibo, a popular online platform among the fan club of Wang Yibo. All guidelines and questions for the questionnaire were originally developed in English and it was professionally translated proficient in English and Chinese by translators. Participants can click on Weibo to enter the questionnaire link. The researcher used convenience sampling and explained in detail all the guidelines to participants before answering the questionnaire. The questionnaires were sent to 30 participants for pretesting to ensure that all questions were fully understood and easy to answer.

4.5 Data Analysis

The three hypotheses were tested using Linear Regression Analysis and Multiple Regression with the significance level of 0.05. For hypothesis 1, the independent variable was Chinese respondents' perceived idol personality Wang Yibo and the dependent variables are their self-identity and group cohesiveness with the fan club of Wang Yibo. For hypothesis 2, the independent variable was Chinese respondents' perceived idol personality of Wang Yibo and the dependent variable was their group cohesiveness with the fan club of Wang Yibo. For hypothesis 3, the independent variables were the self-identity of Chinese youth fans of Wang Yibo and group cohesiveness.

5. Research Findings

Hypothesis 1 results found that Wang Yibo's idol personality in fan culture significantly influenced his Chinese youth fans' self-identity ($R^2=.364^{**}$, $p<.05$) and group cohesiveness ($R^2=.035^{**}$, $p<.05$). The significant positive predictors of Wang Yibo's idol personality that influenced Chinese youth fans' self-identity were sincerity and competence, respectively. And, the highest positive predictor of idol personality was sincerity ($\beta =.433^{**}$, $p < .05$) but sophistication was found to be a negative significant predictor of group cohesiveness ($\beta = -.202^{**}$, $p < .05$).

Table 1: Regression analysis of Wang Yibo's idol personality toward his fan's self-identity and group cohesiveness

| Factors (n=200) | Self- Identity | | Group Cohesiveness | |
|--------------------|--------------------|---------------------|--------------------|---------------------|
| | β | t | β | t |
| (Constant) | | 2.549* (p=.012) | | 4.565** (p=.000) |
| Sophistication | -.067 | -.921 (p=.358) | -.202 | -2.206* (p=.029) |
| Competence | .274 | 3.301** (p=.001) | -.023 | -.216 (p=.829) |
| Excitement | .076 | 1.098 (p=.274) | .002 | .023 (p=.982) |
| Sincere | .433 | 4.934** (p=.000) | .384 | 3.485** (p=.001) |
| Rudeness | .075 | 1.099 (p=.273) | .110 | 1.282 (p=.202) |
| R | .603a | | .186a | |
| F | 113.111** (p=.000) | | 7.134** (p=.008) | |
| R Square. | .364 | | .035 | |

Hypothesis 2 results found that the self-identity of Wang Yibo's fans club was a significant predictor of group cohesiveness with Wang Yibo's fan club ($R^2 = .157^{**}$, $p < .05$). However, only appreciation ($\beta = .325^{**}$, $p < .05$) significantly predicted group cohesiveness while enthusiasm ($\beta = .126$, $p > .05$) and social interaction ($\beta = .092$, $p > .05$) had an insignificant effect on their group cohesiveness.

Table 2: Regression analysis of Wang Yibo fan's self-identity toward their group cohesiveness

| Factors (n=200) | Group Cohesiveness | |
|--------------------|--------------------|---------------------|
| | β | t |
| (Constant) | | 7.296** (p=.000) |
| Enthusiasm | .126 | 1.476 (p=.142) |
| Appreciation | .325 | 4.701** (p=.000) |
| Social Interaction | .092 | 1.110 (p=.268) |
| R | .396a | |
| F | 36.848** (p=.000) | |
| R Square. | .157 | |

Hypothesis 3 findings revealed that the Multiple Linear Regression revealed that Wang Yibo fan's self-identity and group cohesiveness are significant predictors of his fan's worship behavior ($R^2 = .425$, $p < .05$). However enthusiasm ($\beta = .135$, $p > .05$), appreciation ($\beta = .075$, $p > .05$), social aspect ($\beta = .088$, $p > .05$) and task aspect ($\beta = .067$, $p > .05$) did not significantly predict worship behavior. So, only appreciation of Wang Yibo's Chinese youth fans' self-identity was determined as a significant predictor of his fan's worship behavior. Therefore, Hypothesis 3 was partly accepted.

Table 3: Multiple Linear Regression analysis of Wang Yibo fan's self-identity and group cohesiveness toward their worship behavior

| Factors (n=200) | | Worship Behavior | |
|--------------------|--------------------|-------------------|------------------|
| | | β | t |
| (Constant) | | | 3.027** (p=.003) |
| self-identity | Enthusiasm | .135 | 1.923 (p=.056) |
| | Appreciation | .075 | 1.250 (p=.213) |
| | Social Interaction | .498 | 7.251** (p=.000) |
| group cohesiveness | Social aspect | .088 | 1.201 (p=.231) |
| | Task aspect | .067 | .986 (p=.325) |
| R | | .652a | |
| F | | 72.824** (p=.000) | |
| R Square. | | .425 | |

6. Discussion

This study examined the influence of Wang Yibo's idol personality on his fans' self-identity and group cohesiveness and whether fan self-identity and group cohesiveness can lead to worship behaviors. According to Hypothesis 1 results, Wang Yibo's idol personality in fan culture significantly influenced his Chinese youth fans' self-identity and group cohesiveness. The sincere of Wang Yibo's idol personality most positively influenced the self-identity and group cohesiveness of his youth fans. From the study results, only the sincere and sophistication of Wang Yibo's idol personality significantly influenced his fan's group cohesiveness at quite a low level. And, the sophistication of Wang Yibo's idol personality was a significant negative predictor. In the sophistication of Wang Yibo's idol personality, some fans think Wang Yibo's personality is sexy, but some fans disagree with this statement. It may lead to conflicts of views between the two parties, thereby affecting group cohesiveness. And also it seemed that Wang Yibo's idol personality cannot directly influence his fans' group cohesiveness. However, based on the results of Hypothesis 2, Wang Yibo's idol personality significantly influenced his fans' group cohesiveness through his fans' self-identity. Therefore, it can be considered that Wang Yibo's idol personality indirectly influence his fans' group cohesiveness. This was another reason why the idol's personality had a low influence on the fan group cohesiveness. Fans had the high cohesion of the fan group because of maintaining the

idol's personality image, but the actual idol's personality would not completely affect the fan group cohesiveness. Wang Yibo's Chinese youth fans' self-identity was a significant predictor of group cohesiveness with his fan club. When examining the influence of each dimension, appreciation significantly predicted group cohesiveness. However, enthusiasm and social interaction did not significantly predict group cohesiveness. When group members identified with their group, internal group preferences and external group biases would arise. The findings suggested that fans had the same self-identity, which also promoted the communication between fans, thus speeding up the formation of the social identity of fan groups. Group social identity had a positive influence on fan club group cohesiveness.

Based on Hypothesis 3 results, Wang Yibo's Chinese youth fans' self-identity and group cohesiveness were weak significant predictors of his Chinese youth fans' worship behavior. When examining the influence of each dimension of Wang Yibo fan's self-identity and group cohesiveness, the most positive influenced dimension was social interaction. However, the rest of the statements did not significantly predict fan's worship behavior, which is enthusiasm, followed by appreciation, social aspects of cohesion, and task aspects of cohesion. The findings suggested that youth fans can strengthen social interaction, regard idols as their role models, and worship idols rationally and positively. Human behavior depends largely on self-knowledge, and this kind of cognition is mainly formed through social interaction with others. Fans seek self-identity in social interaction, one of the major factors that influenced participants to become celebrity worshipers was peer influence. According to the research results, the sincerity and competence of idol personality had a significant influence on the self-identity of youth fans and let youth fans have worship behavior. The findings would be significant for providing beneficial information to improve Chinese idol fan culture and idol fan economy development. In addition, the findings also suggested that positive idol personality significantly influenced fan's self-identity and group cohesiveness. In the changing idol market environment, an idol's personality had always been the selling point of various entertainment companies. The findings could provide suggestions for improvement of various idol fan clubs, and could effectively develop positive idol fan culture, promote positive idol personality, and regulate rational worship behavior.

7. Suggestions

Despite this study provides relevant contributions, there are still some recommendations for future research, as follows:

(1) Future research can examine other age ranges who are in the working people who might have different insights from the youth which were examined in this study. Other variables should be examined such as fan's self-esteem, fan support, and so on. It helps to improve the research of the idol industry and increase the diversity of idol research.

(2) The findings showed that the idol personality influenced the fan's self-identity and group cohesiveness, which led to their worship behavior toward the idol. Fans' identification with themselves also helps increase the fan club group cohesiveness, which can help promote positive fan culture development. The findings

will have a great impact on the future economic development of idol fans in China and idol marketing. The idol entertainment company undertakes idol discovery and training functions. Set the idol's unique and positive personality to stimulate the curiosity of the fan audience and meet their needs.

8. Acknowledgments

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AN ANALYSIS OF THE USE OF FACEBOOK BY THE UNITED NATIONS REGIONAL OFFICES IN ASIA-PACIFIC FOR RELATIONSHIP CULTIVATION WITH CONSTITUENCIES

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ABSTRACT

Given the rapid evolution of social media trends and the specificity of public relations practices implemented by the United Nations (U.N.), the present study adopted a conceptual framework from a previous study by Waters & Lo (2012), updated some of the relationship cultivation sub-categories and added a new variable related to the Sustainable Development Goals (SDGs) to examine the common strategies featured in the U.N. social media posts. The study quantitatively analyzed 177 Facebook posts published by three selected U.N. regional offices in Asia and the Pacific - UNDP, UNICEF and WHO - during May, June and July 2019. The Chi-Square Analysis results supported the first hypothesis that these agencies used predominantly the “involvement” and “information dissemination” strategies to cultivate relationships with their audiences. While the second hypothesis regarding the similarity on the use of Involvement strategy among three agencies was supported, the third hypothesis proposing that the main difference in the use of Facebook for relationship cultivation among the U.N. agencies relates to the types of information they disseminate was not supported. The main SDG featured across the posts of the three agencies is SDG3 on Good Health and Wellbeing, as hypothesized in the fourth hypothesis. By implementing the findings of the study, U.N. agencies and other non-profit and international organizations will be better equipped to plan their social media interventions for more effective relationship cultivation with their key constituencies.

Keywords: Facebook, United Nations, Relationship Cultivation, Sustainable Development Goals (SDGs)

1. Introduction and Literature Review

Social media is widely used for advocacy and communication purposes within the U.N. and the non-profit sectors. As many other organizations, the U.N. and its different entities have put in place several social media efforts to communicate with their audiences, to increase visibility and to get support for different causes (Eckhouse, 2012). Different divisions of the U.N. have developed social media guidelines in which they highlight how the use of this new communication channel can enhance their work. Practical evidence demonstrates that social media sites offer a great platform for relationship cultivation and enhancement. However, little is known

about how the U.N. agencies use social media to build relationships with their constituencies, particularly in the Asia and the Pacific region. According to the Digital in 2019 report (2019, p. 81), Facebook is the social media platform with more active user accounts globally with 2.217 billion active users in 2019. In addition, based on the researcher's observation, 13 out of 25 U.N. regional offices in Asia and the Pacific have their own Facebook account. Facebook rather than other types of social media is, therefore; the focus of this study.

Originally described as 'relationship management' in public relations, relationship cultivation - or relationship building - makes reference to how organizations build and sustain relations with its different constituencies. This idea implies a shift from the traditional approach of assessing the effectiveness of public relations by quantifying the number of interventions, to a more analytical approach that evaluates the quality of relationships between the organization and its different publics (Ledingham, 2006). Grunig & Hunt (1984) introduced four public relations models which can be used to frame the discussion on how organizations are using social media to cultivate relationships with their key constituencies: press agentry/publicity, public information, two-way asymmetrical and two-way symmetrical. While the 'press agentry/publicity' model is considered as a propaganda strategy as it disseminates the messages and agenda of a certain organization offering partial or manipulated information, the 'public information' model aims mainly at spreading information about the organization, not always with the intention to persuade the audience. In these two models, the communication is established in a unidirectional manner, going from the source to the receiver, with no possibility for feedback. On one hand, in the two-way asymmetric model, organizations utilize research and scientific methods to craft their messages with the purpose of persuading the audience to identify with the organization's ideals or to take specific actions in line with the organization's interests. In this category, audiences are able to interact and respond to the messages, but the process is partially controlled by the organization (Grunig & Hunt, 1984). On the other hand, the two-way symmetric model, often considered the ideal public relations model proposed by Grunig and colleagues (1995), aims at establishing a common understanding and identification between the organization and its audiences. Under this model, constituencies are also able to interact and provide feedback to the organization. In regard to the two-way symmetric model, Waters, Burnett, Lamm and Lucas (2009, p. 104) proposed three relationship cultivation strategies - disclosure, information dissemination and involvement - as shown in Table 1.

Table 1. Relationship cultivation strategy and their sub-strategies

| Relationship Cultivation Strategy | Sub-Strategies | Data Coding |
|---|--|----------------------------|
| 1) Disclosure (Involves the provision of information specifically about the organization) | 1.1) Mission organization and 1.2) History organization | 0 = Not found 1 = Found |
| 2) Information Dissemination (Refers to the dissemination of content related to the work of the organization) | 2.1) Storytelling, 2.2) Key messages, 2.3) Testimonials, 2.4) Facts and Figures, 2.5) Press releases, 2.6) Statements, 2.7) Reports, articles, blogs, and 2.8) External articles / Materials | 0 = Not found 1 = Found |
| 3) Involvement (Makes reference to any material requesting users to take a concrete action) | 3.1) Read more link/Tags/Hashtags, 3.2) Questions / Calls for audience, 3.3) Jobs, 3.4) Calls for internships, 3.5) Calls for scholarship, 3.6) Volunteer Opportunities, 3.7) Calls for Contests, 3.8) Invitation to Events/Campaigns, and 3.9) Invitation to Donate | 0 = Not found 1 = Found |

Using social media as a component of strategic communication in organizations proves to yield several benefits such as building and consolidating corporate image, instituting effective, dynamic and transparent communication with the audience (Hristache, Paicu & Ismail, 2014), enabling two-way and more symmetrical interaction between organizations and their publics (Macnamara & Zerfass, 2012), as well as allowing them to communicate directly with their stakeholder groups without being dependent on journalists. (Preusse & Schulze, 2012). Accordingly, the **Hypothesis # 1 -- the U.N. agencies use predominantly “information dissemination” and “involvement” strategies to cultivate relationships with their constituencies on Facebook --** was proposed.

In this regard, Lovejoy & Saxton (2012, p. 339) added “Overall, social media appears to have created opportunities for interpersonal engagement, interactivity, and dialogue that are qualitatively different from those offered by traditional websites. It would thus be reasonable to infer that social media would similarly carry considerable potential as an organizational communication and stakeholder relations tool,” which leads to the development of the **Hypothesis # 2 -- The main similarity in the use of Facebook for relationship cultivation among the U.N. agencies is the use of the “involvement” strategy.**

Although there has been extensive research on the use of social media for commercial marketing purposes, much less has been done on the use of social media by non-profit organizations. However, a good example is a study conducted with 275 non-profit organizations Facebook profiles, which described how these organizations used social media to develop closer relationships with their stakeholders (Waters & Lo, 2012). This study reveals various methods of sharing information used by nonprofits’ programs and services which include posting links to news media stories (57.3%), posting pictures of their events (55.4%), videos (22.2%), campaign summaries (17.8%), organizational press releases (3.6%), and audio files (1.3%). Based on the findings of this

study, the **Hypothesis # 3 -- The main difference in the use of Facebook for relationship cultivation among the U.N. agencies relates to the types of information they disseminate** -- was proposed.

All U.N. offices' mission involves the Sustainable Development Goals (SDGs), a set of seventeen development objectives established and adopted by the Member States of the United Nations General Assembly in September 2015 (see details in Table 2), with the aim of addressing global issues, including poverty, hunger, health, education and environmental matters (Sustainable Development, 2019). As a result, it is interesting to examine how their regional offices use the SDGs as themes for relationship cultivation. SDG 3 on Health and Well-being plays a crucial role in the overall agenda of the SDGs. Health-related targets are present in almost all SDGs and are directly linked to different aspects of sustainable development including poverty, hunger, education, clean water, climate action and others (WHO, 2019). Accordingly, this study proposed the **Hypothesis # 4 -- The main theme featured in Facebook posts of selected regional U.N. agencies is health.**

Table 2. Sustainable Development Goals

| Sustainable Development Goals (SDGs) | Data Coding |
|--|----------------------------|
| 1) No Poverty, 2) Zero Hunger, 3) Good Health and Well-being, 4) Quality Education, 5) Gender Equality, 6) Clean Water and Sanitation, 7) Affordable and Clean Energy, 8) Decent Work and Economic Growth, 9) Industry, Innovation, and Infrastructure, 10) Reducing Inequality, 11) Sustainable Cities and Communities, 12) Responsible Consumption & Production, 13) Climate Action, 14) Life below Water, 15) Life on Land, 16) Peace, Justice, and Strong Institutions and, 17) Partnerships for the Goals | 0 = Not found 1 = Found |

In summary, the present study analyzed how the selected regional offices of the U.N. in Asia and the Pacific use Facebook for relationship cultivation with their key constituencies. It identified similarities and differences among the selected agencies in their use of Facebook for relationship cultivation, and mapped common themes related to the SDGs as a reference.

2. Objectives

This study aims to achieve the following research objectives:

1. To investigate how the U.N. regional offices use Facebook for relationship cultivation with key constituencies.
2. To identify similarities and differences among U.N. regional offices in the use of Facebook for relationship cultivation with key constituencies.
3. To examine how the U.N. regional offices use the SDGs as themes for relationship cultivation.

3. Methodology and Data Analysis

Using quantitative content analysis, a total of 177 Facebook posts by three U.N. regional offices in May, June and July 2019 were analyzed. The three agencies studied were selected based on their number of followers and their thematic focus, in accordance with the priorities set by the SDGs (Sustainable Development, 2019). In this regard, agencies working on SDG 1: End Poverty, SDG 2: Zero Hunger and SDG 3: Good Health and Well-being were considered for selection. Based on these criteria, the U.N. Facebook pages selected are the ones corresponding to the United Nations Children Fund (UNICEF) Regional Office for East Asia and the Pacific (<https://www.facebook.com/unicefeap/>), which covers 27 countries; the United Nations Development Programme (UNDP) Regional Office for Asia and the Pacific (<https://www.facebook.com/undpasiapac>), covering 36 countries; and the World Health Organization (WHO) Regional Office for South East Asia (<https://www.facebook.com/WHOSEARO>), which covers 11 countries.

For the data analysis, each relationship cultivation strategy and SDGs identified in the sampled posts were counted as ‘frequency,’ and then each frequency was transformed to percentage based on the data coding indicated in Table 2 and 3. The Chi-Square analysis was performed to test the proposed hypotheses regarding similarity and difference of relationship cultivation strategies used by the U.N. agencies, and the most used SDGs.

4. Findings and Discussions

Descriptive statistics reveal that among 177 sampled posts, 92 posts belong to WHO (51.98%), 59 posts belong to UNICEF (33.33%), and 26 posts belong to UNDP (14.69%). Regarding **Hypothesis # 1:** The U.N. agencies use predominantly “information dissemination” and “involvement” strategies to cultivate relationships with their constituencies on Facebook. Table 3 reveals that the main relationship cultivation strategies used across the Facebook posts is “involvement,” (94%); followed by “information dissemination,” (75%) and “disclosure” (2%). Therefore, the first hypothesis was supported.

Table 3. Frequency and percentage of sampled posts using different Relationship Cultivation Strategies

| Relationship Cultivation Strategies | Frequency | Percentage |
|-------------------------------------|------------|----------------|
| Disclosure | 3 | 0.99% |
| Information Dissemination | 132 | 43.71% |
| Involvement | 167 | 55.30% |
| Total | 302 | 100.00% |

Remarks: Multiple counts resulted from posts with more than one strategy.

The fact that the second most used strategy by these agencies is “information dissemination” suggests that social media, in this case Facebook, is used as a public relations tool to communicate in real time with different audiences at a time when individuals turn primarily to the internet in search for information (Waters & Lo, 2012). With regards to the information dissemination sub-strategies, the extensive use of ‘storytelling’ by the

three agencies confirms that in the digital era, organizations are using social media to build their image and tell their story to the audience (Hristache et al., 2014).

Chi-Square results support **Hypothesis # 2**: The main similarity in the use of Facebook for relationship cultivation among the U.N. agencies is the use of the “involvement” strategy. In relation to the use of the “involvement” strategy for relationship cultivation, the analysis of the sampled posts found that the most used sub-strategy by the three selected agencies was ‘read more link/ tags/ hashtags’ as follows: UNDP with 84.6%, UNICEF with 83.1% and WHO with 16.3%. The second most used modality was ‘question/ call for audience’ with 47.3% use by WHO, 33.9% use by UNICEF and 15.4% use by UNDP. Two sub-strategies, ‘jobs’ (0.6%) and ‘calls for internships’ (0.6%) were rarely used. Other five sub-strategies within this strategy namely, ‘volunteer opportunities’, ‘calls for contests’, ‘calls for scholarships’, ‘invitation to events/ campaigns’ and ‘invitation to donate’ were not used at all by any of the agencies in the sampled posts.

Table 4. Ranking of “Involvement” sub-strategies used by three offices (Agency Sample)

| Rank | UNDP | UNICEF | WHO |
|------|--|--------------------------------------|---|
| 1 | Read more links/ tags/ hashtags (84.6%) | Read more / tags/hashtags (83.1%) | Questions/ Call for audience (47.3%) |
| 2 | Questions/ Call for audience (15.4%) | Questions/ Call audience (33.9%) | Read more /tags/ hashtags (16.3%) |

Table 5. Frequency and Percentage of Involvement sub-strategies used by three offices (Full Sample)

| Agency | Involvement Sub-Strategies | | | | | | | | |
|--------|----------------------------|------------|----------|-----------|------------|---------|-------------|-------|--------|
| | Read | Question | Job | Volunteer | Internship | Contest | Scholarship | Event | Donate |
| UNDP | 22 (12.4%) | 4 (2.3%) | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| UNICEF | 49 (27.7%) | 20 (11.3%) | 1 (0.6%) | N/A | 1 (0.6%) | N/A | N/A | N/A | N/A |
| WHO | 15 (8.5%) | 43 (24.3%) | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

The extensive use of the “involvement strategy” also indicates that the selected U.N. agencies are increasingly tapping into the potential of a novel open public relations model which enables interaction between the organization and its audiences while allowing for the generation and dissemination of content and messages by both parties. (Reitz, 2012). The analysis also suggests that social media is providing these organizations with a tool that enables building rapport and interacting with key constituencies in real time (Madianou, 2013). The wide use of the “involvement” strategy by U.N. agencies indicates that these organizations are taking advantage of the interactive features currently available on social networking sites. By enabling and encouraging their constituencies to take different kinds of actions within their social media, U.N. agencies are allowing the users to engage, promote and advocate for their own mandates. For instance, when a member of the audience clicks on a “read more” link, usually this takes them to the website of the organization, where they will find not only the story or information offered on social media, but also many other ways to engage and interact with the U.N.

agency, such as signing up for email updates, reading about the work of the organization, applying for a job, volunteering, donating to the cause or sharing organizational content in their own social media platforms.

Referring to **Hypothesis # 3**: The main difference in the use of Facebook for relationship cultivation among the U.N. agencies relates to the types of information they disseminated, the results of Chi Square Analysis indicate that all three agencies similarly used the top five sub-strategies as reported in Table 6 to convey their messages. Therefore, this hypothesis is not supported.

Table 6. Ranking of “Information Dissemination” sub-strategies by three offices (Agency Sample)

| Rank | UNDP | UNICEF | WHO |
|------|--------------------------------------|-------------------------------------|------------------------------------|
| 1 | Storytelling (76.9%) | Storytelling (79.7%) | Facts/Figures (70.7%) |
| 2 | Reports, articles, blogs (50%) | Reports, articles, blogs (45.8%) | Storytelling (32.6%) |
| 3 | Facts/Figures (38.5%) | Facts/Figures (20.3%) | Testimonials (3.3%) |
| 4 | External articles/ materials (30.8%) | Testimonials (11.9%) | Reports, articles, blogs (N/A) |
| 5 | Testimonials (15.4%) | External articles/ materials (3.4%) | External articles/ materials (N/A) |

Table 7. Frequency and Percentage of Information Dissemination sub-strategies used by three offices

| Agency | Information Dissemination Sub-Strategies | | | | | | | |
|--------|--|------------|-------------|-------------|-----|----------|------------|-----------|
| | Storytelling | Key mess. | Testimonial | Facts Figs. | PRs | Statemnt | Rep/Art/BI | Ext. Arti |
| UNDP | 20 (11.3%) | 8 (4.5%) | 4 (2.3%) | 10 (5.6%) | NA | 2 (1.1%) | 13 (7.3%) | 8 (4.5%) |
| UNICEF | 47 (26.6%) | 36 (20.3%) | 7 (4.0%) | 12 (6.8%) | NA | 2 (1.1%) | 27 (15.3%) | 2 (1.1%) |
| WHO | 30 (16.9%) | 47 (26.6%) | 3 (1.7%) | 65 (36.7%) | NA | 4 (2.3%) | NA | NA |

The Chi-Square analysis of the sampled posts also identified that the most used sub-strategies in the sampled posts was ‘storytelling’ with 79.7% by UNICEF, 76.9% by UNDP and 32.6% by WHO. The second most used sub-strategy was ‘facts and figures’ with 70.7% use by WHO, 38.5% use by UNDP and 20.3% by UNICEF. The extensive use of ‘storytelling’ across the three agencies, in addition to the researcher’s observation of current social media practices indicate that this sub- category represents a creative way to circulate organizational information among key constituencies, using an engaging format that is not often perceived as corporate content. Instead, this type of materials, tend to appeal to emotions to engage the audience and communicate a more human side of the organization, over its brand or institutional image.

As hypothesized in **Hypothesis # 4**: The main theme featured in Facebook posts is health, the most featured SDG is SDG3 on Good Health and Well-being, encountered in 100% of posts by WHO, 45.8% of posts by UNICEF and 7.7% of posts by UNDP. The second most used SDG was SDG 13 on Climate Action found on 26.9% of posts by UNDP, 6.8% of posts by UNICEF and 2.2% of posts by WHO.

Table 8. Ranking of the themes based on the SDGs by selected U.N. Regional Offices

| Rank | UNDP | UNICEF | WHO |
|------|----------------|---------------|---------------|
| 1 | SDG 8 (30.8%) | SDG 3 (45.8%) | SDG 3 (100%) |
| 2 | SDG 13 (26.9%) | SDG 4 (16.9%) | SDG 13 (2.2%) |
| 3 | SDG 10 (15.4%) | SDG 13 (6.8%) | SDG 8 (1.1%) |
| 4 | SDG 17 (15.4%) | SDG 16 (5.1%) | SDG 15 (1.1%) |
| 5 | SDG 4 (11.5%) | SDG 8 (1.7%) | N/A |
| 6 | SDG 16 (11.5%) | SDG 10 (1.7%) | N/A |
| 7 | SDG 3 (7.7%) | N/A | N/A |
| 8 | SDG 14 (7.7%) | N/A | N/A |
| 9 | SDG 15 (7.7%) | N/A | N/A |

The fact that the health-related SDG was the most featured across the three U.N. agencies suggests that health remains a strategic developmental priority for the international organization, regardless of the specific mandates of its different agencies. While it is evident that WHO focuses entirely on health and well-being this is not the case for UNDP and UNICEF, however, these agencies promote health-related messages and advocate for overall well-being in alignment with SDG 3. With regards to SDG 13 on Climate Action, one of the main purposes of the SDGs is actually establishing a global partnership to advance development priorities, particularly tackling climate change, hence the name Sustainable Development Goals. While the three selected agencies do not work entirely on climate change, they all contribute in different levels to promote SDG 13.

5. Conclusion

Most of the findings of this study are consistent with the researcher's expectations. Furthermore, the analysis of the sampled posts confirms that the selected U.N. agencies are consistently using social media to build relationships with their constituencies and suggests that these agencies are following a U.N. strategic approach which highlights how social networks enable organizations to establish direct communication with their audiences, promote their initiatives and advance their agendas, while allowing audiences to participate and connect with their work in a more effective and measurable way (U.N., 2010).

By using Facebook to regularly communicate with their audiences, these organizations are able to create and maintain closer and more meaningful relations with them (Men & Tsai, 2013). In utilizing social media, U.N. agencies are cultivating relationships with their constituencies through different strategies. The findings of this study provide insights into how these organizations are using predominantly "involvement," which refers to any content the audience can interact with; followed by the more traditional "information dissemination," which is limited to sharing news, stories, and other organizational content. The study also reveals that the "disclosure strategy" is barely used by these agencies. The predominant use of "involvement" and "information dissemination" over "disclosure" indicates a shift in social media practices and trends. Seeing that Hypothesis # 3, stating that the main difference in the use of Facebook for relationship cultivation relates to the types of

information shared by the selected U.N. agencies, was not supported by the findings. This unexpected result can be assumed that in the last decade, since the Waters & Lo study was conducted, organizations have moved from using a unidirectional straightforward way of disseminating concepts or ideas (mandate/ history of the organization), to a more subtle approach which appeals to emotions (storytelling) to convey messages about their mandate and work. The extensive use of the “involvement strategy” by the selected U.N. agencies in their Facebook posts in the context of public relations practices, suggests that these entities are favoring a two-way symmetric model in which both the organization and the different audiences are able to share information, interact and provide feedback to each other. However, it should be noted that U.N. agencies retain a certain degree of control over the exchange process, as they utilize social media intelligence and analytics to influence the overall outcome.

With regards to the Sustainable Development Goals (SDGs), the fact that SDG3 on Good Health and Wellbeing is featured in the majority of the posts analyzed, indicates the relevance of this development priority in the overall work of the United Nations, given that three agencies - with different mandates and missions - regularly display content related to the matter.

It must be noted that this study presents some limitations. Firstly, the rapid evolution of the social media landscape and practices poses a challenge when examining how different platforms are used by organizations and their publics. Secondly, the fact that the selected Facebook accounts cover a range of countries with different languages in Asia and the Pacific, but use predominately the English language may confound how the relationship cultivation strategies are used.

6. Suggestion

It is expected that the current study will be useful for U.N. agencies -and other non-profit and international organizations- when analyzing their social media practices and how these have an impact in their outreach and public relations model. By examining the findings of the study, these organizations will be better equipped to plan their social media interventions for more effective relationship cultivation with key constituencies. For instance, when defining their social media strategies, these organizations can establish guidelines to ensure storytelling is used for the dissemination of organizational content and that involvement options, such as tags, hashtags, links or questions, are consistently included in the materials shared. These measures will not only enable the audience to interact with the posts, but also create a conducive environment to cultivate positive and long-lasting relationships with key constituencies.

The study will also be beneficial for researchers and scholars analyzing relationship cultivation through the use of social media, specifically in the context of public relations studies, as well as for marketing communications specialists who could also refer to the study as a reference to develop strategies for audience engagement on social media.

As for future research recommendation, increasing sample size by studying additional U.N. agencies' Facebook posts can offer a more comprehensive insight onto the nature of the strategies used by the agencies to

build relationships with their key audiences. In addition, the period of time should be expanded to gain more holistic understanding of how the relationship cultivation strategies are implemented. Revising the present methodology should be done to make it more relevant to future social media trends and practices. The second phase of the study would benefit from expanding the number of agencies examined and adding a focus group with communication or social media strategists from the different agencies to confirm or expand the results.

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**‘THE CUSTOMER IS ALWAYS RIGHT.’ AN EXPLORATION OF
THE ETHICAL TENSIONS AT THE VENDOR-BUYER INTERFACE,
WITH PARTICULAR REFERENCE TO MANAGEMENT-STAFF
RELATIONS.**

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ABSTRACT

This paper will examine the historical axiom of consumer primacy that has governed buyer-seller relations within living memory, and beyond. It seeks to question the assumption that market philosophies remain unchallenged within the domain of commercial logic, and that infrastructural associations are rightly subordinated to the proper discourse of profit-oriented business activities. It will further investigate the efficacy of this existing arrangement with special analysis of management-worker interactions to determine the worth and durability of the status quo ante, and will subsequently offer considered discussion of perceived outcomes.

Keywords/phrases: leadership; customer; industrial relations; markets; management.

Introduction

“The customer is always right” is a time-honoured cliché. What I find more useful as a guiding maxim is that you must never put the customer in the wrong. There is no way you can win by doing so; on the contrary, it is a sure way to lose the customer. (Quinn, 1990: 100)

Testing the veracity of this statement will be considered later in this paper, but business can never be driven in a totally ‘value-free’ environment; there are always certain existent shibboleths and customs that follow time-honoured and proven approaches to how a commercial environment should be administered. Moreover, and taking into account the universalist nature of business and management practice in an overtly globalised environment, values do not always translate favourably when juxtaposed against local custom and practice. So, what applies in South-east Asia does not necessarily resonate in Western Europe. That said, this ethos typically applies at the vendor-consumer interface, where transactions are seen to be of supreme importance to the future viability of professional enterprise, and that impact directly on the business. (Buttle and Maklan, 2019: 5-6; Ciulla, 2020) In this sense, it is assumed that the customer, of whatever persuasion, is the prime dynamic that determines how a commercial establishment acquits itself in the marketplace. Moreover, that such dynamism further

extrapolates a belief that the health of any going concern depends on the relationship between those who seek custom, and those who provide it.

Accordingly, this paper will persist with the notion that the bi-polar association alluded to above is predicated on the primacy of the customer; that he/she enjoys the dominant role. Therefore, there exists a tacit acceptance by the subordinate entity, recognising the immutable nature of this arrangement, that it may debatably entail a degree of ‘marketplace injustice’ from an overtly socio-moral standpoint. (Borna and Stearns, 1998: 39; Sorell, 1994; Heinonen and Strandvik, 2015). Moreover, the paper will enquire about the ethical efficacy of this affiliation, in that tensions may arise within the target organisation as a result of misperceptions, ill-considered policy statements, and so on, but with the implicit acceptance throughout that ‘consumers and organizations meet[ing] their respective goals is the *sine qua non* of the marketing concept’. (Borna and Stearns, 1998: 40)

Objective 1

Initially, the paper will discuss some of the more esoteric and abstract arguments that characterise the customer-vendor ‘who is right, who is wrong’ conundrum, with a view to clarifying the convoluted and philosophical nature of the various ways of looking at this *problematique*. Subsequent to that, the study will move on to juxtapose the ethical and commercial tensions that arise when customer primacy is at variance with employee rights when they are charged with implementing, and abiding by, company policy.

Objective 2

Further, this paper intends to examine the axiom that the customer exercises the right to impose his or her worldview in terms of rights and, notably, responsibilities. Rhetorically, the outcome would be thus: irrespective of any notions of commercial morality, is it not the customer who is doing the vendor the favour by patronising his establishment, and buying his goods and services, rather than the other way round? The logic of the argument assumes, therefore, that the customer can take his or her custom elsewhere, whilst the vendor is static in space and time, and in relation to the purchaser. Therefore, logically, there exists an apparent imbalance in commercial power that comes down squarely in favour of the buyer, especially when one considers the matter of competition in the marketplace. (Fonfara *et al*, 2018.)

Topic

There seems, *prima facie*, to be a compelling *raison d'être* here that both precedes *and* supersedes protestations to the contrary, including the concept of ‘consumer error’ alluded to by Friedman (1998), and the converse, oft-laboured notion of ethics in business discussed by Cohen (2001). However, one may have to appreciate that the twin accepted wisdoms of right and wrong occupy a distinctly bi-lateral association *vis-à-vis* the two elements of the exchange. In other words, one may have to concede the idea that Friedman has a point after all, and it is much wiser to accept the fallibility of the customer in order to present a rounded view of the paper’s aims.

But, the vexed question of ends and means arises; it renders the argument increasingly opaque, as Business School scholars and commercial practitioners alike attempt to align their arguments to better reflect reality. What may be evident is that not all parties to the quandary can be right, all at the same time; much depends on the nature of the association between buyer and seller, the type of market, and the outcomes of their respective transactions. Borna and Stearns (1998) refer to the ‘airline seat over-booking’ paradigm when responding to Sorell (1994), and his belief that this amoral activity is questionable by the consumer, and the response by airlines to block over-book ‘rather than face the economic hardship of empty seats’ merely compounds the capriciousness of the customer’s pre-disposition to waste company time and resources for selfish purposes. Borna and Stearns (1998: 39) take the view that, irrespective of any negative knock-on outcome of a consumer’s seemingly unethical behaviour, there is an irrefutable, compelling reasoning to the primacy of the purchaser, which sits comfortably with Goldzimer’s assertion that ‘Today – and in the future – the orientation is toward what the customer wants and needs. *Being market-driven is not enough anymore*, because global competition for the consumer’s dollar is stronger than ever and still growing.’ (Goldzimer, 1990:3) (Emphasis included.)

In times of austerity such as what we currently witness, this applies even more rigorously. Chasing increasingly scarce Dollars, Pounds, Yen or Euros virtually guarantees a near-Darwinian scramble amongst competitors to emerge relatively unscathed from the Covid-19 pandemic whilst one’s rivals go to the wall, global chaos and uncertainty notwithstanding. (Elliott and Treanor, 2008)

Social responsibility: from within and without

Friedman’s (1970) work on social responsibility in terms of maximising profit for shareholders, and being at least partially beholden to the firm’s obligations regarding customers, suppliers, employees, and so on, is well documented. (Gossling, 2011). The basis for this theoretical approach pre-supposes that, by taking a multi-lateral position and adopting an even-handed philosophy, the firm creates a form of ethical, benign global commons that ultimately benefits all those entities with whom it has dealings, or associations, but noting that some disagree with this notion on ‘altruistic’ grounds (Lantos, 2002). Evidently, there exists a tension between what is moral and immoral, dependent on the perspective one takes. Lantos (2001) takes the view that unless Corporate Social Responsibility (CSR) is subordinated to anticipated financial dividends, it abrogates the necessity for any form of CSR. In his (2002) paper, he still persists with this notion. However, Lantos and others of his ilk appear to ignore the human element in the search for an elusive way of untying the Gordian Knot relevant to the corporation not as an unyielding, inhuman edifice but an entity that is primarily of, and about, people. Lantos’ argument is, however, seductively persuasive, as he states:

The analogy between individuals being generous and organizations being munificent is misleading. Unlike humans, who are multifaceted with diverse interests, corporations are formed for limited economic purposes that include profit maximization for their owners but not promoting societal welfare. Also, in contrast with wealthy individuals, who are expected to be compassionate and share their good fortune with the less

fortunate, individual stockholders might not be particularly wealthy and could be counting on a profit stream for future private needs such as retirement and college savings (Lantos, 2002: 207)

Be that as it may, it exhibits a form of ontological amnesia that discounts the needs of a wider socio-commercial community based not on the acquisition of wealth for upholstered privilege not shared by all, including employees who may be languishing on the economic periphery and subject to the strictures of a minimum wage. (Sorkin, 2015) Moreover, the supposition that organisations cannot invest in societal welfare suggests an unmoving, monolithic construction that exists outside of the social *milieu*. Clearly, as charitable works and similar activities undertaken by organisations informs, this is emphatically not the case. Companies and similar commercial concerns cannot exist outside social association, and cannot therefore proceed under the illusion that they are separate. There is an inexorable symbiosis between the social and commercial worlds; one which cannot maintain viability in total isolation from the other. As Hutton explains, Lantos' thesis is inherently suspect, thus:

The firm [that is, the corporation] is not only at the heart of the economy; it is at the heart of society. It is where people work and define their lives; it delivers wages, occupation and status. It is corporate citizen, economic actor and social institution. (Hutton, 1995: 111) (Emphasis added.)

Moreover, this ethos can be taken beyond the hard economics of supply, demand and profit; to be sure, there needs to be pure supply-side econometrics to meet customer needs on time, and the obviously intimate interface of customer-company relationships requiring hard-edged business acumen. There is also an implicit appreciation of confidence (albeit in short supply at the moment), and the priceless concept of trust, as Evenson (2007) alludes to. As a general tenet, this is also about accepting the civilised ideas of 'doing the right thing' and also 'do everything with integrity. Everything' (Evenson, 2007: 25), which of course entails conducting positive and ethical relationships with employees, as well as customers, so that each can share the dividends of even-handed behaviour. (Zaefarian *et al*, 2017)

The point of conjoining customer-employee concepts in a close commercial relationship is to maximise material and abstract outcomes for both parties. In the business universe, neither can exist without the other as the essentialist element accepts that bi-lateral exchanges between the two are inevitable if profits are to be realised, and that the employee's remuneration can fructify in the wider economic sphere.

Also, there is a recognition that the nature of work, and its effects on staff morale, provide a correlation between good experiences and the merely indifferent characterised by general apathy. As Scroggins (2008: 57) notes, 'meaningful work experiences are critical to employee engagement, performance, and turnover.' Notably, a significant aspect of the roles and responsibilities within organisations, rests with the changing nature of staff management techniques, and the perhaps not-so-subtle change from 'Personnel' to 'Human Resources' departments and the role that this division has with any sizeable business concern, as Scroggins elaborates:

One argument presented ... is that human resource management professionals can make an important contribution to the creation of meaningful work experiences that impact performance behaviors and retention. These professionals are in this position because they are responsible for, or at least influence to some degree,

those activities that constitute much of our work experience. They make decisions regarding compensation and other benefits which affects the degree to which the job supplies the employee with valued job outcomes. (Scroggins, 2008: 58)

This doubtless also encapsulates matters relating to discipline within a commercial entity of any meaningful size, and the way in which employees are regarded by all management divisions. In other words, this comes down to whether employees are regarded as true human assets, or economic units occupying space on the company accountant's balance sheets. By avoiding a linear, one-dimensional approach to relations and adopting a more pluralist attitude, companies are much better placed to meet expectations and hence, to enjoy greater profitability that ensues from mutual regard and observance of common values. In that sense, a multi-lateral relationship (management, staff, and customer) results in 'win-win' outcomes rather than the 'zero-sum' paradigm characterised by fractious exchanges and a concomitant erosion of the projected customer base.

From a further, internal perspective, there may doubtless also be some worth to be accrued from 'top-down' management initiatives that seek to explore matters of inclusivity, designed to foster an atmosphere of mutual regard that does not lend itself to a 'them and us' mentality that damages interactions and projects a poor image. As Walker (1990: 75) would put it, in terms of inculcating a 'company' ethos:

The greatest impact can be achieved if the whole organization experiences the programme, mixed across all disciplines and levels, managers and staff on the same programme ... Whatever the choice of venue, it must provide a quality environment – both materially and personally – to support the message of the programme itself.

Allied to these thoughts is the belief amongst 'progressive' companies that staff are greater than the sum of their parts – they may be 'assets' in corporate-speak, but they are people above all. By instilling a sense of responsibility in staff, the organisation *in toto* benefits exponentially, certainly in terms of external customer needs. As Stone and Young (1993) observe, policies that empower staff by implementing better customer care work very well. Taken a stage further, directives that ensure improved quality results for those designated to carry out these guidelines appear to produce better customer satisfaction. (Santouridis and Veraki, 2017.) Moreover, companies attract long-term benefit from affording greater responsibility to employees, which in itself is tantamount to increasing confidence and reducing negativity. (Stone and Young, 1993) As this paper will now go on to explore, this also has to take account of the concept of leadership

Leadership as motivational enforcer: some thoughts from Japan

'Entrepreneurship [taken to be leadership in context] has long been recognised as a leading driver of development in local, regional and national economies' (Gupta *et al.* 2004:247. For a further discussion of 'entrepreneurship' see also: Faulkner, 2007) To be sure, the importance of leadership at managerial levels should not be underestimated; to this end, as Fritz (in Brown, 1997) says, that management recognition of customer service not being a department but a philosophy touches on the whole point of the debate, and implicitly in the sense of leadership as a barometer of innovation and recognition. As Fritz goes on to elaborate, it is about the

fact that ‘upper management *must lead the way* by believing in it, supporting it, and focusing on it’. (Fritz in Brown, 1997: 43) (Emphasis included.) These thoughts are endorsed by Barwise and Meehan (2004) in discussion of the automotive industry, and with due regard to Japanese management techniques, namely the ‘Toyota Way’, that encompasses continuous improvement and respect for people (with the inherent qualities of leadership, mutual respect and teamwork. Simply put, we have here a statement of intent drafted by senior management as a clear and unambiguous signal that, whilst management must be allowed to manage, nonetheless every employee is seen as a valuable and *motivated* member of a team acting in concert for the betterment of their organisation. As Gupta *et al* (2004: 245) go on to agree with Cho, this is about

Entrepreneurial leadership had much in common with transformational leadership in that the leader [Cho] evokes superordinate performance by appeals to the higher needs of followers [employees]. However, the entrepreneurial leader’s ability to evoke such performance is founded in the context of the firm’s need to adapt to emerging ... contingencies. Thus, the basic challenge is to create as willingness in followers to abandon current conventional but career-secure activities for creative, entrepreneurial action.

This, consequentially, is born out by results: As of 2004, Toyota’s market capitalisation was higher than ‘the combined market value of DaimlerChrysler, Ford, and General Motors.’ (Barwise and Meehan, 2004: 151) Also, and perhaps at variance to Lantos’ (2001) assertion of profit as the prime motivational impetus, it is nonetheless put forward here, that businesses are inherently *communities* in the micro sense, if the wider socio-economic location is situated at the macro level of analysis. What is consequently not in doubt is the observation that both customer and vendor enjoy a synergetic relationship that realises mutual exchange reward, in terms of quality product purchase and the injection of pecuniary gain, respectively. Through this medium of change, therefore, managerial leadership and the knock-on effect on customer and employee satisfaction undergoes a process of evolution and rejuvenation, to meet the needs of today and tomorrow.

However, this paper recognises that there are an almost infinite number of personality variables commensurate with an appreciation of the complexities of the human condition, and that studying the psychology of individuals and collectives is an ongoing project. Yet, one must nevertheless arrive at some form of analytical end point in order to provide as complete a picture of the subject area as possible, but which must also factor in the allied issue of total quality management, as this paper will now go on to briefly discuss. As Buch and Rivers (2001) acknowledge, there is an intimate relationship between Total Quality Management (TQM) and issues of leadership and company culture. Moreover, they stress the importance of the twin concepts of leadership and culture by drawing initially on a model that places emphasis on flexibility, and the ‘freeing up’ of rigid patterns and norms that has been the erstwhile accepted methodologies for doing things.

The implicit suggestion that Buch and Rivers arrive at, therefore, (and as a result of exhaustive research) is that the ‘culture change is difficult to sustain’ especially in terms of presumed necessary internal alterations and challenges posed from without (2001: 371) and that such times predicate the need for high-quality leadership. In order to ensure that employees do not ‘revert to type’ and take up obsolete or non-preferred practices, matter of training and reward become increasingly significant, noting the bearing this may have on customer

relationships. The problem with this, though, is that no amount of training or assumed reward brings automatic employee satisfaction, if leadership qualities are found wanting. Naturally, the interdependent relationship between the buyer and the seller is heavily weighted in favour of the former, for reasons discussed earlier in this paper. This, then, is the immutable law of supply and demand, a fact that remains inviolable for the foreseeable future.

Conclusions

This paper has advanced the proposition that the arrangements between the customer and vendor may not be quite as established and clear cut as may have been originally considered. What has been put forward is that there are underlying tensions in an erstwhile seemingly straightforward association, including abstract concepts like morality, ethics, entrepreneurship, managerial acumen, and leadership. The significance of these thoughts have particular resonance today, given that the global economy displays signs of having submerged beneath a full-blown contagion, the final effects of which cannot yet be fully analysed. In such a volatile socio-economic climate, therefore, one may wish to re-visit the vexed issues of which of the above entities enjoys the superior aspect of their arrangements. The point may, indeed, be moot as neither side can completely escape the attritional nature of commercial shrinkage where confidence is conspicuous by its absence, and liquidity is ensnared in the twin headlights of lender-borrower fear and economic atrophy.

Suggestions:

In the final analysis, what remains is an acceptance that, whilst the customer may arguably always be right in order to ensure a healthy balance between trade, profit and mutual regard, there is nonetheless a clear limit to how far matters of ethics and morality can be stretched to accommodate this belief. Customer satisfaction is thus rendered meaningless if it brings a reductive quality to the lives of all those who partake of this arrangement. This extends to the need for further research to be undertaken to broaden our knowledge base for this area of investigation.

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**THE EFFECTIVENESS OF INFLUENCER MARKETING:
FACIAL COSMETICS TARGETING GENERATION Y AND GENERATION Z
IN BANGKOK**

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ABSTRACT

The research aims at analyzing and determining the effectiveness of Influencer marketing of facial cosmetics as perceived by Generation Y and Generation Z in terms of their word-of-mouth communication and purchase decision-making and exploring the significance of the types of the advertising process, communicative channels, and different methods of communication which are used to convey information about facial cosmetic products to Generation Y and Generation Z. This study utilizes an analysis of these topics through the use of a qualitative research methodology applying an online interview to gather the information. With this study, it identified the value influencers have in the new advertising media while their communicative talents and various channels of social media have allowed them to reach out to the Millennials and Gen Z. The results therefore show that the many viewers and individuals who find their purchasing decisions and daily lives impacted by their favourite influencers are drawn towards content that is quick, easily accessible and contains entertainment value as the charisma of the influencer is highly valued based on the findings which show an increasing number of interviewees who find TikTok to be a primary and influential platform and wholly agree.

Keywords: Public Relations, Effectiveness of Influencer Marketing, Facial Cosmetics targeting Generation Y and Z.

1. Introduction

Influencer marketing has become a significant aspect of many marketing tactics for many companies. Each generation, be it Generation X, Y and Z showed slight variations in their likes, dislikes, and what appeals to them may vary according to their differing needs and behaviours. As noted by Dhanik (2017), “influencer marketing -- if you're one of those viewers -- is seen as a way, maybe even *the* way, to connect with Gen Y and millennials.” (p. 1). Connecting with the audience is an important part of marketing. It is observed that influencer marketing is steadily replacing conventional marketing methods.

The purpose of this study is to identify the types of communication processes, and the most effective channels to communicate to audiences for the influencer, as part of the betterment of understanding of how marketing utilizes this. By understanding how influencers are the future of marketing, it gives the opportunity to understand the methods of how to best communicate with Gen Y and Gen Z, who are the main audiences of most influencers of facial cosmetics. Understanding the correlation between the influential power of influencers over Gen Y and Gen Z can help to better utilize the talents and relatively not wholly utilized form of advertising.

The notable challenges and gaps found to limit the overall effectiveness to perform this research is the current COVID-19 pandemic which caused issues with doing interviews. The other issue that was experienced is the reliance on internet connection and not all participants had a clear connection and weren't able to share their full stories.

Thus, the study will cover the related literary materials to help offer a background for the research and allow for a foundation of previous research to give further insight and clarity into the research topic as well as an understanding of influencers and facial cosmetics. Then it will incorporate the research method applied by this paper to gather the appropriate data and form a reasonable conclusion to answer the hypothesis proposed at the end of the literary review.

2. Research Objective

1. To study the effectiveness of Influencer marketing of facial cosmetics as perceived by Generation Y and Generation Z in terms of their word-of-mouth communication and purchase decision-making.

2. To explore the significance of the types of the advertising process, communicative channels, and different methods of communication.

3. Literature Review

3.1 Theory, Concept and Related Research

In the field of influencer marketing, Nazeral (2017) denotes that it is “rewriting the marketing rulebook” (p. 1). As noted, the growing potential of influencer marketing has definitely posed great changes. It is worth noting that influencer marketing shares little resemblance to celebrity marketing, as influencer marketing involves quite a bit of brand familiarity, making stronger relations with the target audience and relatability which celebrity marketing does not have, as they are meant to be famous and memorable. Furthermore, according to Nazeral

(2017), the “how” matters as much as the “who” (p, 4). This emphasizes the importance of influencers who give ‘demos’ help to drive home the value and qualities of the brand’s product more efficiently.

Influencers are the future as noted by Kadekova and HolienČinová (2018). The importance of social media influences has offered a means to present new opportunities, creating frontiers into marketing and communication with virtual opportunities ever-present. The researchers show that social media influencers are “winning over the internet” (p, 1). It shows that the influencer is able to have strong and profound impacts on their audiences and what they say can shape or mould someone’s perspectives towards something, by presenting their point of view. Furthermore, Kadekova and HolienČinová, (2018) have identified that there are different types of influencers according to their categories. In the particular order, “Bloggers, YouTubers, Instagrammer, and Celebrities” (p, 92) make up the list of social media influencers.

Based on the study by Hjortass and Øverås (2018), the applied of the theoretical framework of Principles of Persuasion and PSI or parasocial interaction is utilized in the research which reveals that marketers can see the significance of influencers and that factors are not the driving force but rather a guideline for influencers and marketing strategies should be geared towards that. In this particular research, De Veirman et al. (2017) showcased the “far-reaching potential and growth” of social media as the future of marketing. Influencers is the core of this, as it is shown that Instagram is one of the faster-growing media sites and this study uncovered why (p. 1). The study thus revealed in earnest that impressions do significantly determine the believability of an influencer based upon the number of subscribers.

According to Lou and Yuan (2019), the researchers uncovered the fundamental importance of ‘message value and credibility effect’ when it comes to branded content on social media (p, 146). Here, it is analyzed and proven that influencer’s attractiveness and influence is perceived based on the credibility of its sources and information.

Furthermore, according to Guruge (2018), the contribution which relates to celebrity endorsement and social media influencer marketing is definitely huge. That is, Instagram is one of the fastest-growing sources of influencer marketing that is credited to be worth as stated: “\$ 2 billion in 2018” (p. 17-37). Based on the topic of The effectiveness of Influencer marketing with regards to facial cosmetics as perceived by Generation Y and Generation Z, the application of source credibility theory which involves the “3 R’s” Reach, Relevance, Resonance (Diza, 2018, p, 14) is this most appropriate. Reach stands for the capacity to deliver content to the wider audience. Relevance associates with the strengths of the relation between brand and topic with the audience. Resonance refers to the ability to insinuate or influence a desired type of behaviour into the audience.

According to the research by Braatz (2017) the study utilizes the theory of influence it advocates for the belief that a minor percentage of people possesses the talents necessary to persuade a large group of people. Thus, the marketing belief is that it involves targeting these key individuals which will have a ‘snowball effect’, as per deduction based on this study itself.

Similarly, another theory incorporates the two-step flow. This is a research conducted by Ewers (2017) stipulating that there exist key opinion leaders who themselves are very attentive to mass media and thus convert their interpretation of other media and pass it on to the masses.

3.2 Research Framework

According to Kostic et al. (2018), influencer marketing is a new form of word of mouth. Its basis stems from the root of the influential factors of the word of mouth that plays a crucial role in decision making, as it imparts a stronger relatability between the audience and the product. Furthermore, it includes the definition of the word of mouth which is the sharing of information from one individual to another either through face to face, verbal or through social media. This new form of marketing emphasizes social media's ability to target mass groups while still having the same impact of word of mouth. This is where influencers become a major component.

As noted by Kadekova and HolienČinová (2018), it is stated that "The growth of influencer marketing has played a vital role in changing the marketing landscape" (p. 1). Here, influencers utilize several methods to outreach towards their audiences. This method of outreach often takes the shape of tips, guides, and hacks. Typically used by bloggers, and YouTubers to communicate and gain interest in the product that they are promoting.

4. Research Methodology

4.1 Research Design

The research used a qualitative research method and conducted an in-depth interview online with key informants. The informants were selected based on their age-group of 16 to 33, to match the Gen Y and Gen Z age requirements. Their selection was based on the relation with the researcher, as the COVID-19 prevented other interpersonal connections with strangers at the time. These responses were then further analyzed using a combination of both a deductive approach, as well as a thematic content analysis. The research itself was conducted online from June 23-30, 2020, and the information compiled and analyzed on July 1, 2020. The interview itself was sent online via URL to the subject group of key informants on the 23rd. The information itself was gathered by a method of social distancing due to the COVID 19 lockdown. To work around it, the use of face to face video calls was conducted with the respected people, through Zoom and Messenger. The identity of the participants were kept anonymous and thus be labelled as A1, A2, A3, and onwards. This is so that this coincides with professional ethics in regards to the identity and privacy of the key-informants. Furthermore, at the beginning of the interview and to notify them in advance, their consent was requested so that they know that all information given will be strictly for academic uses only. This means their identities are confidential and their responses anonymous.

The data collection process has been noted down in a notepad form, recording their sessions via recording them and using the recording to formulate notes. Their explicit consent is also accepted and their agreement is first established.

The data compiled and put through some key indicators in mind. A) The likeliness of purchase. B) Reason for following influencers based on quality or quantity. C) Preference for direct advertising or subtly influenced types. These themes are based upon the findings of the Literature review which discuss the reason for embracing influencers over standard advertising media and why it is so prevalent. These results are then presented in the findings.

4.2 Population and Sample

The key informants for this research were selected based on their specific demographics; Gen Y and Z, people aged 16 to 33. A total of 20 key informants were selected for this research and split between 4 control groups based on the type of social media platform they have selected after analysis of the data results show which group they will be categorized into. The sample size of 20 is selected since it is a controllable group suitable for interviews to reach an appropriate number of saturation due to the fact that the interview itself is not a complex one and that the sampling technique is limited, given that it is a one on one interviewing session between a single researcher and 20 different subjects who have been selected due to their preferences. Their selection is based on age, an even number of 10 Gen Y and 10 Gen Z for a controlled group.

4.3 Research Instrument

The interview was conducted online using a list of open-ended questions via one-on-one voice calls. The questions are as following:

Interview Questions

- 1) Which channels of social media are you more likely to follow? Why?
- 2) If you see a famous influencer endorse a certain brand of facial cosmetic, are you more likely to buy it? Why or why not?
- 3) Do you follow influencers according to their popularity or the frequency of their posts? Why or why not?
- 4) Will you buy a brand of facial cosmetic that you see your favourite influencer use? Why or why not?
- 5) Will you repeat your purchase and further recommend friends to buy based on the posts promoting the product on social media? Why or why not?
- 6) Based on Facebook, Instagram, YouTube and TikTok, which one do you spend more time on and follow an influencer daily? Why?
- 7) Do you prefer paid influencer post advertising or a more subtle approach by an influencer in endorsing a facial cosmetic on social media? Why or why not?
- 8) Do you regularly purchase facial cosmetic products that you have seen on social media? Why or why not?
- 9) Do you share information often among your friends on facial cosmetics you have seen on social media? Why or why not?

4.4 Data Collection

These responses were further analyzed using a combination of both a deductive approach, as well as a thematic content analysis. The research itself was conducted online from June 23-30, 2020, and the information was compiled and analyzed on July 1, 2020. The interview itself was sent online via URL to the subject group of key informants on the 23rd. The information itself was gathered by a method of social distancing due to the COVID 19 lockdown. To work around it, the use of face to face video calls were conducted with the respected people, through Zoom and Messenger. The identity of the participants were kept anonymous and thus were labelled as A1, A2, A3, and onwards. This is so that this coincides with professional ethics in regards to the identity and privacy of the key-informants. Furthermore, at the beginning of the interview and to notify them in advance, their consent was requested so that they know that all information given were strictly for academic uses only. This means their identities are confidential and their responses anonymous.

The data collection process was noted down in a notepad form, recording their sessions via recording them and using the recording to formulate notes. Their explicit consent is also accepted and their agreement is first established.

4.5 Data Analysis

The data was compiled and put through some key indicators in mind:

- The likeliness of purchase.
- Reason for following influencers based on quality or quantity.
- Preference for direct advertising or subtly influenced types.

These themes are based upon the findings of the literature review which discuss the reason for embracing influencers over standard advertising media and why it is so prevalent. These results will then be presented in the findings. In accordance with the data analysis there are 4 control groups which are separated according to their results once the interview has been concluded for easier analysis and preferred social media platform and have therefore been categorized as;

- A (Facebook)
- B (Instagram)
- C (TikTok)
- D (YouTube)

5. Research Findings

The findings show that from the four social media platforms, Tik Tok is the most popular. TikTok is superior. Since the research results show that TikTok has kept their audiences from being bored and that unlike Youtube which has a lot of advertisements and established content, TikTok delivers entertainment and content within a minute. These minute-long videos help to keep people engaged for long enough to deliver the importance of the message of the content while keeping things concise and to the point. From the research it determines that endorsements play a critical role in influencing the purchasing behaviour of the interviewees and a lot of it is based upon charisma.

Based on the various results from each group the findings show that TikTok has kept them from being bored and that unlike Youtube which has a lot of advertisements and established content, TikTok delivers entertainment and content within a minute. Furthermore, when ranked it showed that Tik Tok is the first place, followed by Instagram, Youtube, and lastly, Facebook. The second most popular social media channel of Instagram as noted from the interview from the participants.

C1 Interviewee says; *"TikTok is my popular choice because it is not longer than a minute and I don't have to wait for 10 minutes to get the content of the video. Their videos on TikTok are short which keeps it entertaining."*

C2 Interviewee says; *"TikTok is my preferred social media channel because the influencers and other celebrities on TikTok create content that is funny and entertaining for me."*

From this sample taken from the responses, based on the popularity of TikTok, C3 to C5 all agree that TikTok is by far a favourite social media channel.

C6 says; *"I like to watch my favourite influencers from TikTok because they are very entertaining and they are also very convincing, they can do it in a minute which helps me make my decision or move on to the next video quickly."*

B1 says; *"Instagram is my favourite because I get to look at a lot of pictures and I like looking at pictures. For me, the image content is important and I like to see pictures that are beautiful."*

B2 said; *"I use Instagram often because I enjoy looking at the pictures from many of the popular people there. They share interesting pictures like fashion style or even short videos that showcase different types of cosmetics that I like."*

B3 says; *"Instagram is my preferred social media channel because it offers a lot of features and is primarily a place for sharing and browsing pictures, it is one of the places I go to so that i can share my own experiences with people"*

For both Facebook and Youtube, the feedback shows a growing lack of general interest in browsing both since the COVID-19 lockdown, as many people are looking for ways to keep themselves entertained.

Based on the majority feedback on TikTok users, the overall agreement aligns with the theory that endorsements positively affect purchasing behaviours. C1, a young woman who spends most of her time on TikTok since the lockdown and since then has made a few purchases online from TikTok, says; *"I make my decision to buy things from TikTok because influencers are very convincing and they are very funny, that is why when they tell me something is good like facial cosmetics I am compelled to buy it."*

C2 says; *"Most of my purchasing decisions were decided when I was browsing TikTok and the most popular person there was very funny and the cosmetics they used were very nice. I really liked the way they said that cosmetics were good for me and they also showed it. That is why I was motivated to try it out myself."*

Based on C2's remark and also C3, C4, C5, C6 and C7, who had the same thinking that was not so dissimilar. All agreed that the influencers who were funny, entertaining and also charismatic won their hearts and also the likeliness to make purchases. However, on the other hand, those from Instagram had this to say, particularly B1, B2, and B3. According to their overall feedback, Instagram's influencers helped show them a

step by step and even how beautiful they looked. For them, beauty and also functionality was what drew their attention.

B1 says; *“When I make a purchase based on the influencer, especially from Instagram, like the skincare product I bought recently was influenced by my idol from Instagram. I wanted to buy it because it was shown very well, I like how she said it made her skin healthier and cleaner and I thought that I should give it a try too.”*

Thus, the question that is “Do you regularly purchase facial cosmetic products that you have seen on social media” is currently utilized to analyze the purchasing frequency and thus determine how effective influencer marketing has been for facial cosmetics to the audiences.

C1 says; *“I do make regular purchases of facial cosmetics products, yes. I do this because I am not often sure of what I want, so I look online to famous influencers or popular people who do cosmetic reviews to get their opinion and then I buy it.”*

C2 said; *“Most of my buying of online cosmetic products is because I think it really works. The influencers say that the product works, then show it from the video. I see it, and I believe them because they do it in a funny way.”*

Both C1 and C2 make their purchases based on the entertainment value of the influencer which becomes synonymous with their marketing style. The findings also state that based on the results from B1 and B2, they both clarify that on Instagram this stands out more prevalently as shown from their responses that acknowledge that they understand Instagram is a good marketing platform but embrace it either way.

B1 says; *“I buy things off of Instagram because I feel that it is a very good place for things to be marketed. Most of my make-up was bought after seeing my favourite influencer use it on Instagram because I want to follow their example.”*

B2 states; *“Influencers have an impact on my buying behaviour because they do something that a lot of other advertisements do and that shows you how to use facial cosmetics without any edits. This makes them trustworthy in my eyes and also helps me know what to do with these cosmetics if I get them, that way it assures me I am making the right choice.”*

However, both B1 and B2 spend a lot of time on social media. They are the first jobbers who earn a decent income and find that they don't have time to watch lengthy cosmetic tutorials and because of that prefer to use Instagram which is much shorter. From the responses of C3 to C7, they are in agreement that TikTok influencers are much more influential from their own perspective as it is remarked by C3 who says; *“My purchases from TikTok are regular because not only do influencer endorse products but they are also offered on sale and in times like this I like to hear that some products that are shown that work is also affordable for me and it motivates me.”*

The findings indicate that the DIY or Do it Yourself trend is what motivates people to do things. As remarked by the interview, and off footnote by one of the interviewees stated; A1 *“Sometimes, I feel inspired by watching influencers are other people who post on social media to copy them. It is taken as a challenge by me because they are just normal everyday people and I feel like I can be like them too.”* The participant remarks have merit, in that most people do feel inspired to participate after watching, as they get motivated to do so.

6. Discussion

Based on the collected data and literature material, there are two notable discoveries of endorsements and effectiveness. It is the focus of this study to identify the effectiveness and significance of influences and the role they play within the advertising and marketing of facial cosmetics. According to the study by (De Veirman et al., 2019) the study suggests that influencers are the new method of communication between organisations and their intended audiences. Notably, is that the similarities of this research coincide with the findings of this study that was conducted. Both share in the same results that influencer marketing is indeed the future and its main target audiences are those of Generation Y and Z. Here, we can see the effectiveness of influencers especially on a platform like TikTok which has shown to be one of the most popular platforms for marketing and promoting as well as influencing the buying decisions of consumers which is shown by the research data that dictates the amount of interest generated by humour and charisma of the individual directly correlates with the purchasing behaviour.

7. Suggestion

(1) When conducting further research into the Facial Cosmetics targeting Generation Y and Z in Bangkok, there are particular areas that should be kept to mind. Focusing on The effectiveness of influencers for facial cosmetics, the targeting of Generation Y and Z within the Bangkok area and emphasizing on online surveys which can better target since they use social media more actively, so reaching them through the method is more appropriate.

(2) Any future research should take into account that there are limitations to conducting an interview approach and there should be steps taken to also conduct further analysis into the communicative paths that influencers utilize and conduct further analysis to understand the significance of incorporating the new technologies that offer a better and improved social media experience.

The practical implications of this research to those who are looking for insight into marketing with social media influencers can take key notes of the up and coming rise of TikTok as a new potential platform for quick, easy access to potential consumers through the audience of the influencers who can deliver the benefits and attractiveness of a product in less than a minute.

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A STUDY OF THE MARKET POTENTIAL OF LATEX PILLOWS FOR COMMUNITY ENTERPRISES NAKHON SI THAMMARAT PROVINCE

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ABSTRACT

The objective of this research (1). To identify potential target markets and the direct competitors. Indirect behavior and competitor behavior. (2). to understand the behavior and needs of the target market (the Customer the Insight. (3). to development potential and market opportunities latex pillows. (4). to promote the marketability and plan marketing strategies for SME manufacturers latex pillows Nakhon SiThammarat Province. Using qualitative methodology by collecting data from interviews of 7 community enterprise groups in Nakhon SiThammarat province. SWOT analysis, internal and external have been applied for analysis qualitative approach. The results of analyzing the quality of the product, showed that the latex pillows were soft and comfortable. Product design helps protect the spine and neck. Analyzing the market found Chinese market is main and big market worth 50,000 million baht / year. Marketing problems in this case are; most of them will produce rubber pillows.

In conclusion, due to improving and developing the number of customers and sales volume, the importance of latex pillows is differentiate in product design & quality, which is playing an important role for positioning the market and unique to increase price. In additional, latex pillows Community Enterprise Nakhon Si Thammarat province should have strategy deficit to suit their own potential to be able to compete in the future.

Keywords: Marketing Strategy, Ergonomic design, Rubber pillow community

1.Introduction

Asian countries is the world's major producer of natural rubber (NR). It accounts for more than 90% of the global rubber output. Thailand is the world's number 1 rubber country with approximately 4.56 million tons or 35.9% of world output in 2017, followed by Indonesia, Vietnam, China, Malaysia and India with 26.0%, 8.6%, 8.0%, 5.5% and 5.0% respectively, and it is expected that Thailand's exports of concentrated latex will continue to grow in line with the direction of the rubber glove industry in the world market and Thailand will continue to maintain a high market share. But Thai exports rubber sheet, block rubber and compound rubber face risks from a drop in demand in China and intense competition from CLMV that has greatly expanded rubber exports to China. As a result, the Thai market share in the Chinese market has decreased accordingly. However,

the price of Thai rubber in the world market during the next 1-3 years. Expected to swing in a narrow range Has resulted in entrepreneurs at risk of stock loss reduced (Chetchuda Chuasuwan: Krungsri Research, March 2018)

Rubber in Thailand has faced a very low price crisis. Government agencies have a policy to promote farmers who grow rubber. In particular, rubber plantation cooperatives to process latex to add value to the production of rubber, such as the production of latex mattresses, latex pillows, etc. In addition, in 2018, there is a policy of the Ministry of Agriculture and Cooperatives to support farmers' institutions to strengthen and export processed products Rubber to be able to export And a response policy to promote the use of tires in the government's concrete . As an administrator, timber system and the promotion of rubber, in various forms, whether it is processed for use as a raw material or processing into products For farmers Rubber farmers institute can increase their income And add the value of rubber to make farmers life more stable, prosperous and sustainable.

Development a Latex Pillow to Meet Customer Requirements. Available from: never thought of marking trade brand and never going to develop on design or original design manufacturers (ODM) Moreover, it has 2-3 companies that have own brand and succeed in local and global market. Then, Thai government supports the research fund to develop the Latex Pillow manufacture from OEM to ODM or OBM. To succeed in the competition market, it is necessary to manufacturer that has to adopt the design strategy coping with meeting of needs and requirements of customers. Designers need to have tool or method to help them finding product attributes that are related needs and requirement of customers.

Nakhon Si Thammarat province is classified as an area where there are many rubber farmers in Thailand in the past 3 years. Community in Nakhon Si Thammarat province was formed to establish a community project to produce products made from rubber, such as the manufacture of latex pillows for head support. There were rubber plantation farmers in Nakhon Si Thammarat province has gathered since being about 14 community enterprises in the early stages of combining into a community enterprise to produce foam rubber. Farmers lack knowledge and understanding about the effects of various factors in the production process on the foam rubber properties. Causing uneven quality of rubber foam products and non-standard products. As a result, the latex pillow could not be sold in the market, resulting in the loss of capital and time including the waste that is caused by the production that is not quality from the aforementioned problems. There are some community enterprises have closed their businesses. Currently, there are still only 7 community enterprises still producing latex pillows.

Therefore, from the research project to study the market potential of the latex pillow for the community enterprises Nakhon Si Thammarat Province, this is an important project to have in promoting and supporting marketing planning marketing strategies for community enterprises to have the ability to increase sales channels. Expand new audience which will bring additional income to the community

2. Research Objective

- (1). to identify potential target markets and the direct competitors. indirect behavior and competitor behavior
- (2). to understand the behavior and needs of the target market (the customer the Insight.

(3).. to development potential and market opportunities latex pillows.

(4). to promote the marketability and plan marketing strategies for SME manufacturers latex pillows,

Nakhon Si Thammarat Province

3. Literature Review

Kotler and keller (2012) states that consumer behavior is the choice, purchase, use of goods or services of individuals, groups and organizations to meet their needs . However, the study of consumer behavior is not ambitious, because consumers is constantly changing all the time.

Adul and Dolaya Chaturongkul (2007) found that consumers are individuals who have the ability to buy (ability to buy) or anyone with money. In addition, consumers must be willing to buy (Willingness to buy) goods or services as well. Some people buy products for personal gain. At the same time, some people buy it for resale or use in production.

Kotler and keller (2012) said that consumer behavior is the study of the motivations for making a decision to purchase goods and services, starting with stimuli that generate demand and through stimuli to the minds of buyers. The buyer's consciousness is influenced by the buyer characteristics and the purchasing decisions are made according to the process. The perceived need or problem (Down Problem/the Need Recognition function) at this stage, the consumer is aware of the problem. Or a need for a product or service, where the need or problem arises from the needs (Needs) arising from internal stimuli (Internal Stimuli) such as the feeling of hunger, thirst and external stimuli (External Stimuli) which may be Caused by the stimulation of the marketing mix (4 P's), for example, the pizzas are seen to eat, so they feel hungry, etc. The factors that make consumers do the decision to buy (at Purchase, Decision). After evaluating the alternatives consumers make decisions to purchase in a variety of areas such as brand, the store brand, quantity, time of purchase and payment method, Then will be the behavior of purchase (Post The-Run Behavior at Purchase) after the customer has made a purchase or service then marketers will follow up on satisfaction after purchase.

4. Research Methodology

This research employed a mixed type of methods. The first part of the research consisted of series of well-structured questionnaires (for management, employee and technician of industries) and semi-structured interviews with key stakeholders (government bodies, ministries, and industries) in participating latex pillows business. The other design used is an interview How customers feel about quality of latex pillows, and field observation at the selected community enterprise was undertaken.

5. Results & Discussion

The respondents are female. 6% to 7.5 ages ranged between 26-35 years, representing a 3% married, with children. Accounting for 38.6% having an education level lower than a bachelor's degree accounted for 48.6% of their occupation in private business / trading Accounting for 34.8% with average monthly income

10,001-20,000 baht The study found that The respondents choose to buy a pillow when the old pillow is damaged. 51.2%. The frequency of buying pillows 1-2 years per time, accounting for 49.8%. The cost of purchasing a pillow is less than 300 baht or 52.8%. The type of pillow that is selected is synthetic pillow. 51.7% of the pillow brands used are Lotus, 36.3% of the reason they chose to buy pillows because they are confident in the quality 40.5% size of a pillow selection is : Standard Size 19 * 29 inches per cent to 67.6 lifespan of pillows influence the decision to buy a percentage 73.7 Place Shopping Center is a mall. goods 71.3 percent have never used, but known natural latex pillows. 64.2% known but never used latex pillows manufactured by "Community enterprises Province "as a percentage of 45.0 known brands or had a pillow timber is Pillow ozone Punic Lo @ Lan Saka percent 18.8 for pillows parameters for Foam Latex quality standards at the pass. g. 1490 / 2559 or ISO. 2741 / 2559 is 300-600 Baht / or a percentage of 50.7 the optional rubber pillow is convenient and easy shopping. Percentage 53.1, the vacuum packaging or normal. Affect the decision to buy latex pillows Percentage 62.1 advertising through television, rubber pillows. Have the greatest effect on purchasing decisions Percentage 38.5. The results of the study revealed that consumers pay the most attention to the factors influencing the decision to buy latex pillow. They focus on promotional prices, have the most part in purchasing decisions. Next is the price, there are several levels to choose from. In terms of marketing promotion, consumers are the least important factor.

Latex pillows are considered a product that uses local raw materials, such as latex, to be processed to create added value. In the past, it appears that government and private agencies support them as technical mentors in manufacturing to build confidence in the world market in quality. Thai rubber-based products are of excellent quality and will be able to be sold in the middle and premium markets around the world. Nakhon Si Thammarat province is the province with the largest number of rubber farmer institutions located in Thailand, with more than 14 institutions, Nakhon Si Thammarat Province is the first province to establish the project. "**Nakhon Sri Model**" to produce latex pillows (Sleep pillow) from 100% natural latex and have gathered together to establish a community enterprise or SME to produce and distribute the most processed rubber products in Thailand, number 14 places if the project is successful will expand the project to other provinces and regions In countries with agricultural and industrial operations, because Thailand grows rubber that provides good quality rubber solution. Therefore making the rubber pillows that are produced are of good quality as well. Latex pillow have a key feature is that they are soft and comfortable. Highly stretchy to support the pressure of the body while sleeping, and there are numerous ventilation holes that allow moisture to escape. It allows for good ventilation, and the ergonomic design protects the spine and neck. Helps reduce snoring and make sleep more. In addition, real latex pillows use natural latex in the production, and there will be latex proteins that helps prevent dust mites and mold which causes allergies. And can be cleaned with a washing machine, so latex pillows are healthy pillows suitable for people with allergies. This makes the latex pillow a product that Chinese tourists are in high demand, and Chinese businessmen have purchased latex pillows from Thailand for their own branding (brand) to be sold in China. As a result, there are manufacturers of latex pillows in the market, there are many products such as latex pillows (sleepers), U-shaped pillows, back sleepers, knee pillows, and donut pillows. The market demand for latex pillow that is the which is preferred by the Chinese market, the main market and the large market that

is valued at 50,000 million baht / year. Marketing problem from the fact that latex pillows are preferred by the Chinese market. This caused for market of latex pillows to have fierce competition, but it turned out that the latex pillows of the community enterprises produced the latex pillow. Nakhon Si Thammarat Province has faced marketing problems such as

1. Most of them will produce rubber pillows. (Sleeping pillow) makes latex pillows not different product because they have the same features, just use different brands (brands) with 7 brands (brands), namely 1) Ozone Phulo @ Lan Saka, 2) the brand of a central unit. 3), based on the body by protocol packet. 4) by Junior Service Pillow 5), Star Latex 6) Sisun Organics, and 7) Healthy, Service Pillow the Pillow Community production of rubber. Nakhon Si Thammarat Province hopes that Will produce premium quality latex pillow or grade A to be able to sell in the middle market and premium market. Instead, they face inventory management problems for waiting for sale because they have large quantities of inventories. As a result, some community enterprises have temporarily stopped producing latex pillows for 3-6 months due to the lack of orders from customers.

2. The production of latex pillows is **“Handmade”** with a production cost of about 270-280 baht, making it unable to compete in price with the rubber pillows of the injection industry.

3. Since the latex pillow is a product that is sold the same, it will differ only at the price. Make the past Community enterprises producing latex pillows Province Number 14 policy sales, and the number of minimum conditions vary, resulting in price competition, which is how to survive the competition with the **Red Of Ocean** is doing a large number of similar businesses And each other competing to reduce, exchange, give, and undercut the price fiercely until the size of death to one side, equal to doing business in the bloody sea, the final result is the inevitable loss of each other because of the price cut.

Although there are sales channels in both offline markets, namely 1) sales in front of the manufacturing plant, 2) in-store sales, 3) sales through dealers, 4) consignment by location, tourist destination, and 5). Participate in various trade fairs and online marketplaces, including Facebook, @Line, Instagram, your own website and others. But not yet sold through channels such as Lazada, Shopee and e-bay, thus unable to stimulate the sales of latex pillows to increase as expected

Summary and Recommendations

The research finding from data collection and SWOT analysis, as well as the Strategic Advantage (SA) analysis and Strategic Challenge (SC) in marketing strategy planning of pillow manufacturing community enterprises. Rubber Nakhon Si Thammarat, so it presents a marketing strategy for a pillow timber in a strategic marketing mix (Marketing A a Mix Strategy's), which is to meet the needs of customers, there are 4 main product (the Product), price (Price). Place of distribution (Place) and promotion (Promotion), all 4 aspects must be in the same direction in order to meet the needs and demands. The satisfaction of the consumer will returns to the purchase service again until it becomes loyal to the product or brand and eventually becomes a loyal customer. The marketing strategies are as follows:

Community enterprises Nakhon Si Thammarat product strategy should be used by Emphasize on differentiation strategy of products (latex pillows). Enterprise should improve product to be different from competitors such as production processes. Packaging Quality, standard, raw materials, etc., because at present, the latex pillow is a product that is the same as a latex pillow. (Sleeping pillow) from 100% natural latex to the narrative (Storytelling) as a model of successful and award-winning " 7-11 the SME Thailand sustainability ," the year 2018 under the pillow timber. The "Sire " brand can be born in the Chinese market. In spite of sending out health latex pillows for only one year, using storytelling strategies

For the price strategy, lessons from doing business on the concept of the Red Of Ocean such a pricing strategy does not focus on price competition , but should focus on "the competition by quality" and creating a " difference " is the identity of the brand (brand) by operating the business based on responsibility throughout the supply chain from upstream to downstream, based on the White Ocean Strategy (WOR), which is an important strategy to overcome economic and environmental crises. Up to now, people are facing on the balance of society, people and target groups of all sectors (People), natural resources. Environment, both physical and mental (Planet) and profit that are appropriate and shared with the public (Profit) with a commitment, faith (Passion) to work. Therefore the driving social change for the better for the Sustainable Development Goals (SDGs), enterprises should focus on adjusting the business of selling latex pillows through E-commerce or E-commerce channels because e-commerce has lower investment budget than traditional business because E-commerce is the future of the commercial world of scale. Small and able to trade without borders around the world 24 hours a day, it will help expand the market and reach more target customers, in line with Jack Ma (2018) saying 80 percent of the next 30 years Of small businesses will benefit from globalization, which has implications for the economic and business growth of countries around the world by 2030, the more 85 % of businesses will be e-commerce (E-commerce) and 99 % of trade on the line and less than 1 % to trade on off line for community activities. Therefore, the potential of E-commerce business should be developed urgently because it will make the community enterprise become **"Fast Fish, Slow Fish"**, able to grow exponentially and survive.

In terms of sales promotion advertising should be emphasized on the quality of the product. Latex pillow is an important selling point, for example, high resilient latex pillow Relieve pain in the neck, waist and shoulder incompressible easy access dust reduces allergies reduce snoring by more than 60% in last 10 years and odorless rubber because of the extraction of proteins from the rubber, advertising should be used through various media such as websites and online media. It will be an affordable and affordable way by offering three languages: Thai, English and Chinese to penetrate both local and international markets. The above method is a pull marketing strategy, focusing on advertising rather than sales by trying to stimulate consumer demand for the product because it believes that when the consumer sees the ad. In the store, the salesperson should be a high-quality two-way communication through talking or guiding the use of the product to each consumer. Direct marketing by person is a feature of offering news and special information to potential customers, as well as helping to advertise and provide reliable product information on the properties and benefits of latex pillow products to create awareness and create good feelings. Towards latex pillow products, it will help consumers to

trust and urges them to buy by salespeople combined with sales promotion as a push strategy is suitable for small brands. For example, community enterprises that sell latex pillow products in the industrial market should focus on self-promotion strategies by building relationships with bloggers in the latex pillow business group to generate favor and interest from customers to motivate them. Buying more easily, should focus on supporting local Corporate Social Responsibility (CSR) activities by cooperating or promoting activities that benefit the society of the community, such as scholarship donations. Latex pillows and playground with rubber block flooring for students, schools in Nakhon Si Thammarat province, etc. to create educational opportunities and develop various aspects for students as public relations are one-way communication about commercial news of the product. Through the public media, it is characterized by a new product offering and evaluates the product. The objective is to create awareness, learn, change attitudes and support the decision to buy latex pillow products of community enterprises.

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THE DIGITAL LITERACY OF THE SMALL AND MEDIUM BUSINESS WORKFORCES IN THAILAND

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ABSTRACT

The problems and challenges faced on the road to becoming digital and analyses a new approach for business industries to initialize their digital transformation. Business owners or executives must consider about their business transforming to the digital era, crafting strategy for the purpose of achieving sustainable innovation in the face of the reshaping of the industry and the market and how companies can overcome these obstacles and become digital. Digital literacy is another significant consideration focused on developing the human capital force. The findings reveal that the predictor variables of photovisual ($\beta = 0.174$, $t = 2.357$, $P = 0.000$), reproduction ($\beta = 0.211$, $t = 2.579$, $P = 0.000$), branching ($\beta = 0.243$, $t = 4.857$, $P = 0.000$), information ($\beta = 0.155$, $t = 4.582$, $P = 0.000$), and socioemotional ($\beta = 0.257$, $t = 2.248$, $P = 0.000$) are achieved significance at the 0.05 level.

Keywords: Digital Literacies, Digital Skills, Workforces

Introduction

The digitalization of a growing number of new business opportunities, including new types of products and services goods is huge access to crowd-sourced. These players are taking advantage of big data, powerful analytics, artificial intelligence, and other key innovations to drive growth. On the other hands, the industries are destined for technological disruption. Many businesses and industries are being disrupted by digital technology. While the revolution of digital technology is expected to impact the overall economic landscape, it is clear that these innovations are disrupting ecosystems in most of the industries. Developing countries like most countries

in South East Asia have the opportunity to transform its economy and to contribute to the development of the digital economy. Although these economies are characterized by high added value, faced with numerous obstacles, many developing countries cannot adequately respond to the demands of the digital economy.

The Digital Literacy Challenges Facing the Growth of Digital Economy

The problems and challenges faced on the road to becoming digital and analyses a new approach for business industries to initialize their digital transformation. Inadequate access to the latest technology, sophisticated telecommunications infrastructure, low computer literacy as well as numerous cultural and socio-economic factors are just some of the challenges that developing countries have to face. The threats for the industries in the business environment is the increasing competition in a dynamic environment where traditional boundaries are shifting. For example, telecommunications companies or land line telecom has been replaced by voice over internet protocol (VoIP) (Yovanof, and Hazapis, 2008), and many social messaging applications such as WhatApps, Line, and WeChat. Therefore, business owners or executives must consider about their business transforming to the digital era, crafting strategy for the purpose of achieving sustainable innovation in the face of the reshaping of the industry and the market. One of the main purposes of this research is to seek the answer that how companies can overcome these obstacles and become digital.

Digital Literacy

In the digital economic climate, most businesses try to maximize return on investments on multiple levels. Due to their versatility, digital technologies may be an important factor in reducing costs and at the same time increasing the value offered by information and communication technologies. Although most companies have realized the need to digitize, various challenges are inhibiting them from starting or benefitting from digital transformation, especially for the SMEs. Basically, the major barriers for SMEs are related to insufficient IT structures, lack of technical skills, inadequate business processes and high implementation risks and costs (Leipzig, Gamp, Manz, Schöttle, Ohlhausen, Oosthuizen, Palm, and Leipzig, 2017). Generally speaking, The efficiency, whereby ventures can utilize digital business through highly scalable infrastructures. Thus, the digital decade has seen businesses taking advantage of lower price/performance levels of computing (hardware and software) as well as global connectivity through standard protocols such as the Internet, mobile web, and application to adapt their business infrastructure to the new digital era. Therefore, digital transformation challenging for traditional businesses require hardware infrastructure, software infrastructure, and digital literacy (Boonnoon, 2014; Bharadwaj, El Sawy, Pavlou, and Venkatraman, 2013; Eshet-Alkalai, 2004; and Ziphorah, 2014).

Participating in the digital revolution requires change; acquiring new skills and knowledge; new systems and processes; new partnerships; new forms of collaboration and investment in new digital strategies, people skill, business procurement and digital tools. Furthermore, this has big implications for jobs as workers are finding themselves with outdated skills and struggle to match the demands of these changing business models. Change

on this scale can create uncertainty, doubt and many other real or perceived barriers to progress. The elements with the greatest influence on success are clear targets for organizations' key performance indicators and clear communication of the transformation's timeline. These categories suggest where and how companies can start to improve their chances of successfully making digital changes to their business.

Digital literacy is another significant consideration focused on developing the human capital force. In ASEAN, the citizens have the skills needed to thrive as digital disruption creates both risks and opportunities for workers. The workers are dedicated to re-skills and up-skills of all types of workers in the digital ecosystem. (Nguyen, 2020). The main objective to re-skill and up-skill is to convene group of like-minded organizations united in their new digital skill sets.

Since the change of technologies and widespread diffusion of the digital economy, it led to innovation in business models, which in turn allows consumers and businesses to connect around the world any time. The digital economy provides business an ability of the transformational effects of new way to use the data as in the fields of information and communication. It gives rise to certain form of new business models, which is important to the business to adapt in the new environments. Digital skill sets have been among the most popular expressions featuring in the curricula of the last few years (Dani, 2013; Jukes, McCain & Crockett, 2010). The information literacy concept has been adapted to include ICT. According to Huerta and Almazan (2007), the digital literacy is based on five skills, including photovisual, reproduction, branching, information, and socioemotional.

Photovisual

The photovisual skill refers to the ability to use graphical user interfaces. This skill also includes the user's ability to understand information delivered through different sensory channels. This skill is specific to the digital environment; it describes the ability to use computer and digital devices (Huerta and Almazan, 2007).

Reproduction

The reproduction skill refers to the ability to synthesize and analyze the information gathered to create an original piece of work. The analytical skill is used to examine the big data, gathered from online and offline sources, by reproducing and manipulating preexisting digital text, visuals, and audio pieces Huerta and Almazan, 2007).

Branching

The branching skill refers to the ability to navigate in a nonlinear environment to find the desired information. This skill is specific to the digital environment through knowledge domains, such as in the Internet and other hyper- media environments (Huerta and Almazan, 2007).

Information

The information skill refers to the ability to assess the quality of the information retrieved. The reproduction and information skills are not unique to the digital environment but they are increasingly relevant to this environment because of the great deal of information available. The skill is to consume information critically and sort out false and biased information (Huerta and Almazan, 2007).

Socioemotional

The socioemotional skill refers to the ability to interact with other people on the Internet. A user with socioemotional ability must be familiar with the rules of interaction on the Internet, being able to communicate effectively in online communication platforms such as discussion groups and chatrooms. The socioemotional skill reflects the fact that ICT access is not only used as a means for gathering information (Huerta and Almazan, 2007).

Research Methodology

The research design is used quantitative research methodology. The survey is used to establish a baseline on Almazan's the digital literacy on five skills. The total sample for this study consists of 400 samples who are working in SMEs, including staffs, supervisors, and managers. Descriptive, frequency, percentage distributions, means are used to describe and report the information collected. Furthermore, the data obtained is analyzed by Stepwise Multiple Regression.

Results

The result shows the distribution of usable responses by age; 32% report their age to be between 18 and 32; 24.25% report their age to be between 33 and 40; 26% report their age to be between 41 and 50; 5.75% report their age to be between 51 and 60; and 12% reports his/her age to be over 61. In terms of respondent's level of education, 15 (3.75%) reports high school as their highest level of education. 76 (19%) report having some college education, 228 (57%) indicated they have a bachelor's degrees and 81 (20.25%) reported having master's degrees or higher degrees.

Table 1 shows the respondents are asked their opinion regarding elements in digital literacy readiness based on five skills. Respondents agree that digital skill is challenges facing the growth of digital economy, which photovisual (mean = 4.12), reproduction (mean = 4.02), branching (mean = 4.11), information (mean = 4.01), socioemotional (mean = 4.09), and the average (mean = 4.07).

Table 1 The Mean for Digital Literacies and Skills

| Digital Literacies and Skills | Mean | SD. | Ranking |
|--------------------------------------|-------------|-------------|----------------|
| Photovisual | 4.12 | 1.43 | 1 |
| Reproduction | 4.02 | 1.72 | 4 |
| Branching | 4.11 | 0.55 | 2 |
| Information | 4.01 | 1.20 | 5 |
| Socioemotional | 4.09 | 0.93 | 3 |
| Average | 4.07 | 0.77 | |

Table 2 shows the significance of each coefficient for each independent variable. It reveals that the predictor variables of photovisual ($\beta = 0.174$, $t = 2.357$, $P = 0.000$), reproduction ($\beta = 0.211$, $t = 2.579$, $P = 0.000$), branching ($\beta = 0.243$, $t = 4.857$, $P = 0.000$), information ($\beta = 0.155$, $t = 4.582$, $P = 0.000$), and socioemotional ($\beta = 0.257$, $t = 2.248$, $P = 0.000$) are achieved significance at the 0.05 level. Therefore, the regression equation for predicting the dependent variable from the independent variable is

$$\text{Digital literacies and skill readiness} = 3.117 + 0.513 (\text{Photovisual}) + 0.322 (\text{Reproduction}) + 0.445 (\text{Branching}) + 0.545 (\text{Information}) + 0.310 (\text{Socioemotional})$$

Table 2 The Relationship between Marketing Mix and Customer Purchase Decision Making

| The Relationship between Marketing Mix and Repurchase Intention | Regression Coefficient (b) | Standardized Coefficient (β) | t | P |
|--|----------------------------|--------------------------------------|-------|--------|
| Photovisual | 0.513 | 0.174 | 2.357 | 0.000* |
| Reproduction | 0.322 | 0.211 | 2.579 | 0.000* |
| Branching | 0.445 | 0.243 | 4.857 | 0.000* |
| Information | 0.545 | 0.155 | 4.582 | 0.000* |
| Socioemotional | 0.310 | 0.257 | 2.248 | |
| Constant (a) | 3.117 | | 6.734 | 0.000* |
| R = 0.803, R² = 0.645, SEE = 0.343, F = 65.114, P = 0.000* | | | | |

*P < 0.01

Discussions

To success in the change in digital economy is required digital transformation demands vision, leadership and process change alongside powering core operations with technology. Therefore, digital transformation requires a change at the most fundamental level, the way in which things get done everywhere in the organization. Digital transformation affects the company culture itself. Without addressing culture change digital transformation is bound to be a superficial attempt. According to Hemerling et.al (2018) nearly 80% of the companies that focused on culture sustained strong or breakthrough performance. Not one of the companies that neglected to focus on culture achieved such performance.

Policies are one of the key for strategy development, that help in building the foundations for the digitization. This includes policies that affect the broad enabling environment for the digital economy, as well as policies that foster accessible and affordable digital infrastructures and services. Strategy development should enable the effective use of digital technologies by people, firms and governments, and policies that foster the application of digital technologies in specific activities and policy areas. Furthermore, it can help all individuals, including citizens, workers and consumers, as well as society as a whole to adjust to the digital transformation,

including by ensuring that all people have the skills they need to adapt to and excel in an increasingly digital world. Moreover, it includes policies aimed at the use of digital tools to enhance well-being, including by providing more equitable access to public services. However, there is quite a challenge to co-ordination among ministries and other bodies at all levels of government, as well as actively involving all key stakeholders in the policymaking process to ensure that all policies are mutually reinforcing and aligned with one coherent and strategic national digital agenda. Moreover, collective action will be needed in several areas to seize the opportunities and tackle the evolving challenges of the digital economy (OECD, 2017).

Further Study

1. Future research may investigate about the background and scope of work in their businesses.
2. Future research may conduct a study with more respondents or diversifying the types of businesses, and compare among those businesses.

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**THE INFLUENCE OF TRADITIONAL POST-PURCHASE BRAND
TOUCHPOINTS ON RELATIONSHIP QUALITY AND SELF-BRAND
CONNECTION: A CASE STUDY OF AUTOMOBILE REPURCHASE
IN THAILAND**

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ABSTRACT

The purpose of the study was to determine the relationship of the traditional post-purchase brand touchpoint on relationship quality and the self-brand connection in the repurchase decision of automobiles in Thailand. A Survey method with a structured questionnaire was used for data collection. The target population was all current passenger car users in Thailand. Stratified random sampling was used to sample selection. The sample consisted of 604 current passenger car users of the medium segment in Thailand. A linear regression analysis was conducted to evaluate two sets of relationship composing of (a) the prediction of the relationship quality (RQ) from the frequency of traditional post-purchase brand touchpoints (FTTP) for current customers, and (b) the prediction of the self-brand connection (SBC) from the frequency of traditional post-purchase brand touchpoints (FTTP) for current customers. As hypothesised, current customers who are more frequent in having brand exposure via the traditional post-purchase brand touchpoints tended to perceive a higher degree of relationship quality and self-brand connection. Overall, 24 percent of the variance of the relationship quality was accounted for by its linear relationship with the frequency of traditional post-purchase brand touchpoints, whereas 15 percent of the variance of the self-brand connection was accounted for by its linear relationship with the frequency of traditional post-purchase brand touchpoints.

Keywords: Traditional Post-Purchase Brand Touchpoints, Relationship Quality, Self-Brand Connection, Post-Purchase Buying Behaviour

1. Introduction

The Gross domestic product (GDP) of Thailand from 2009 to 2019 was contributed from such three sectors as agriculture, industry, and services. Among them, the automobile industry was the second most contributors in the share of economic sectors at 33.4 percent in which it played a vital part (Plecher, 2020). Thailand has had a solid infrastructure and network of the automobile industry as it was chosen as the manufacturing base of many local and foreign automakers all along the automobile product supply chain. However, Thailand Automotive Statistics (2019) revealed that the domestic demand for automobiles has faced stagnant growth from 2009 to date. Under this market situation, it was diagnosed that the domestic automobile market has reached the maturity stage of the product life cycle. Levitt (2014) asserted that the company required a new strategic focus on competing more effectively at the market maturity stage. Marketers must shift their focus from customer acquisition to customer retention. Besides, the business must maximise the effectiveness of marketing expenditure. To induce repurchase intention among current customers, auto manufacturers have generally used various customer relationship tools through various post-purchase brand touchpoints. Although traditional brand touchpoints become less powerful in reaching and convincing consumers (Visual Element Media, 2020), such traditional post-purchase brand touchpoints as TV, Radio, and print were still in use; however, effective usage of those traditional post-purchase brand touchpoints deems necessary.

In an exploration of past research, there were several past research that shows conflicting results relating to the frequency of traditional post-purchase brand touchpoints and relationship quality. Nelson (1970) proposed that the more the advertising is spent through such traditional brand touchpoints as TV, the higher the perceived product quality will be, especially among high-quality products. However, Moorthy (2005)'s findings were different from Nelson (1970), as it was claimed that ad repetition through various traditional brand touchpoints could not directly influence perceived quality but it had to be mediated by attitude toward the ad. Besides, Kwon et al. (2019)'s findings were consistent with Moorthy (2005) in which it was indicated that a brand must be exposed for enough time duration To maximise the return on investment regardless of how frequently it is exposed. However, Baxendale et al. (2015) tested the impact of different brand touchpoints in frequency on brand consideration. It was found that the frequency of brand touchpoints is related to the changes in brand consideration. Baxendale et al. (2015)'s finding was consistent with Nelson (1970), but was conflicting with Moorthy (2005) and Kwon et al. (2019).

Next, most of the past research related to the study of the self-brand connection extensively investigated the effects of self-brand connection which were customer satisfaction, customer brand engagement, or repurchase intention. However, very few literature focused on the causes or antecedents of the self-brand connection. Thomson (2006), Kemp et al. (2012), and Brandão et al. (2019) are some of those works of literature. Thomson (2006) investigated antecedents of consumers' attachments to celebrity by qualitative research and found that there were four major antecedents of brand attachment that emerged, which included achieving self and social goals, strong product and service characteristics, positive reminiscence, and consumer expectations. Kemp et al. (2012) explored a place branding and indicated that brand attitude, trust, commitment, and uniqueness were

antecedents of self-brand connection. Brandão et al. (2019) analysed the consumer involvement and the self-brand connection and brand usage intent of customer brand engagement in luxury brand engagement on Facebook. As there were no clear findings from the past research about the impact of the frequency of traditional post-purchase brand touchpoints and the relationship quality, and the investigation of such antecedent of self-brand connection as the traditional post-purchase brand touchpoints was prominent, therefore, this study was to find out how the frequency of traditional post-purchase brand touchpoints have any effect on the relationship quality and the self-brand connection in the repurchase intention of the automobile?

2. Research Objective

The objectives of the research were as follows:

(1) To determine the relationship between the frequency of traditional post-purchase brand touchpoints and the relationship quality in the repurchase intention of the automobile.

(2) To determine the relationship between the frequency of traditional post-purchase brand touchpoints and the self-brand connection in the repurchase intention of the automobile.

3. Research Framework

To sustain in a hyper-competitive market in the next decade, automobile manufacturers must shift their business orientation from just selling a product to selling service or experience. To shift the business orientation, automobile makers changed their focus from the pre-purchase-to-purchase cycle to the purchase-to-repurchase cycle. The purchase-to-repurchase cycle required automobile makers to create the best possible customer experience in all post-purchase brand touchpoints including after-sales service, customer relationship management, and so on. The value of traditional brand touchpoints could not be denied, as most core businesses still relied on the traditional brand touchpoints. Traditional brand touchpoints incorporated that of television, newspaper, radio, magazine ads, and the like.

Past research studies provided different perspectives on the effect of brand touchpoints. Some focused on the direct effects of brand touchpoints, while others were interested in the indirect effect of brand touchpoints. As far as the direct effect of brand touchpoints is concerned, brand touchpoints contributed to both positive and negative customer brand experiences (Hogan, Almqvist, & Glynn, 2005). Baxendale et al., (2015) examined the impact of six brand touchpoints on brand consideration which included brand advertising, retailer advertising, in-store communications, peer-to-peer conversation, traditional earned media, and peer observation. It was found that all of those brand touchpoints had a significant effect on brand consideration to different degrees. Marco and Cristina (2017) examined the relative importance of twenty-four touchpoints in contributing to customer loyalty to mobile service operators. It was found that the reach of brand touchpoints was related to customer loyalty as far as eight brand touchpoints were concerned. These included a corporate website, physical store, word of mouth, emailing, loyalty program, and mobile app. However, the reach of brand touchpoints was negatively related to customer loyalty. These were online advertising and telemarketing. As far as the nine brand touchpoints

were concerned, the positivity of brand touchpoints had effects on customer loyalty. These included customer service, mobile messaging, corporate website, TV and cinema advertising, physical store, mobile app, word of mouth, staff, and special event. Further, as the indirect effect of brand touchpoints is concerned, Dunn and Davis (2004) stated that spending money on the brand touchpoints created customer satisfaction and brand loyalty, which made the brand much stronger. There were so many benefits from having a strong brand. Not only was a customer more likely to actively choose the company's goods but there were also indirect benefits such as higher return on investment to receive (Mårtensson, 2008).

Relationship Quality and Traditional Post-Purchase Brand Touchpoints

The "relationship quality" was composed of at least three dimensions, which included satisfaction, trust, and commitment (Dorsch et al., 1998; Smith, 1998; DeWulf et al., 2001). Chaudhuri & Holbrook (2001) found that there was a relationship between relationship quality and market share. Also, Bowden and Danaher (2011) and Hellier et al., (2003) proposed that relationship quality drives brand loyalty and repurchase intention. Past literature that followed drew the research conclusion in the same direction. Chinomona (2014) asserted that relationship quality drives repurchase intention. Kha et al., (2011) developed a model explaining the repurchase intention of Proton automobile using structural modelling and found that repurchase intention was driven by brand loyalty, whereas brand loyalty mediated the effects of relationship quality on repurchase. Bowden and Dagger (2011) conducted a cross-sectional survey among 474 samples examining the antecedents and consequences of relationship quality and customer loyalty in the restaurant and found that positive affect and disconfirmation of expectation led to relationship quality. The study indicated that the relationship quality mediated the relationship between positive affect, disconfirmation of expectation, and loyalty. Ismail et al. (2011) studied brand and customer experience in service organisation and found that relationship quality drove brand loyalty. Khadim, et al., (2018) investigated the antecedents of brand loyalty from the impact of perceived social media communication with relationship quality and brand equity as mediators. The online survey was conducted with a 508 sample with a garment as the test product. It was found that relationship quality was significantly related to brand equity and brand loyalty. Banyte and Dovaliene (2014) found that relationship quality moderated the relationship between engagement into value creation and loyalty. Besides, the relationship quality was found to be significantly related.

However, very few research stated the effect of brand touchpoints, brand exposure, or brand awareness on relationship quality. Some of them are Sahin et al (2012), Cakmak (2017), and Baxendale et al., (2015). In specific details, Sahin et al. (2012) tested the effects of brand experience and service quality on repurchase intention with the role of relationship quality. Cakmak (2017) studied the role of brand awareness, perceived quality, and effect on risk in creating relationship quality. Brand trust was measured as dependent variables, whereas the independent variables were perceived risk, brand image, and perceived quality. It was found that all those three factors influencing the relationship quality. In other words, brand awareness had an impact on relationship quality. Baxendale et al., (2015) found that brand touchpoints could change in consumers' buying

consideration. As the result, we believe that the traditional post-purchase brand touchpoints can more or less influence the relationship quality among current customers, so we proposed the research hypothesis as follows:

H1: There is a positive relationship between the traditional post-purchase brand touchpoints and the relationship quality.

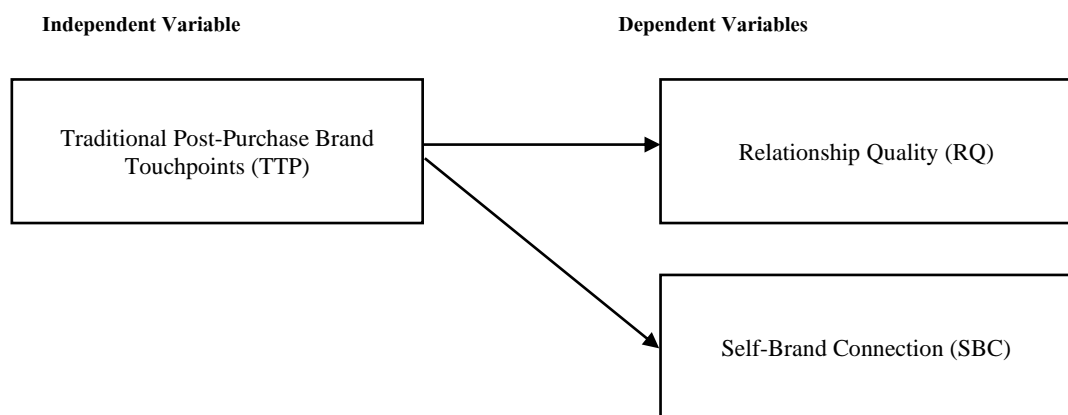
Self-brand Connection and Traditional Post-Purchase Brand Touchpoints

Brands are consolidated with the self of the consumers into self-concept (Cheng et al., 2012), then a self-brand connection is constructed (Escalas and Bettman, 2003). Most past literature related to self-brand connection investigated the effects of self-brand connection. Moore and Homer (2008) broadened the perspective and application of the self-brand connection construct beyond tangible consumer products by focusing on attitudes toward branded sports organisations. The findings indicated that self-brand connection significantly influences brand evaluation and attitude strength. Hapsari and Adiwijaya (2014) proposed that the self-brand connection drove repurchase intention among shopping goods. Hapsari and Adiwijaya (2014) investigated the relationship between self-congruity, relationship quality, and brand loyalty with shopping goods. It was found that customer self-congruity positively affected brand loyalty. Customer self-congruity negatively affected relationship quality, and relationship quality negatively affected brand loyalty, relationship quality, and repurchase intention. Beckers et al. (2017) proposed that brand attachment was the consequence of customer brand engagement. Besides, Premayani et al. (2018) explained the effect of self-image congruity and functional congruity on the attitude and repurchase intention and found that self-image congruity and functional congruity had a significant impact on customer attitude and repurchase intention. Shirley et al. (2011) studied the effects of self-brand connections on responses to brand failure and suggest that high self-brand connection consumers tended to less evaluate the brand, because of a motivation to protect the self. Loureiro et al. (2012) integrated the scattered brand attachment, commitment, and brand trust into a brand love model for a test of non-hedonic products. The researchers interviewed 374 samples who were owners of Toyota, Ford, Renault in Portugal. It was found that the self-expressive brand and brand attachment had an impact on brand love. Brand love was shown to have a direct effect to brand loyalty, and an indirect effect to brand loyalty through commitment and brand trust. Lin et al. (2017) investigated consumers' perception of a brand's green benefits which are composed of utilitarian environmental and warm glow and green transparency on their green perceived value. A Self-brand connection was used as a mediating effect between green perceived value and brand loyalty. The findings showed that self-brand connection had an impact on brand loyalty.

However, only a few studies focused on the causes of self-brand connection. Grisaffe and Nguyen (2011) investigated four antecedents of self-brand connection as sentimentality/emotional memory, socialisation, superior marketing characteristics, and user-derived benefits which had an impact on emotional attachment to brands. Besides, Hazel & Vincent-Wayne (2013) examined the influence of the need for achievement and brand consciousness on a self-brand connection. It showed the significant paths between achievement striving and brand consciousness and between brand consciousness and self-brand connection. Harrigan et al. (2017) studied

customer brand engagement and the relationship between self-involvement, self-engagement, self-brand connection, and brand usage intent. It was found that customer brand engagement which was composed of cognitive process, affection, and activation had effects on a self-brand connection. Most of the causes of self-brand connection stated by past literature were related to such psychological factors as the need for achievement, brand consciousness, self-involvement, self-engagement, and the like. We believe that marketing factors may have influences on the formation of self-brand connection among current customers of an automobile as they have usage experiences and brand experiences on daily basis, hence we proposed research hypothesis as follows: H2: There is a positive relationship between the frequency of traditional post-purchase brand touchpoints and self-brand connection.

Based on the above hypotheses, the research framework was as follows:



4. Research Methodology

4.1 Research Design

This research was designed to investigate the existing facts in the market without creating any research intervention. Survey research with a structured questionnaire was used.

4.2 Population and Sample

The target population of this research was all current owners of the medium segment of the passenger car in Thailand. The sample of this study was both male and female, age between 18-60 years old, living in Bangkok, and its vicinities currently owned Toyota Camry or Honda Accord (Y2014-Y2017 models). All were the main buying decision-maker of the automobile. Since the population was known, stratified random sampling was chosen as the sampling method for this study. The sample consisted of 604 current passenger car users of the medium segment in Thailand.

4.3 Research Instrument

The survey instrument was composed of five sections as (1) qualification screening, (2) traditional post-purchase touchpoints, (3) relationship quality, (4) self-brand connection, and (5) the profile of the respondent. The reliability of the questionnaire was determined to ensure that the responses collected were reliable and consistent. The Cronbach's Alpha for post-purchase traditional brand touchpoint was 0.964, relationship quality

was 0.961, and a self-brand connection was 0.970, so the questionnaire was highly reliable. The survey instrument was developed by deriving scales from past literature. First, we measured traditional post-purchase brand touchpoints by adapting the measurement scale of the frequency of brand touchpoints from McFarland and Buehler (1998) and Baxendale et al. (2015) respectively. Some of them were "how often did you encounter TV, radio, printed, out of home and others of Toyota Camry/Honda Accord?" and others. The five-point scale response ranging from most frequent and the least frequent was used. Second, the measurement of relationship quality was developed by adopting Kim et al (2012). Some of these items were "the product quality of the Toyota Camry/Honda Accord is exactly what I want," "I don't regret choosing Toyota Camry/Honda Accord" and others. The five-point scale response ranging from most to least was used. Third, the measurement of self-brand connection by adopting a self-brand connection from Escalas (2004). Some of them were "Toyota Camry/Honda Accord could reflect who I am," "I could identify with Toyota Camry/Honda Accord" and others. The five-point scale response ranging from most to least was used.

4.5 Data Collection

The data collection was administered in such three phases as a pretest, questionnaire distribution, and followed by source accuracy. First, we conducted the pre-test to find the reliability of questionnaires by examining Cronbach Alpha. 30 staff from three divisions (Compliance Division, Internal Audit Division, and Credit Management) and six staff from the CEO office were administered the questionnaire for the pre-test. In total, 30 participants were selected for the pre-test. Second, after the validity and reliability of questionnaires had completely been controlled and checked thoroughly, we administered the questionnaires to 650 respondents. Last, once the completed questionnaire was sent back with an 85 percent response rate, source accuracy was also traced. Six hundred and four sets of questionnaires were further used for data processing.

4.6 Data Analysis

A bivariate linear regression was used for data analysis to compute an equation that relates predicted Y scores to X scores. A significance test was used to evaluate whether X predicts Y.

5. Research Findings

A bivariate linear regression analysis was conducted to evaluate two sets of relationship composing of (a) the prediction of the relationship quality (RQ) from the frequency of traditional post-purchase brand touchpoints (FTTP) for current customers, and (b) the prediction of the self-brand connection (SBC) from the frequency of traditional post-purchase brand touchpoints (FTTP) for current customers. For the first set of relationships, the scatterplot for the two variables, as shown in Figure One, indicates that the two variables are linearly related such that the frequency of traditional post-purchase brand touchpoints increases the relationship quality increases. The regression equation for predicting the relationship quality is

$$\text{Predicted RQ} = .35 \text{ FTTP} + 2.86$$

As hypothesised, current customers who are more frequent in having brand exposure via the traditional post-purchase brand touchpoints tended to perceive a higher degree of relationship quality. Accuracy in

predicting the relationship quality was moderate. The correlation between the frequency of traditional post-purchase brand touchpoints and the relationship quality was .49, $t(602) = 13.89$, $p = .000$. Approximately, 24 percent of the variance of the relationship quality was accounted for by its linear relationship with the frequency of traditional post-purchase brand touchpoints. The regression equation for predicting the relationship quality is

$$\text{Predicted SBC} = .32 \text{ FTTP} + 3.01$$

As hypothesised, current customers who are more frequent in having brand exposure via the traditional post-purchase brand touchpoints tended to perceive a higher degree of self-brand connection. Accuracy in predicting the self-brand connection was moderate. The correlation between the frequency of traditional post-purchase brand touchpoints and the self-brand connection was .38, $t(602) = 10.25$, $p = .000$. Approximately, 15 percent of the variance of the self-brand connection was accounted for by its linear relationship with the frequency of traditional post-purchase brand touchpoints.

6. Summary and Discussion

The overall purpose of the study was to examine the relationship between the traditional post-purchase brand touchpoints and the relationship quality, and the self-brand connection in a population of current car users of the medium segment in Thailand. As stated earlier, we resolved the conflicting results proposed by Nelson (1970), Moorthy (2005), Brandão et al. (2019), and Baxendale et al., (2015) to find out exactly if the frequency of traditional post-purchase brand touchpoints can drive the relationship quality. The results suggested that the frequency of the traditional post-purchase brand touchpoints can drive the relationship quality. Our findings were consistent with Nelson (1970) and Baxendale et al. (2015) and differed from Moorthy (2005) and Kwon et al. (2019). As Nelson (1970) proposed that the more the advertising is spent through such traditional brand touchpoints as TV, the higher the perceived product quality will be, especially among high-quality products. Traditional post-purchase brand touchpoints tested by Nelson (1970) was only advertising via TV; however, this research went beyond the boundaries of TV advertising to several traditional post-purchase brand touchpoints such as radio, print ads, out of home, direct marketing, leaflet, call centre, event marketing, car usage, word of mouth and so on. Furthermore, Baxendale et al. (2015) found that the frequency of brand touchpoints can shift consumers' brand consideration. Even though this research did not directly focus on changes in brand consideration as proposed by Baxendale et al. (2015), we assumed that the shift of brand consideration was the consequence of perceived product quality. Then, it can conclude that the frequency of traditional post-purchase brand touchpoints can leverage the value in the relationship quality as hypothesised.

However, some possibilities made the results of research different from Moorthy (2005) and Kwon et al. (2019). Moorthy (2005) found that ad repetition through various traditional brand touchpoints could not directly influence perceived quality but it had to be mediated by attitude toward the ad, while we found that the frequency of traditional post-purchase brand touchpoints can be directly driven to the relationship quality. The discrepancy of the findings was attributed to the focus of the customer journey stage. Moorthy (2005) and Kwon et al. (2019) investigated pre-purchase buying behaviour whereas customers were not familiar with certain

products, so the direct effect of brand touchpoints on perceived product quality did not exist. On contrary, this research focused on the post-purchase buying stage whereas customers did experience and had brand knowledge, so the direct effect of traditional post-purchase brand touchpoints on the relationship quality then existed.

As stated that most of the causes of self-brand connection stated by past literature were related to such psychological factors as the need for achievement, brand conscious, self-involvement, self-engagement, and the like. We believe that marketing factors may have influences on the formation of self-brand connections among current customers of the automobile. It was found that the traditional post-purchase brand touchpoints were related to the self-brand connection. Furthermore, it was found that the antecedent of self-brand connection can go beyond such psychological factors as achieving self and social goals, positive reminiscence and consumer expectations, consumer involvement, brand attitude, brand trust, and brand commitment as proposed by Thomson (2006), Kemp et al. (2012), and Brandão et al. (2019). As stated earlier, there was no past research investigating the effect of the frequency of traditional post-purchase brand touchpoints on the self-brand connection. We indicated a direct effect of the two variables whereas it may be further connected to repurchase intention.

7. Suggestion

As the domestic automobile market has reached its market maturity stage of the product life cycle in which the demand levels off and grows only at the replacement and new family formation rate. Conventional wisdom suggests that it requires a new kind of emphasis on competing more effectively. Some are forced to create appeal based on price, marginal product differences, or both in enhancing customer retention. However, this research suggested that the frequency of the traditional post-purchase brand touchpoints can drive up the higher value in relationship quality and stronger self-brand connection between brands and customers. The findings of this research are regarded as the discovery of a new marketing weapon in keeping recurring customers. At least, there are four areas of considerations that marketers can take it into implications. First, nowadays as it is known that digital platforms have gained its popularity, more proportion of marketing expenditure is migrated to digital channels accordingly. However, as it is proven that the traditional post-purchase brand touchpoints are still powerful in keeping customers, the marketing budget for traditional marketing channels may have to be maintained to maximise the marketing efficiency. Second, since there are a large variety of traditional post-purchase brand touchpoints, the marketers must be selective in choosing the right brand touchpoints in corresponding with their markets. However, a mass media type of traditional post-purchase brand touchpoints is crucial to the future product evaluation among current customers, as these brand touchpoints can disseminate essential product information concerning newly improved products and technology. Third, to create appeal to current customers, it is found that product-related content fits better with the traditional post-purchase brand touchpoints. Last, the frequency of the traditional post-purchase brand touchpoints must be set as one of the key performance indicators in keeping current customers.

The declining birth rate of the population in most countries has been attributed to the market growth in most product categories. As the result, future research is suggested to investigate the repurchase behaviour within

the context of the post-purchase buying stage. As this study combined traditional post-purchase brand touchpoints into a single variable, future research may consider an investigation into a break-down or classification of the traditional post-purchase brand touchpoints and its effects on relationship quality and self-brand connection. Moreover, a consideration in extending this research by testing the impact of digital post-purchase brand touchpoints on relationship quality and self-brand connection may be an advantage. Even though the test product of this study is such a high-involvement product as a medium segment of the automobile in Thailand market, the findings may not fully applicable to other segments of the automobile (including compact and sub-compact sedan, SUV), other high-involvement product categories (including luxury brand products), or across markets. Moreover, cross-cultural factors may deviate the research findings whereas future research may take it into consideration of research extension.

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THAI SOCIAL MEDIA INFLUENCERS' INTERNATIONAL SOCIAL PRACTICES AND SOURCE CREDIBILITY PERCEIVED BY THEIR AUDIENCES DURING THE COVID-19 LOCKDOWN

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ABSTRACT

This study examines Thai macro- and micro-social media influencers' social practices and source credibility perceived by their audience during the COVID-19 lockdown period. Driven by theories of self-presentation, two-step flows and source credibility model, this exploratory study used a qualitative approach to understand how influencers adapted their impression management to be perceived as credible during the global crisis. The study relied on in-depth interviews with ten informants. All of them were Thai, living in Thailand, and aged between 26-40 years old. Regarding influencers' social practices, the findings showed four social practices; 1) revealing stay-at-home activities 2) showing concern for audiences' well-being 3) performing intimacy with closed ones 4) replaying past performance. Regarding influencers' source credibility perceived by their audiences, influencers' trustworthiness was reflected in the content that showed their ability to provide clear explanation and honesty. Influencers' expertise was reflected in the content that showed their experiences in the field of their expertise, skills, and knowledge. Influencers' attractiveness was reflected in a positive personality and beautiful relationship with loved ones. The result provides valuable recommendations for practical use in that brands are suggested to work with social media influencers who are able to adapt to any crisis situations. In particular, influencers' content that reflects honesty, knowledge, and positive character has gained credibility in their audiences' eyes during the global crisis.

Keywords: Social media influencers, Social practices, Source credibility, COVID-19, Lockdown, self-presentation

1. Rationale and Problem Statement

According to a study by Vero (2018), 74 percent of Thai millennials trusted a brand more if influencers talked about it on their social media channels, 85 percent wanted to see their influencers using the product they advertised, and 59 percent made a purchase according to social media influencers' recommendation (Wells, 2018). Since the last quarter of 2019, the world has been attacked by the most recently discovered Coronavirus which causes COVID-19 disease ("Q&A on coronaviruses," 2020). The disease primarily spreads from one person to another. Thus, the World Health Organization has provided a social distancing recommendation: keeping physical distance at least one meter away from others ("Q&A on coronaviruses," 2020).

In Thailand, the governor temporarily closed high-risk areas that attracted large crowds. There were among the 26 venue types closed during March 21, 2020 and April 12, 2020 ("COVID-19," 2020) to minimize movements of people. The Emergency Decree was applied nationwide, banning the entry of foreigners to Thailand from March 26 (Boonlert & Sattaburuth, 2020) until July 31, 2020 ("COVID-19," 2020). Supply chains of businesses have been interrupted by the lockdown. Brands have had to re-evaluate their marketing and communication strategies to consider how they can have a dialogue with audiences during this time of uncertainty (Boonlert & Sattaburuth, 2020).

At the same time, social media influencers have faced sponsorship decline, fewer campaigns, and events altogether. While the influencers were encountering numerous unexpected challenges that greatly affected their careers, their followers were still checking in on social media channels to keep up with their favorite influencers, as well as to seek inspiration and a distraction from the negative information about COVID-19. Influencers around the world adopted global trends, such as #StayHome and #WashHands. Due to the COVID-19 restrictions, numerous questions regarding influencing marketing arose. This study is groundbreaking in that it uses Thailand as a research setting in exploring influencing marketing during the global crisis. The study focuses on Thai social media influencers' communication strategies which reflect global and local aspects of social practices. Moreover, the study examines the perceptions of their audience towards their credibility during the unprecedented time. Thus, the research questions are following:

RQ1: What are international social practices used by Thai macro- and micro-influencers on social media during the lockdown?;

RQ2: How do Thai audiences define Thai social media macro- and micro- influencers' perceived trustworthiness during the lockdown?;

RQ3: How do Thai audiences define Thai social media macro- and micro- influencers' perceived expertise during the lockdown?;

RQ4: How do Thai audiences define Thai social media macro- and micro- influencers' attractiveness during the lockdown?

The study contributes to an understanding of theories of self-presentation, two-step flows, and source credibility model in the context of Thai macro- and micro-influencers' self-presentation during the crisis. In

particular, it provides insights into how Thai macro- and micro-influencers in the role of opinion leaders adapt to manage their front and back stage to be perceived as credible during the crisis.

2. Objective of the Study

- 1) To explore international social practices used by Thai macro- and micro-influencers on social media during the lockdown
- 2) To explore how Thai audiences perceive Thai macro- and micro-influencers' trustworthiness during the lockdown
- 3) To explore how Thai audiences perceive Thai macro- and micro-influencers' expertise during the lockdown
- 4) To explore how Thai audiences perceive Thai macro- and micro-influencers' attractiveness during the lockdown

3. Related Literature

The following theories became groundwork to a wider understanding of social media users' behavior and communication strategies relating to this study.

3.1 History of influencers in Thailand

Limkangvanmongkol & Abidin (2018) stated that one of the social media stars is a net idol or internet idol. In the beginning, they were the type of girls who were famous in school because of their loveliness. Their peers started to talk about them, then they emerged to web communities and online discussion forums, such as dek-d.com around the mid-2000s ("What is a net idol?," 2012). Marketers in Thailand have picked net idols and assigned them as seeds or initial consumers to publicize messages about their products or services (Limkangvanmongkol & Abidin, 2018). Their popularity has increased on online platforms, therefore, they mobilized themselves to work with brands on their social media channels, which evolved them into a commercial form of influencers (Abidin, 2016).

3.2 Categories of Social Media Influencers in Thailand.

The social media influencer landscape in Thailand can be identified by four types ("Influencer Marketing in Thailand," n.d.): mega-influencers are those who have fame like celebrities, macro-influencers are people who mainly work with brands to advertise products or services, micro-influencers are consumers who have the power to influence a group of audiences, and brand advocates are consumers who have used and are passionate about products and services, they are therefore willing to share. Social Media Influencer Marketing in Thailand (2020) differentiates them by number of their followers: a mega-influencer has more than a million followers, macro-influencer has between 100,000 to a million followers, micro-influencer has from 10,000 to 100,000 followers, and brand advocate has little followers.

3.3 Theory of Two-step Flows

The theory of two-step flow was formulated in 1948 by Lazarsfeld, Berelson, and Gaudet (Postelnicu, 2016). The initiation of the theory was from analyzing the decision-making process of voters in the U.S. presidential election in 1940. They wanted to find out whether messages from mass media practically influence voting decisions among people. They found that interpersonal interaction affects more than mass media outlets on shaping public opinion (Postelnicu, 2016). Messages flow from media to the public is mediated by opinion leaders who have the power to influence people's attitudes and opinions.

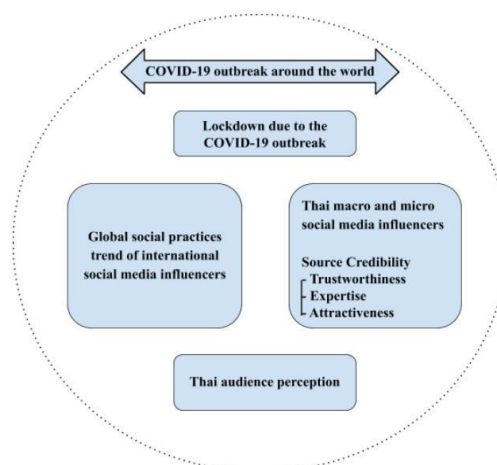
3.4 Theory of Self-Presentation

Erving Goffman found the theory of self-presentation in 1956 and revised in 1959 (Tan, 2014). He analyzed how individuals perform in order to impress audiences by using the theatrical comparison between the front stage and backstage behavior (Bullingham & Vasconcelos, 2013). The front is a performance to the public's eyes, where people act certain personas to impress audiences. Performers in the front stage adapt themselves to fit with social standards and have a role to communicate any messages in an acceptable manner (Tan, 2014). Backstage is an environment where performers have relaxed roles or they are not posting on social media. Performance in the backstage seems to be a more truthful type of performance (Bullingham & Vasconcelos, 2013).

3.5 Model of Source Credibility

Source credibility by Ohanian (1991) refers to positive characteristics that impact the acceptance and persuasiveness of influencers during the process of advertising (Li & Yiyi, 2018). In 1990, Ohanian developed the source credibility theory. Ohanian's theory has three dimensions; trust, expertise, and attractiveness (Ohanian, 1991). The source credibility significantly impacts audiences' attitudes, intentions, and behavior.

3.6 Conceptual Framework



4. Methodology

The researcher used a qualitative method in order to answer the research questions of this study. The qualitative research method was used in the format of in-depth interviews for primary information.

4.1 Study Population and Sampling

The sampling units were selected based on purposive sampling technique which allowed the researcher to have judgment of what units will facilitate the investigation'. The sample size was based on a saturation point. It refers to the point when the researcher saw similar circumstances from the sampling over and over again and the researcher can develop themes from the properties. The saturation point of this study was reached at 10 informants. All of the informants were Thai, living in Thailand and aged between 26-40 years old (millennial generation) ("Boomers, Gen X," 2020). All informants were social media users and had various social media platforms. Their average social media usage was five hours a day. They had followed macro-influencers or micro-influencers for at least 6 months on various social media platforms since January 2020 or before.

4.2 Data Collection Procedure

The researcher conducted in-depth interviews which involve a one-on-one conversation. At the time the researcher processed data collection, Thailand was having the social distancing campaign, the interviews therefore were conducted over the online call and in some cases were conducted in the format of face-to-face. All interviews were held in the Thai language. The researcher spent thirty to forty minutes for each interview.

4.3 Data Analysis

The research used the grounded theory as a research tool to find out and conceptualize the area of interest through the process of constant comparison. Once a substantial amount of data has been collected, the researcher viewed for themes in the data and worked to develop a theory that could explain those themes. No hypotheses can be found at the initial stages of the research. Next, the researcher analyzed data by using coding. The researcher arranged raw data putting into 3 coding processes; initial coding, focused coding, and theoretical coding. Example of coding process is as following:

Question: What are international social practices you have seen Thai influencers did on their social media channels during the COVID-19 lockdown?

Raw data from an informant's answer: I've seen I Roam Alone made many videos staying home and cooking. Before COVID-19 outbreak, she normally made content about travelling to foreign countries. One of her interesting cooking videos is making Dalgona coffee. I've also seen influencers and anyone from many countries around the world follow the trend and posted their videos on Tiktok, YouTube, and Facebook.

| | |
|--------------------------------|--|
| 1st) Initial coding | Consuming posts reflecting activities at home that the influencer had never done before, such as cooking. The activity originated from another country and is very famous around the world since the COVID-19 broke out. |
| 2nd) Focus coding | Revealing stay-at-home activities |
| 3rd) Theoretical coding | Self-Presentation Theory: Both front and back stage |

5. Findings

5.1 RQ1: What are international social practices used by Thai macro-influencers and micro-influencers on social media during the Government's lockdown period due to the COVID-19 outbreak?

5.1.1 Revealing Stay-at-Home Activities

Most of the posts portrayed influencers in stay-at-home dress and disclosed activities that were usually considered behind-the-scenes. The informants consumed posts reflecting new activities that influencers had never done before, such as cooking and planting, which is reiterated by an informant: *"I Roam Alone is a travel influencer. She is unable to travel to foreign countries. I saw her make a cooking program and made Dalgona coffee which is an international trend during the lockdown."* - Female, 35 years old, a teacher

The informants also observed influencers did new activities that they never expected them to do, such as renovating home furniture, picking fruits from trees, which is reiterated by an informant: *"Fah sarika's made many videos about her staying home doing activities such as gardening and cooking. The influencer also did something new such as painting furniture and game broadcasting."* - Male, 34 years old, an engineer

The informants observed that stay-at-home activities did not only refer to activities that were usually done at home, but also activities that we generally had not done by ourselves, such as having a haircut, and extending acrylic nails, which is reiterated by an informant: *"Saranya C. made a few videos doing nail and eyelash extension which normally she got these things serviced at the salons during COVID-19 outbreak."* - Female, 27 years old, an unemployed

The informants observed sponsored content of Thai beauty influencers by adopting a global beauty challenge in their presentation, which is reiterated by an informant: *"Amy Kitiya created makeup looks to go with their medical masks. I also think they were sponsored by Seven-Eleven as I saw the brand logo on their videos."* - Male, 26 years old, a marketer

The informants observed branded content in stay-at-home videos, which is reiterated by an informant: *"BoomTharis is a real estate influencer changes how he makes content during the lockdown period, as it seems there are no sponsors from real estate companies. From reviewing condominiums, he made many eating-at-home and stay-home-with-me videos instead."* - Male, 38 years old, an interior designer

Unboxing or unpacking delivered stuff from online shopping have been a popular international social practice used by Thai beauty influencers, which is reiterated by an informant: *"Nurseryus' content used to be varied but she has recently made many videos about clothing try-on haul at home."* - Female, 30 years old, a sale representative

5.1.2 Showing Concern for Audiences' Well-being

The informants observed that influencers increasingly made instructional content as self-help and well-being guides, which is iterated by an informant: *"shaipilan posted on Instagram recommending a proper way to wear masks because wearing a mask incorrectly will not protect us from the virus. I have seen celebrities, and medical workers from around the world teaching how to wear face masks properly as well."* Female, 39 years old, an entrepreneur

The informants benefited from content regarding mental and psychological aspects. Like social media influencers from many countries, Thai social media influencers also have the content of adapting to a new lifestyle, how-to relieve stress content fitted very well, which is reiterated by an informant: *"earthpynn made a video on how-to relieve stress at home as we can't spend time in many places, which can make people feel isolated and lonely. She recommended us to do makeup, dress well, and eat a special menu by ordering food from our favorite restaurants at home."* - Female, 40 years old, an advertiser

The informants were also interested in posts regarding a healthy lifestyle which is the global trend, which is reiterated by an informant: *"Healthy Sister - Food & Happy Lifestyle recommended products for those who are interested in healthy eating should stock during the lockdown period."* - Female, 30 years old, a sale representative

5.1.3 Performing Intimacy with Closed Ones

The strategy to craft the content showing them staying together at a specific part of the house had been adopted. The informants felt fun when see the posts portrayed positive family relationships, which is reiterated by an informant: *"Nisamane.Nutt made a music video with her family instead of doing many makeup tutorials videos that she used to do most of the time."* - Male, 26 years old, a marketer

The informants enjoy observing influencers' relationships with their closed ones, as the content is new and authentic, which is reiterated by an informant: *"I Roam Alone made many videos having her mom and grandma joining in. It helps while waiting for her to be able to travel aboard again."* - Female, 35 years old, a teacher

The informants were not only introduced to influencers' closed ones but also had an opportunity to know about how the influencers had been shaped by their upbringing, which is reiterated by an informant: *"All events are canceled, Nin of Blacklist Secret visited her parents at her hometown and made a Q&A video with her parents on how she had been shaped by her parents."* - Female, 30 years old, a sale representative

5.1.4 Replaying Past Performance

The informants saw Thai influencers who normally made videos about traveling in Thailand reuse past posts just like influencers from other countries during the lockdown, which is reiterated by an informant: *"HappyNancy is a traveling influencer. She always traveled and I saw her posted some past traveling pictures and videos. She said in the caption that she wants to travel again."* - Male, 31 years old, reporter

5.2 RQ2: How do audiences define Thai social media influencers' perceived trustworthiness?

Perceived trustworthiness depends on the social media influencers' ability to explain hard-to-understand information understandably. Therefore, audiences relied on influencers' posts as dependable sources, which is reiterated by an informant: *"Capt.Benz makes Buddhavacan (Words of the Buddha) easy to understand and apply in real life."* - Male, 31 years old, a reporter

Also, audiences trusted social media influencers' posts based on their reliable information which showed influencers' honesty. Lifestyle bloggers usually showed their before-and-after photos of making over themselves influenced by international trends, which is reiterated by an informant: *"When I want some ideas*

about fashion and clothing, I will check out vvalentines' photos on her Instagram. She adopts fashion and style from international influencers and looks just right them." - Female, 27 years old, an unemployed

5.3 RQ3: How do audiences define social media influencers' perceived expertise?

Perceived by informants, the social media influencers' expertise during the lockdown was the result of the influencers' experiences in the field of their expertise, which is reiterated by an informant: *"shaipilan has a lot of work experience from a flight attendant, makeup artist, and beauty magazine editor. Those jobs normally require people who have good looks and good personality so I believe that he knows how to take care of himself properly and can recommend the right information."* - Female, 39 years old, an entrepreneur

Also, audiences tended to perceive influencers' expertise based on influencers' skills. Audiences treasure contents that reflect technical techniques by social media influencers, which is reiterated by an informant: *"Golfwashere is a professional photographer, he presented how to take a cool video at home by using a mobile phone during the lockdown."* - Male, 28 years old, a graduate student

Perceived by informants, the social media influencers' expertise during the lockdown was the result of influencers' knowledge, which is reiterated by an informant: *"I believe that Healthy Sister - Food & Happy Lifestyle has knowledge of healthy food, that's why she can write the book."* - Female, 35 years old, a teacher

5.4 RQ4: How do audiences define social media influencers' perceived attractiveness?

Perceived attractiveness toward social media influencers was affected by influencers' positive personality, such as friendliness and confidence, which is iterated by an informant: *"Many influencers do makeup tutorials but Saranya C. attracts me more than others because of how she talks which is very friendly but confident at the same time. It just feels like I'm genuinely hanging out with a friend."* - Female, 27 years old, an unemployed

Perceived attractiveness toward social media influencers related to the dimension of influencers' presentability in terms of their appearance, which is iterated by an informant: *"dust_ntk has a nice body when he dresses up, he looks good. I follow him because of how he looks."* - Male, 38 years old, an interior designer

Perceived attractiveness by informants toward social media influencers that show beautiful relationships that are like a dream come true life, which is reiterated by an informant: *"Pai Gun Na is an influential couple. They create traveling content and are very outstanding. Their pictures are very lovely and romantic, so it is like living a dream."* - Female, 40 years old, an advertiser

6. Discussion

The researcher found that the findings of this research are corresponding with the ground theories. Driven by the theory of two-step flows (Lazarsfeld et al., 1948), the social media influencers performed their personas of opinion leaders who consumed information from the representatives of brands and further produced content from such information for their audiences. During the COVID-19 lockdown, the influencers used both unbranded with branded content to keep their audiences engaged. For unbranded content, they produced content related to current affairs derived from media channels. For branded content, they seeded information favorably about branded products.

Driven by the theory of self-presentation (Goffman, 1956), the influencers performed their online presence by managing their positive impression through audiences' eyes. Audiences perceived that there are four international social practices used by social media influencers. Influencers produced content that revealed themselves by disclosing private information, as if it would happen in the backstage. As the informants perceived, the influencers portrayed themselves at "the blurred boundaries of front and backstage" (Limkangvanmongkol, 2018, p. 71) during the outbreaks of COVID-19.

Driven by the source credibility model (Ohanion, 1991) which consists of trustworthiness, expertise, and attractiveness, the findings of this research indicate that influencers' ability to provide a clear explanation (Balaban & Mustăţea, 2019) (e.g., explaining hard-to-understand information in an understandable way, providing information that applies to real-life situations) and honesty (e.g., showing before and after makeover content, the influencers' using the products they advertise) were indicators of the influencers' perceived trustworthiness. Such indicators allowed them to become dependable which enhanced their credibility (Phung & Qin, 2018).

The findings of this research indicate influencers' experiences in the field of their expertise (e.g., demonstrating technical skills, providing informative instruction), skills (e.g., taking interesting photos using simple tool like a mobile), and knowledge (e.g., writing a clean food book) were indicators of the influencers' perceived expertise. Source expertise comes from influencers' skills and knowledge through experiences (Ohanian, 1991). Expert influencers can build up loyalty and trust among their audiences when the influencers are experts in their niche.

Variables of attractiveness are similarity between influencers and audiences, familiarity - the near of the receiver and the source, and sympathy - the affectivity shown to the receptor (Ohanion, 1991). The findings of this research indicate influencers' positive personality (e.g., friendliness, confidence, presentability, nice body), and beautiful relationships (e.g., couple relationship) were the influencers' perceived attractiveness. It is anticipated that attractiveness is an important factor when evaluating the effectiveness of an influencer. Physical attractiveness tends to give benefit to influencers to gain more success in influencing customers' attitudes and beliefs than unattractive spokespersons (Ohanian, 1991). Therefore, influencers' credibility is an important aspect of brands which relates to audiences' perception of whether they feel the recommendations from influencers as unbiased, believable, or factual (Rebelo, 2017) especially during crisis like COVID-19 pandemic. The audiences' level of confidence and level of acceptance of influencers is an important paradigm in communication.

The source credibility requires a human touch to review things and convey feelings to audiences that technology cannot detect such as authenticity and believability (Ohanian, 1991). Advertisers choose to work with influencers who are reliable to ensure advertisements run smoothly and effectively because reliable social media influencers are proactive.

7. Recommendations

The result provides valuable recommendations for practical use in that brands are required to work with social media influencers who are able to adapt their impression management to any crisis situations. Influencers' content that reflects honesty, knowledge, and positive character has gained credibility in their audiences' eyes. Brands and social media influencers are required to carry out the best communication strategy for both daily use and during any critical situations.

It is suggested there should be further research to examine the impact of COVID-19 on Thai or global social media influencers and audiences in different research questions. The further research should study how social media influencers' adapted social practices affect their audiences' engagement and purchase decisions during a global crisis, in particular, the COVID-19 lockdown period.

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ECO-DESIGN AND INVESTMENT RECOVERY IN GREEN SUPPLY CHAIN MANAGEMENT (GSCM) PRACTICES: A CASE STUDY OF THAI AUTOMOTIVE MANUFACTURER

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ABSTRACT

The relationship between green supply chain initiatives and green supply chain performance outcomes has been provided a lot in globally, but for Thailand context, there is less publications. Then, this paper aims to study eco-design and investment recovery concept with Thai manufacturers. A case study methodology based on focus groups with different departments from 1-Tier supplier in automotive industry in Thailand is conducted. The results show the development of re-packaging, which applied eco-design and investment recovery practices, in transportation has a significantly importance for Thai Manufacturers. The company can reduce about 50% of transportation cost and also reduce carrying 50% carton per pallet per trip. In this study, it can be seen that organization can apply green supply chain management concept, in-term of eco-design and investment recovery, within their process to improve better performance and also reduce operation expenses. Thus, Thai Manufacturers can use this case study for further improvement in their process or transportation to generate benefits from environment, in the form of reduced waste and better resource utilization, and for economic benefits by reducing cost for the organizations.

Keywords: Eco-design, Investment Recovery, Green Supply Chain Management (GSCM)

1. Introduction

In most developing countries, road transport is the main mode of freight movement. It can be seen that the efficiency of road transport is a major determinant of the overall environmental impact of logistics (Piecyk, Browne, Whiteing, & McKinnon, 2015). Meanwhile, it can be found that the main objective of product design is to reduce cost and meet the product pricing strategies, specifications and customer needs while maintaining compliance with health, safety and environmental legislation (Grant, Trautrim, & Wong, 2013). Moreover, there is now increasing of evidence mentioning that the ways supply chains participate in product design is a major contributor to various environmental sustainability and health and safety problems. Thus, based on these two

ideas, most of manufacturers around the world are focusing in reduce cost from transportation and production, improve sustainability in their product and packaging and provide more good image to their customers.

Regarding to a case study from 1-Tier supplier from automotive industry, the company expects to receive high customer satisfaction from their customers by providing 100% delivery on time. Therefore, the company plans to achieve their goals while reduce transportation cost at the same time. However, the company found that if they need to support their customers, their transportation cost will increasing significantly, based on number of trip and number of products per pallet. So, this issue forces the company to pay more transportation cost higher than before. The main reason is when the company calculate transportation cost, the company needs to use the higher price when compare between (1) actual weight per pallet or (2) actual space require per pallet. Moreover, due to this company is a medium size company so they concern about environment impact and focus on reduce waste in their process as well. As state by S. Zailani, Jeyaraman, Vengadasan, and Premkumar (2012), various manufacturing organizations create pollution and wastes while doing their business, thus this result push organizations to consider about environmental impact for all steps of their process.

According to the current issues in transportation as the company need to supply components to manufacturers, this study intends to solve this problem by developing new packaging design for road transport by reducing dimensions and weight carrying in each trip. This approach will support the company and their respective supply chains to reduce their business wastes but it increases value to their customers. Three research questions are developed from literature review and a case study as 1) is eco-design and investment recovery practice influences cost reduction in Thailand? 2) which eco-design and investment recovery sub-practice impact green supply chain management in Thailand? and 3) do Thai manufacturers need to focus on eco-design and investment recovery?

This paper is organized as follows. Following the introduction, a literature review on green supply chain management field is provided. Then, a research framework is proposed as a set of eco-design and investment recovery concept. After that a case study on automotive company is studied to validate the concept of this study. Finally, some consideration are drawn.

2. Research Objective

(1) To study eco-design and investment recovery practices which influences cost reduction in logistics and transportation; and

(2) To study green supply chain management concept with Thai manufacturers.

3. Literature Review

According to the concern about environmental factors in the last decade. It can be seen that there are an increasing issues related to this factor. Most of companies have opportunities to reduce costs by improving brand positioning and enhancing business communications with their supply chain. Furthermore, in the past, organizations have caused harm to the natural environment by generating waste, disrupting the eco-system and

depleting natural resources (R. J. Lin, 2011). Furthermore, Green, Zelbst, Meacham, and Bhadauria (2012) describe manufacturing companies have started to implement green supply chain management practices in response to customer demand for products and services that are environmentally sustainable and that are created through environmentally sustainable practices and in response to governmental environmental regulations.

3.1 Green Supply Chain Management Practices

Organizations around the world are need to balance between environmental and economic performance (Q. Zhu & Sarkis, 2004). Thus, organizations are focusing on reducing environmental impact of goods and services, reduce wastes from productions and transportations and also improve more good image for their customers. As same as previous studied in this field, there are many manufacturers have applied green supply chain management (GSCM) in their policy. As mentioned by Lee, Ooi, Chong, and Seow (2014) that GSCM is “an extension to the supply chain, which represents a set of inter- and intra-organizational environmental practices that are useful for logistics management. It is designed to include environmental matters when making decision at every inbound logistics phase of managing materials all the way through to the outbound logistics phase of post-consumer disposal and the concept of ‘closing-the-loop’ in reverse logistics”. Furthermore, Q. H. Zhu, Sarkis, and Geng (2005) describe that the measurements of GSCM are cooperation with customers, green purchasing, internal environmental management, eco-design and investment recovery.

In this study, the researcher focuses on eco-design and investment recovery for GSCM practices because these two topics are very important for all organizations. According to this study, the company need to improve better performance for supporting customer needs while reduce transportation cost as much as possible.

3.2 Eco-design Practice

Numerous researchers explain about eco-design in the existing literature such as Eltayeb, Zailani, and Ramayah (2011) state eco-design or design for the environment includes activities that aim to minimize environmental impact of products during their entire life cycle. Moreover, S. H. M. Zailani, Eltayeb, Hsu, and Tan (2012) describe eco-design also called design for the environment or green design, which refers to the identification of environmental aspects of a product over its entire life cycle and the integration of these aspects into product development. Furthermore, Q. Zhu, Sarkis, and Lai (2008) summarise eco-design requires that manufacturers design products that minimize consumption of materials and energy, that facilitate the reuse, recycle and recovery of component materials and parts, and that avoid or reduce the use of hazardous products within the manufacturing process. S. Zailani et al. (2012) found sustainable packaging has a significant positive effect on the sustainability concepts, as environment, economic and social performance because a reduction in the resources and waste directly implies the key environmental element, which can be related to overall cost reduction from an economic point of view. In addition, S. H. M. Zailani et al. (2012) argue eco-design actions or activities depend on companies, products or services.

Hence, there are five practices for eco-design practices as following;

1) Design for reduction and elimination of environmentally hazardous materials in productions (Zsidisin & Siferd, 2001),

- 2) Design for reuse in products or components to reduce the used product (Sarkis, 1998),
- 3) Design for recycling in waste product in term of used materials or un-reusable products and also design for reprocessing of the raw materials, components and finished goods (B. Lin, Jones, & Hsieh, 2001),
- 4) Design for remanufacturing, repair, rework and refurbished activities for returning product to re-use again with standard performance or better (Beamon, 1999), and
- 5) Design for resource efficiency by reducing consumption of materials and energy during product use (Asian Productivity Organization, 2004)

Thus, the definition of eco-design in this paper is the design of products or services that focusing on reduce environmental impact for the whole life of products and improve better image for the organization at the same time. Moreover, this study will focus on design for resource efficiency than other aspects because the company has planned to reduce cost for packaging and transportation cost so this option is the most relevant action for the company.

3.3 Investment Recover Practice

According to today's marketplace, it is characterized by higher levels of turbulence and volatility because supply chains are more vulnerable to disruptions and the increasing of risk in business is higher than before. In the past, the principal objective of supply chains was cost minimization and service optimization but at this moment, companies are focusing on the ability of the supply chain to cope with unexpected disturbances. Thus, It can be seen that investment recovery is one of important practice in GSCM field.

Regarding to the existing literature, there are some researchers explain about investment recovery definition. For example, Q. Zhu et al. (2008) describe that investment recovery requires that sale of excess inventories, scrap and used materials, and excess capital equipment. Moreover, Q. Zhu and Sarkis (2004) conclude that in developed countries, such as USA and Germany, companies think that investment recovery is very important practice for GSCM; while investment recovery in developing countries, such as China, seems less important. Thus, in a 20 century, investment recovery will become more important because developed and developing countries are considering green concept within the company and the globe.

While eco-design focuses on sustainable product and process development, investment recovery focuses on obsolete, end-of-life (EOL) products and surplus asset recovery (Choi & Hwang, 2015). Thus, the difference of eco-design and investment recovery is investment recovery is looking for a higher form of recycling/reuse by pursuing value-added recovery involving remanufacturing (Guide, Jayaraman, Srivastava, & Benton, 2000). So investment recovery can support organizations to maximize cost saving and value.

Moreover, it can be found that investment recovery has been successfully applied to a wide range of industries such as automobiles, computers and electronics. Choi and Hwang (2015) summarize that investment recovery strategies include with;

- 1) Consolidating product returns from multiple locations at the collection stage;
- 2) Recovering valuable components from used materials at the recycling stage; and
- 3) Making refurbished products for sales at the remanufacturing stage.

Thus, investment recovery has received attention in recent decade as a growing number of environmental regulations impose greater responsibilities on original equipment manufacturing (OEMs) for managing their EOL products. Moreover, organizations are now recognizing the potential value of product returns which have recoverable value and can bring additional revenue into organizations. Therefore, it is reasonable to argue that investment recovery contributes to green performance. The researcher defines investment recovery in this study as “the management of EOL products for gaining more revenue by reuse, recycling and remanufacturing used products in organizations and also provide more environmentally friendly for the globe”. Thus, in this study eco-design and investment recovery concept will be used to develop better packaging with lower transportation cost than before.

3.4 Green Supply Chain Management and Firm Performance

Regarding to eco-design and investment recovery, these practices include a broad range of environmental activities among the supply chain members, so it has become more difficult for a single organization to have all important information on products and services and its production processes. Regarding to various studies, it indicates that organizations can expect more substantial environmental and financial improvement when they take into account design factors outside of their control as suppliers, customers or transporters (Choi & Hwang, 2015). Therefore, in this study, eco-design and investment recovery are two main representatives for green supply chain management.

Regarding to Choi and Hwang (2015), they found that GSCM practices can be beneficial for a company's performance and it can be argued that the implementation of GSCM practices supports a company to develop unique environmental performance capabilities that lead to higher performance. Eltayeb et al. (2011) argued that eco-design is an internally-focused type of green supply chain initiatives, which mean that organizations try to improve environmental attributes of its products internally with little cooperation or interaction with external parties such as suppliers and customers. Therefore, the impact of improvement can be directly linked to the internal performance of the organization. Furthermore, S. H. M. Zailani et al. (2012) examined the drivers of eco-design and their impact on environmental performance and the results show empirical eco-design mediates the impact of regulation and incentive, and customer pressure on environmental performance. Furthermore, Green et al. (2012) found both practices, as eco-design and investment recovery, are positively linked to environmental performance but is negatively associated with economic performance.

In addition, Lee et al. (2014) confirm investment recovery has a significant and positive relationship with a firm's technological innovation, which supported by various findings in the past. Moreover, Lee et al. (2014) also highlight that developing countries did not prioritize investment recovery systems as their waste management policies and product recovery activities were not well established with related to firm's performance. So organizations in developing countries should change their mindset and implement investment recovery strategies in their supply chain if they wish to improve firm performance.

3.5 Research Framework

Based on the empirical evidence introduce that green supply chain initiatives are related with better environmental performance (ex. reduction of hazardous pollutants, wastes and material use, etc.) and economic performance (ex. financial gains, increase in market share, sale growth, etc.), then, Figure 1 presents the framework for this study.

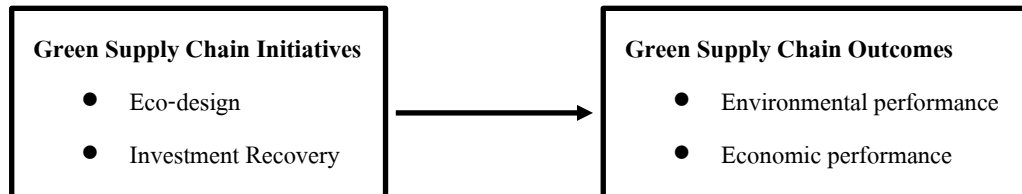


Figure 1 Research Framework

4. Research Methodology

This qualitative research was conducted by applying qualitative tools; focus group from key informants. The study area is automotive industry in Thailand with a single case study. Focus groups were guided by a semi-structured interview protocol to collect necessary data, while maintaining the highest level of reliability possible (see Appendix).

4.1 Population and Sample

This study is exploratory and based on a single company case study. In this case, Thai Manufacturing who is a 1-Tier supplier from automotive industry was selected due to they need to reduce transportation cost based on Just-in-time (JIT) strategy from their customer. The reason for selecting this company because Automotive industry is the most important industry in Thailand. Furthermore, through a case-study approach, this study can present the result from the actual work by applying some theories from the literature. In this case, one item, which has high transportation cost, was selected for this study because the company need to prove that eco-design and investment recovery concept can be used significantly before implement with other items in the company.

4.2 Data Collection and Data Analysis

During this study, investigation was utilized as the data collected represented difference perspectives from several parties such as warehousing, transportation, production and purchasing. The development of packaging need to get the comments and ideas from all parties and also organizations need to focus on cost reduction in transportation and warehousing.

Primary collecting data was record the discussion from those parties and applied eco-design and investment recovery concept into new packaging design. Content analysis was used to look themes in the interview transcripts. Content analysis is a technique that uses a set of procedures to make inferences from textual materials.

5. Research Findings

The focus groups discussion, which held in the company, from various departments, as warehousing, transportation, product design, purchasing and productions, then the organization designs new packaging for resource efficiency by reducing consumption of materials and energy during product use. Regarding to a current issue as the company found that transportation cost increases because there are lot of trips to deliver products to customers than expect. At the first time, new packaging design was developed to smaller rectangle but it still not capability. Therefore, the company re-designed new packaging from rectangle to triangle instead, which based on eco-design and investment recovery concept, refer to Figure 2. After that when the company combines boxes and place on pallet, the company can combine 2-triangle box to rectangle box so it can be seen that the company can reduce space to carry product about 50% refer to Figure 3, this result supports the company to decrease transportation cost. Moreover, the company can reduce packaging cost as well because the company uses less packages for triangle than rectangle. Furthermore, the company also reduces business wastes in their supply chain. Thus, this study also confirms that eco-design and investment recovery will influence to reduce logistics cost in term of transportation, purchasing raw materials and inventory cost.

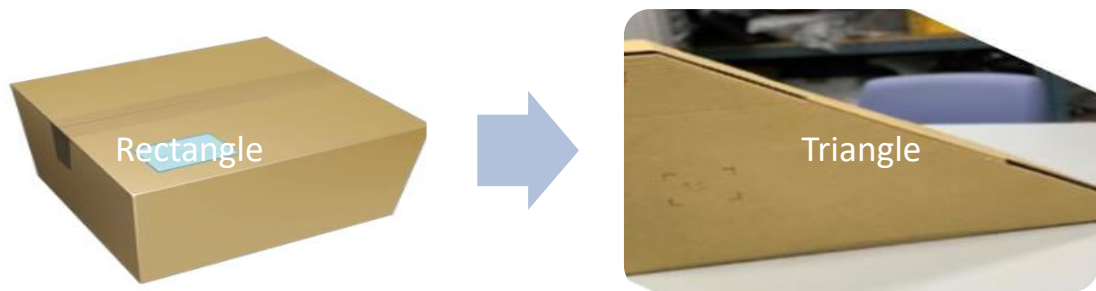


Figure 2 Changing from rectangle packaging to triangle packaging



Figure 3 Triangle packaging on a pallet

The results from this study show that the company can reduce transportation cost. For example, see in Table 1, if the company has to deliver products about 400 items (equal to 400 rectangle boxes), normally the company used 20 rectangle boxes per pallet so the company used 20 pallets for these shipments but now the company uses only 10 pallets because the company uses triangle packaging instead of rectangle (it calculated by 2-triangle boxes equal to 1-rectangle box). Therefore, if price per pallet is 12,000 Baht, the company can save more money from this action about 120,000 Baht per 400 items (saving more 12,000 Baht per pallet and reduce pallets from 20 to 10 pallets), see Table 1. However, transportation cost need to calculate based on weight per pallet or space per shipment, but it can be found that once the company design new packaging, the company can save more money and reduce number of pallet used significantly.

Table 1 The comparison between before and after repackaging

| Topic | Before | After |
|---------------------|--|--|
| Number of pallet | Use 20 pallets with 400 items Or 20 rectangle boxes per pallet | Use 10 pallets with 400 items Or 40 triangle boxes per pallet |
| Transportation Cost | 1 pallet used = 12,000 Baht ➔ 20 pallets x 12,000 Baht ➔ 240,000 Baht | 1 pallet used = 12,000 Baht ➔ 10 pallets x 12,000 Baht ➔ 120,000 Baht (Saving 120,000 Baht) |

Note: Number in this calculation is for example only.

6. Discussion

Regarding to the results from this study, organization can reduce cost in packaging and transportation as they would like to be. Therefore, this study supports managers to understand the value of their internally developed eco-design and investment recovery capability to respond to external pressures and institutional concerns. As same as S. H. M. Zailani et al. (2012) mention “the response on external institutional pressures provides a basis for creating an inimitable eco-design source base, which is critical to environmental sustainability”. Moreover, this study support work from S. Zailani et al. (2012) that sustainable packaging can reduce overall cost. In addition, this study also relates to Q. Zhu et al. (2008) that investment recovery thinking in developing countries is less important than developed countries but this study shows that manufactures in developing countries, as Thailand, begin to think about investment recovery concept.

In summary, the overall findings indicate that eco-design and investment recovery practices can be used in this company, so it seem to be that other Thai manufacturers can apply these two concepts into their process too. Thus, this is an interesting area for Thai Manufacturers to consider about it for the future business. The development new-packaging at the beginning may have a high cost, but when it is running continuously, the cost is going down. Thus, if organizations pay attention on reduce cost eco-design is one practice that should have. Finally, Thai manufacturers should focus to develop packaging or other related functions by reducing cost and creating more environmentally friendly products. However, this study may not be able to replicate with other

companies or packaging but it can motivate other Thai manufacturers to think about eco-design and investment recovery concept in their product and process.

7. Limitations and Future Research

The researcher proposes a single case of this study, so the result is a limitation of this work. So future study might investigate more samples and compare the results between them together. Moreover, in this study, repackaging is a combination practice from eco-design and investment recovery so this should be studied more as possible. Furthermore, this study focused on the suppliers points of view, who deliver product to manufacturers, so future study might investigate in customer' and manufacturer's point of view in term of eco-design and investment recovery.

Future studies can investigate the effect of eco-design and investment recovery of green supply chain management on other measures of outcomes. The insignificant effects of eco-design and investment recovery on the outcomes suggest that the benefits of these initiatives are related to the members of supply chains, such as suppliers and customers. Therefore, future research may consider utilizing inter-organizational measures of outcomes which measures the impact and effect of GSCM practices for the whole supply chain members in Thailand. Furthermore, future studies may investigate the effect of GSCM with company size because the difference of company size will provide the difference of GSCM practices. Lastly, future research might study in different industry in Thailand about green supply chain management concept such as electronic & electrical, pharmaceuticals, garments or agri-cultural.

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10. Appendix

Focus Group Protocol example:

1. What is the current situation and current problem?
2. Does this types of event happen often?
3. What was the immediate impact of the transportation cost?
4. What are the methods that we can use to prepare for solving this issue?
5. Can we design new packaging with eco-design practice?
6. Can we design new packaging with investment recovery practice?
7. What kind of packaging that we need?
8. How can your supplier/customer help you to be prepared for a cost reduction?
9. How do you anticipate positive change?
10. What are some ways that you create positive change?

TRANSPORT MODE CHOICE ANALYSIS FOR KO CHANG TOURISTS

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ABSTRACT

Overtourism at Chang Island or Ko Chang causes bad congestion on its narrow roads. The problem is necessarily contributed by large volume of visiting vehicles especially at the piers on both sides. The objectives of this study are to (1) identify the travel factors affecting tourists' transport mode choice, (2) evaluate the effects of these factors to the mode share, and (3) to establish a policy to discourage driving private car onto the island. The island access cost is introduced and tested based on the binary logit choice model. Two available choices are car, and park and ride. The traveler's behavior is modeled in form of linear utility function. Traveler and trip characteristics are also taken into consideration. The result shows that age, income, companion type and trip's destinations affect mode choice with 99% level of significance. The model validation shows that companion model is the most significant model. This research recommends the local government to set a policy by price strategies, and improve service and facility for travelers.

Keywords: Mode choice model, Binary logit model, Park-and-ride, Public transport, Logistics tourism

1. Introduction

Located 315 kilometers from Bangkok, Ko Chang is one of most visited destinations in the eastern region of Thailand. The statistics from Tourism and Sports office shows that Ko Chang welcomed more than one million visitors per year, 70 percent of which are Thai. Due to its close proximation from the capital, a large number of tourists prefer to drive to the pier and take the private car onto Ko Chang. Two operators provide car ferry service to Ko Chang, namely Ko Chang International and Cenferry. The former receive the majority of the tourists as it offers more frequent service and takes only 30 minutes to the island. Meanwhile Cenferry run less frequent service with longer time, but with a slightly cheaper fare. During peak times and long holidays, a large number of cars normally wait at ferry pier for up to 4 or 5 hours before getting on the ferry. Table 1 shows the number of visiting passengers and cars in 2019. The phenomenon of tourist overcrowding creating negative

impact to tourist destination is usually referred to as Overtourism. This happens to tourist destination all around the world. To prevent Ko Chang from Overtourism thus, this research studies the tourist mode choice behavior and recommend policy to reduce the number of private cars on the island.

Table 1 Visiting passengers and cars in 2019 (Source: Marine Office, Trat Branch and calculated by author)

| | Statistics | Ao Thammachat | Centerpoint |
|------------------------|--------------------------------|---------------|-------------|
| Capacity | Passenger/trip | 300 | 250 |
| | Cars/trip | 40-60 | 50-60 |
| Trips | High (April - May 2019) | | |
| | Minimum (round trips) | 17 | 14 |
| | Maximum (round trips) | 54 | 28 |
| | Average (round trips) | 27.8 | 15.3 |
| | Low (June - July 2019) | | |
| | Minimum (round trips) | 19 | 13 |
| | Maximum (round trips) | 40 | 25 |
| | Average (round trips) | 22.7 | 13.6 |
| Travelers (average) | High (April - May 2019) | | |
| | Arrival passengers (per day) | 3850 | 1182 |
| | Departure passengers (per day) | 395 | 1391 |
| | Arrival cars (per day) | 700 | 238 |
| | Departure cars (per day) | 695 | 278 |
| | Low (June - July 2019) | | |
| | Arrival passengers (per day) | 1834 | 925 |
| | Departure passengers (per day) | 1933 | 989 |
| | Arrival cars (per day) | 532 | 196 |
| | Departure cars (per day) | 538 | 207 |

2. Research Objectives

This research aims to relieve congestion at Ko Chang. The key objectives are to (1) identify the travel factors affecting tourists' transport mode choice, (2) evaluate the effects of these factors to the mode share, and (3) to establish a policy to discourage driving private car onto the island.

3. Literature Review

3.1 Theory, Concept and Related Research

Mode choice theory is one of the most popular theories for predict related factors of consumer decision to mode of transport. Daniel McFadden applied Discrete Choices Models and revealed preference to public transport. He predicted the mode shift from private vehicle to Bay Area Rapid Transit (BART) by using Random Utility model (Daniel McFadden, 1974).

Systematic variables are weighted by parameters. The likelihood Ratio Index is used to estimate the values of parameter. The following is Systematic variable equation (David and others, 2005).

$$V_i = \beta_0 + \sum \beta_i X_{ij} + \sum \beta_c X_c$$

where

β_0 = parameter specific for a given mode or the alternative specific constant (ASC).

It is a constant value that cannot be changed.

β_i = parameters representing the weight of the attributes.

X_{ij} = attributes or variables such as cost, time, and frequency.

The utility function has specified variables as below.

X_g = generic variables that effect indirectly to utility of all modes.

X_s = alternative specific variables that effect for some modes.

c = Socio-demographic characteristic and trip characteristic for person, also known as covariates.

The number of β is the constraints that we called degrees of freedom. We can calculate possible parameters of fractional factorial design as below.

Linear effect of label design = main effect + 1

Non-linear effect of label design = main effect + 1 + (number of level -1)

This research change coefficient to deal with non-linear effect to be linearized form by converting the equation to show different alternative specific across various group at travelers. This research applied dummy code for level of attributes. Logit model with discrete choice predicts mode choices in transportation. Binary logit model is the model that explains the choice behavior in the specific situation with only 2 modes. The following is utility equation with non-linear.

$$\begin{aligned} V_i &= \beta_0 + \sum \beta_i X_{ij} + \sum \beta_c X_c & \text{or} \\ V_i &= \beta_0 + \sum \beta_i X_{ij} + \sum \beta_c X_{ij} X_c \\ &= \beta_0 + (\sum \beta_i + \beta_c X_c) X_{ij} \end{aligned}$$

The different between each equation is covariates. The first equation is more concern of each mode with traveler's behaviors while second equation is more concern of socio-demographic to each mode. For example, the first equation will explain that car is more popular than public transport while second equation will explain that car is popular for rich more than poor.

The previous research studied socio-demographic and attributes in many different modes. For example, elders would concern about convenient because they usually had health problems. On the other hand, some elders preferred to exercise so they would be concern about accessible at transit point. The facilities had to be safe and convenient for their health (Simesek and others, 2018). Families with children were more concern about safety, reliability, comfort and convenience. Travelers who concerned about environment preferred choice with the least pollution impact. They preferred travelling by public transport to private car (Basheer and others, 2019). Income also greatly affected travel cost. Travelers would change mode of transport if the price was higher, but some still preferred paying higher if they could save time (Shahikhaneh and others, 2019). Trip length was also found to

be related to transport mode choice. Travelers preferred to drive a car in long distance trips. Destinations might have an effect to traveler's decision as well (Thrane, 2015). In addition, the number of companions had an effect to mode of transport. A traveler who travelled by public transport would switch private car if they travelled with family (Basheer and others, 2019). Travelers had to think of cost, safety and convenience when accessing other modes (Allard and Moura, 2018). Tourists who travelled during holiday were sensitive to time than cost, while travelers who travelled during weekday were sensitive to cost than time (Yang and others, 2019). Some research found that destination affects mode choice (Koo and others, 2010). The research on air transportation found that travel cost affected passenger's mode choice for both work and non-work trips (Zhou and others, 2019). A study about travelers during peak hour in England found that travelers may shift to public transport than driving a car in congestion (Keyes and Brown, 2018). Lastly, the amount of luggage affected mode of transport involving ferry (Bolla and others, 2019).

3.2 Research Framework

Research framework were designed as shown in Figure 1. All responsive variables were put into the experiment design process. First the population and sampling were identified. Then the attributes and attribute levels were assigned. Next the experiment scenarios were constructed as full factorial design before reducing the combinations of levels with fractional factorial design. The questionnaires were created from these choice sets. The data collected from the respondents were analysed in NLOGIT program before results and recommendations were made (David and others, 2005).

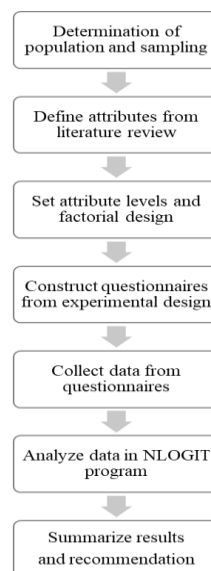


Figure 1 Research Framework

4. Research Methodology

4.1 Research Hypotheses

The study focused only on Thai tourists as they were the majority of Ko Chang visitors. In addition, most foreign tourists did not drive private cars. Thus, they did not generate traffic problem on the island and were omitted from the study. Thai visitors in tour group were also disregarded as their travel behavior did not generate additional traffic.

The respondents were randomly sampled, and the mix of their characteristics were taken as the same as that of the population. All respondents were assumed having reasonable knowledge to estimate their transportation and other expenses on Ko Chang under situations in which they take and did not take car onto the island.

4.2 Research Design

This research reviewed attributes from previous research that applied logit model to study Socio-demographic and attributes in different area. This research classified the attributes into three kinds of characteristics. The first was traveler characteristics such as gender, age, education, marriage status, income, number of cars, driving license etc. The second characteristic involved the nature of the trip such as trip purpose, trip origin, trip destination, companions, traveling with luggage etc. The third characteristic comprised relevant attributes such as travel cost, travel time, convenient, comfort, accessible, safety, reliable, weather, flexible etc. Three alternatives were available for travelers. The first choice was to drive private cars both mainland and island but crossing the sea by car ferry. The second choice was to drive private car from origin and parking near ferry port on mainland. Travelers would cross the sea by ferry and take on public transport on island to destination. The last choice included travel by public transport only, which was not considered in this research. Thus, this research would focus only two combinations of mode choices: Car-Ferry-Car (i.e., “Car” choice) and, Car-Parking-ferry-pedestrian (i.e., “Park” choice). The analysis used stated preference (SP) experiment for tourists on weekend during high season. The questionnaires consisted of three sections. The first section included information of travelers. The second was information related to the trips being made. The third contained mode choice scenarios under different attributes.

Table 2 Variables in questionnaires.

| Section | Variable | Scale | Level | | | |
|----------------------------|-------------------|----------|---|---|---|---------------------|
| Traveler's characteristics | Gender | Nominal | Man | | Woman | |
| Traveler's characteristics | Age | Interval | < 25 years | 25-34 years | 35-44 years | > 45 years |
| Traveler's characteristics | Monthly income | Interval | Low (<18,000 baht) | Medium (18,000 - 36,000 baht) | | High (>36,000 baht) |
| Trip's characteristics | Companion* | Ordinal | None | 1-2 people | | > 3 people |
| Trip's characteristics | Type of companion | Nominal | Alone | Family | Friend | Etc. |
| Trip's characteristics | Travel day* | Ordinal | 1 days | 2 days | | Up to 3 days |
| Trip's characteristics | Luggage* | Ordinal | 1 bag | 2-3 bags | | Up to 3 bags |
| Trip's characteristics | Trip destination | Nominal | Eastside (Salak Phet Bay, Salak Kok Bay, Sai Daeng Beach) | Westside 1 (Klong Son Bay, White Sand Beach, Pearl Beach) | Westside 2 (Klong Prao Beach, Kai Bae Beach, Lonely Beach, Bai Lan Beach, Bang Bao Bay) | Others |
| Preference (Car) | Travel time | Ratio | 2 hours | 3 hours | 4 hours | |
| Preference (Park) | | | 30 minutes | 1 hour | 1 and half hour | |
| Preference (Car) | Travel cost | Ratio | 200 baht | 400 baht | 800 baht | |
| Preference (Park) | | | 80 baht | 130 baht | 180 baht | |
| Preference (walk) | Accessible | Ratio | 300 m. | 600 m. | 900 m. | |
| Preference (Public) | | | Free | 50 baht | 100 baht | |

*Ordinal scaled variables are converted to nominal scaled to eliminate the linear effect of these variables.

4.3 Population and Sample

Population included Thai travelers who drove private car onto Ko Chang during high season with Ko Chang International ferry. The reason for choosing only Thai was not only the quantity but it also considered specific behavior. Foreigners relied on public transport while Thai were used to drive private car. The sample size was calculated by Cochran method (Cochran WG., 1977). It was assumed that 70 percent of the tourists were Thai, with an error of 5 percent. The number of minimum sampling is 323 persons.

4.4 Research Instrument

They research used NGENE program to generate balanced orthogonal fractional factorial designs. Travel cost for car and park included ferry fare and parking fee. Access distance between parking and ferry port

was only for park choice. Waiting time for park choice referred to waiting time at ferry port. Public transport cost on Ko Chang was only accounted for park choice. A total of 12 sets of questionnaire were created, each of which contained 3 scenarios or choice tasks. A set of questionnaire would be randomly selected for an individual to complete these 3 choice tasks.

Data were input in an econometric software NLOGIT to calibrate the logit model and evaluate the significance of the model parameters. The result showed significant level of each attributes as 10%, 5%, 1% level of significant, respectively. Only parameters with at least 95% level of confidence would be considered.

4.5 Data Collection

The questionnaires were collected from tourists on 23-24 November 2019 and 7-8 December 2019 from 09.00 a.m. to 3.00 p.m. Surveys were conducted at Ao Sapparot pier, White sand beach, Bang Bao bay and Mhu Ko Chang National park viewpoint. The questionnaires were responded by 205 persons, 69 of which were collected on weekend, and 136 were collected on weekend. Each questionnaire had 3 scenarios of mode choice for a total of 615 scenarios. The sample consisted of almost equal number of man and women. The majority of travelers were of early working ages between 25 and 34. Almost half of travelers were from high-income group. Trip characteristics showed that half of the travelers visit in group size larger than 2 persons. The distribution as shown in Table 3 was taken as the representative of actual distribution for the whole population.

Table 3 Respondent's characteristics

| Characteristics | | Quantities | Percentage |
|----------------------|---------------------------|------------|------------|
| Gender | Man | 94 | 46 |
| | Woman | 111 | 54 |
| Age | Under 25 | 41 | 20 |
| | 25-34 | 81 | 40 |
| | 35-44 | 52 | 25 |
| | Up to 45 | 31 | 15 |
| Income | Under 18,000 Baht | 98 | 48 |
| | 18,000-36,000 Baht | 80 | 39 |
| | Up to 36,000 Baht | 27 | 13 |
| Number of companions | 0 | 17 | 8 |
| | 1 to 2 | 71 | 35 |
| | Up to 2 | 117 | 57 |
| Type of companions | Alone | 16 | 8 |
| | Family | 97 | 47 |
| | Friend | 78 | 38 |
| | Etc. | 14 | 7 |
| Length of stay | 1 day | 47 | 23 |
| | 2 days 1 night | 96 | 47 |
| | 3 days 2 nights or larger | 62 | 30 |

Table 3 (continue)

| Characteristics | | Quantities | Percentage |
|-----------------|---------------|------------|------------|
| Luggage (piece) | 1 | 74 | 36 |
| | 2 to 3 | 91 | 44 |
| | Up to 3 | 40 | 20 |
| Destination | Eastside | 18 | 1 |
| | Westside near | 50 | 25 |
| | westside far | 91 | 65 |
| | Etc. | 46 | 9 |

4.6 Data Analysis

SP survey data were analyzed by the NLOGIT program. 80 percent of data were calibrated to 8 models such as gender, age, income, number of companions, type of companion, travel days, number of luggage, and trip's destinations. It was found that travel cost had the greatest effect to traveler's behavior with 99 confidence level, while travel time and accessible did not show significant impact to the model. The results also revealed that socioeconomic and trip characteristics such as ages between 25 and 34 years, low income and medium income, type of companion and trip's destination affected mode choice. In summary, the model can be written in form of utility functions as below.

Age group: $U(\text{car}) = 0.882 - 0.002(\text{cost})$, $U(\text{Park}) = -0.002(\text{cost}) + 0.005$

Income group: $U(\text{car}) = 1.287 - 0.002(\text{cost})$, $U(\text{Park}) = -0.002(\text{cost}) + 0.005(\text{cost})(\text{low}) + 0.005(\text{cost})(\text{medium})$

Companion group: $U(\text{Car}) = 0.608 - 0.005(\text{cost}) + 0.003(\text{cost})(\text{alone}) + 0.003(\text{Cost})(\text{friend}) + 0.004(\text{cost})(\text{family})$,
 $U(\text{Park}) = -0.005(\text{cost}) + 0.007(\text{cost})(\text{family})$

Destination group: $U(\text{car}) = 1.056 - 0.002(\text{cost})$, $U(\text{Park}) = -0.002(\text{cost}) + 0.005(\text{cost})(\text{near}) + 0.004(\text{cost})(\text{far})$

The other 20 percent of data were use for model validation. The results showed the model containing the number of travel companions could accurately predict at 66.67 percent, while others only produce slightly better than 50 percent accuracy.

Table 4 Results from Calibration and Validation

| Models | Calibration (N=492) | | | | | | Validation (N=123) | |
|-------------|---------------------|-------------|----------------|-------|-------------------------|-------------|--------------------|--------------------|
| | Parameters | Coefficient | Standard error | Z | Log likelihood function | Chi-squared | Correct prediction | Percentage correct |
| Age | ASCCAR | 0.88186 | 0.17701 | 4.98 | -323.02669 | 35.99531 | 69 | 56.1 |
| | COST | -0.0019 | 0.00037 | -5.10 | | | | |
| | PARKAGE2 | 0.00454 | 0.00139 | 3.26 | | | | |
| Income | ASCCAR | 1.28731 | 0.27844 | 4.62 | -323.92234 | 34.20402 | 64 | 52.03 |
| | COST | -0.00204 | 0.00038 | -5.38 | | | | |
| | PARKL | 0.00512 | 0.00187 | 2.73 | | | | |
| | PARKM | 0.00522 | 0.00191 | 2.73 | | | | |
| Companion | ASCCAR | 0.60809 | 0.21953 | 2.77 | -315.68025 | 50.68819 | 82 | 66.67 |
| | COST | -0.00513 | 0.00117 | -4.38 | | | | |
| | CARALO | 0.00255 | 0.00126 | 2.03 | | | | |
| | CARFRI | 0.00336 | 0.00107 | 3.13 | | | | |
| | CARFAM | 0.00362 | 0.00129 | 2.80 | | | | |
| | PARKFAM | 0.00699 | 0.00249 | 2.80 | | | | |
| Destination | ASCCAR | 1.05593 | 0.2148 | 4.92 | -323.60083 | 34.84703 | 66 | 53.66 |
| | COST | -0.00195 | 0.00037 | -5.21 | | | | |
| | PARKNEAR | 0.00477 | 0.0018 | 2.65 | | | | |
| | PARKFAR | 0.00403 | 0.00152 | 2.64 | | | | |

5. Research Findings

According to the data analysis from NLOGIT Program, the cost had great influence to traveler's behavior. Early working-age normally had income between low and medium and were sensitive with travel cost. There would be significant mode shift from car to pedestrian if travel cost was higher. On the other hand, travelers who worked for a long time with high incomes were pleased to pay for driving a car onto Ko Chang. They may not want to shift mode because driving became a habit. Destinations also impact traveler's behavior. If travel cost was higher, travelers who traveling near or far from the ferry pier may choose public mode while traveler who traveling more than 1 destination or traveling to East side would prefer to drive a car. However, the most impact of the traveler's behavior is the type of companion. The results show that normally travelers prefer to travel by private car more than public transport. If the price is higher, some travel groups who travel with family would be shifted to be pedestrian.

6. Discussion

The companion model was the best model from this study. It yielded accurate predictions of almost 70 percent. If government would like to reduce traffic congestion, they should introduce the island access fee for cars. The first group who decided to shift involves travelers who travel with their family. The proportion of this group is 50 percent of all traveler groups. If the price was increased until they shift mode, congestion could be relieved by almost 50 percent. However, 80 percentage of travelers had low and medium income and were sensitive with price. They would be thinking of travel cost by comparing between driving on Ko Chang versus park on land and ride on public transport.

7. Suggestion

(1) The first group who decided to shift involved travelers who traveled with their family. They would be travelling with kids and elderly. The government should invest facilities that are safe for children and people with disabilities.

(2) Early working-age were sensitive with travel cost. This research recommends setting the new fare under willingness to pay or setting an environment fee. The negative affect of increased fare may affect to some traveler group. They may switch to another tourist attraction. In this case, government should clarify to travelers that Ko Chang will be high-quality tourism. The purpose of high-quality tourism is to protect the environment on Ko Chang but still make money for the villagers and entrepreneurs.

(3) Travelers with high incomes were willing to pay for driving on Ko Chang. The public transport service on the island should be improved to change people's negative viewpoint. Reliability becomes the key and should be offered by keeping the bus departure schedule.

(4) The number of travelers always high volume during high season so the access car fee should not be paid during the low season. During the high season, the government should promote Park-and-Ride and public transport campaign.

8. Acknowledgement

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กลุ่มย่อยที่ 3

*Science, Technology,
Engineering*

SYNTHESIS OF ANTIBACTERIAL METHACRYLAMIDE MONOMERS FOR DENTAL RESIN ADHESIVE

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ABSTRACT

Dental resin adhesive is a mixture of monomers used as adhesive in resin-based composite tooth restoration. The use of resin-based composite has been increasing over the year due to the health concerns of the traditional mercury amalgam-based tooth restoration. The problem with resin-based tooth restoration is that it has significantly shorter life-time than the amalgam-based one. The main cause of restoration failure is that the adhesive comprises mostly of methacrylate monomers, which can be hydrolyzed easily by acidic bacterial enzymes. Herein, The methacrylamide monomer, **MAUPB** were synthesized as the antibacterial resin adhesive against two common bacteria found in the tooth cavity, *S.mutans* and *E.feacalis*. **MAUPB** showed no sign of hydrolysis even after being submerged in acidic deuterium oxide (pH 1) for 60 days. However, 1-(12-

(methacryloyloxy)dodecylpyridin-1-ium bromide (**MDPB**), the only commercial available antibacterial resin adhesive was partially hydrolyzed at the ester bond.

Keywords: resin adhesive; antibacterial monomer; hydrolytic resistance; methacrylamide

1. Problems and Significance of the Studies

Resin adhesive is a mixture of monomers used in resin-based composite tooth restoration. The use of resin-based composite in tooth restoration has been increasing over the years due to potential adverse health effect of amalgam-based composite. (Al-Qarni, F.D. *et al.*, 2018) In addition, the damaged amalgam must be entirely removed from the tooth, and it may cause additional damage to other teeth or tissues in the mouth of patients as well as unnecessary loss of tooth tissue. On the contrary, resin-based composite can be replaced without damaging tooth tissues. However, this restoration method also met a setback in a form of secondary caries that reduce the lifetime of resin-based composite considerably comparing to amalgam-based composite. Most of the resin adhesives used in clinical practice are ester-based monomers, especially methacrylate, which can be easily hydrolyzed by bacterial enzymes and do not have antibacterial property to prevent the bacterial growth. Therefore, the average lifetime of the resin adhesive is only about 5 years, while the average lifetime of amalgam is about 8.7 years (Rho, Y. J. *et al.*, 2013). Hence, the synthesized resin adhesive monomers with antibacterial and hydrolytically resistance properties can increase the lifetime of the resin composite.

2. Objectives

- (1) To synthesize a hydrolytically resistant and antibacterial monomer
- (2) To evaluate properties of the synthesized monomer, such as antibacterial activities, cytotoxicity, and hydrolytically resistance

3. Literature Reviews

Resin adhesive monomers are monomers used in resin composite-based tooth restoration, for example methylmethacrylate (**MMA**), 2-hydroxyethylmethacrylate (**HEMA**), 2-(phosphonooxy)ethyl methacrylate (**HEMA-phosphate**), *N*-hydroxyethyl methacrylamide (**HEMAM**) and *N*-(1-hydroxy-2-methylpropan-2-yl)methacrylamide (**2dMM**) as shown in **Fig.1**. **HEMA** is a biocompatible molecule with low molecular weight, relatively high hydrophilicity, relatively cheap and popularly used in clinical practice (Geurtsen, W. *et al.*, 2000). The **HEMA-phosphate** has a phosphate group that can bond to calcium of the tooth, thus greatly increases the bond strength. However, methacrylate and phosphate groups can undergo hydrolysis into acid and ester (Van Landuyt, K. L. *et al.*, 2007).

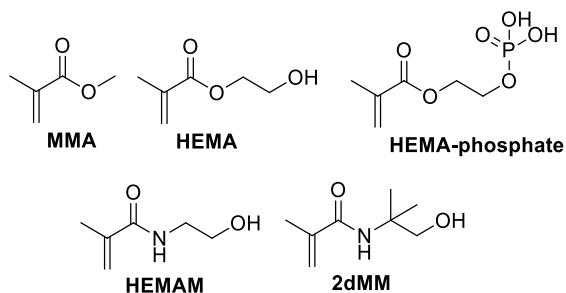


Fig.1 Examples of monomers in primer

Quaternary ammonium compounds (QACs) have broad-spectrum of antibacterial properties and low toxicity (M. Antonucci, J. *et al.*, 2012). There are many synthetic antibacterial resin adhesive monomers containing QACs used in resin composite, for example *N,N*-dimethylaminohexadecylmethacrylate (**DMAHDM**), *N,N*-dimethylaminoethylmethacrylate (**DMAEMA**), 1-(12-(methacryloyloxy)dodecyl)pyridin-1-ium bromide (**MDPB**) and 1,1'-bis[o-(2-methacryloyloxyethyl)-2-methylphenylene]dimethylammonium bromide (**IMDA-3**) as shown in **Fig.2**. Among them, **MDPB** is the only commercially available antibacterial monomer mixed in composite under the brand name 'Clearfil Protect Bond[™]'. Additionally, chain length is also one of the factors that influence antibacterial properties of QACs (Zhou, H. *et al.*, 2014). The alkyl chain can provide hydrophobicity complement with the bacterial outer cell wall and disrupt the membrane like a pen popping a balloon. Many studies indicate the most suitable carbon chain length to be used in dental resin composite is in the range of 12-16 (Cocco, A. R. *et al.*, 2015). Among many polymerizable groups, the methacrylate and methacrylamide are the most effective functional group because the vinyl and styryl groups are less reactive in free radical polymerization. Methacrylate monomer is unstable to water while, methacrylamide monomer is hydrolytically resistant due to the amide bond is less hydrolyzable than the ester bond.

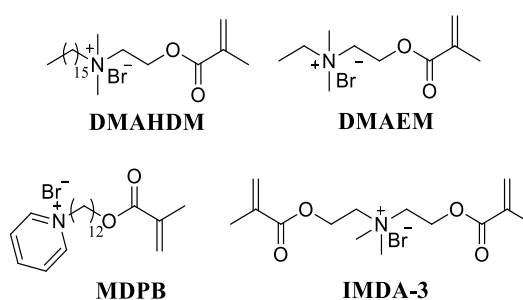


Fig.2 Examples of resin adhesives with QACs

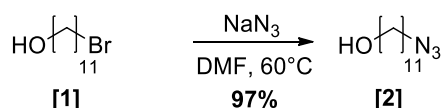
This study was focused on synthesis of methacrylamide monomer containing quaternary ammonium salt, namely **MAUPB**, for use as antibacterial primer.

4. Research Methodology

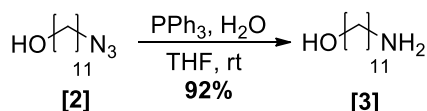
4.1. General Information

Extraction and column chromatography solvents were distilled at their boiling point before use. Other analytical grade solvents for reactions were directly used as providing from suppliers or distilled by using standard procedures. Thin-layer chromatography (TLC) was performed using SiliaPlateTM R10011B-323 (Silicycle) or silica gel 60 GF254 (Merck) and were visualized by fluorescence quenching under UV light and ninhydrin stain. Column chromatography was performed using SiliaFlash® G60 Silica (60-200 μm , Silicycle). ¹H NMR (300 MHz) and ¹³C NMR (75 MHz) spectroscopic data were recorded using a 300 MHz Bruker FT-NMR Ultra Shield spectrometer with a residual solvent signal as an internal standard. Chemical shifts were expressed in parts per million (ppm) and coupling constants were reported as hertz (Hz). Splitting patterns were indicated as follows: br, broad; s, singlet; d, doublet; t, triplet; q, quartet; qn, quintet; m, multiplet. Infrared spectra (IR) were measured using a Perkin Elmer Spectrum GX FT-IR spectrometer (Bruker Corp., Billerica, MA, USA) and recorded as wavenumber (cm^{-1}). High-resolution ESI mass spectra were obtained using a liquid chromatograph-mass spectrometer (LCMS-IT-TOF, Shimadzu, Japan).

4.2 Synthesis and Characterization of MAUPB

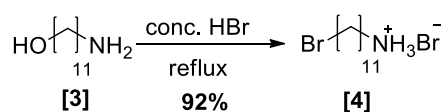


Synthesis of 11-azidoundecan-1-ol [2]. The 11-bromoundecan-1-ol ([1], 10.000 g, 39.80 mmol, 1 equiv.) was placed in a 500 mL round-bottom flask and dissolved in dimethylformamide (399 mL). Sodium azide (3.888 g, 59.71 mmol, 1.5 equiv.) was added to the solution. Then, the reaction mixture was heated at 60 °C for overnight and allowed to cool to room temperature. The solution was then transferred to a 1,000 mL separatory funnel containing water (120 mL) and ethyl acetate (150 mL). After that, the organic layer was washed with water (70 mL, 7 times), brine (50 mL), dried over sodium sulfate, and concentrated under reduced pressure to provide [2] (8.225 g, 97%) as yellow oil. $R_f = 0.54$ (4:1 hexane: ethyl acetate, UV); FT-IR (neat): ν_{max} 3340 (brs), 2929, 2856, 2096, 1458, 1256, 1056 cm^{-1} ; ¹H NMR (300 MHz, CDCl_3): δ 3.64 (t, $J = 6.9$ Hz, 2H), 3.26 (t, $J = 6.9$ Hz, 2H), 1.57 (quin, $J = 6.9$ Hz, 4H), 1.296 (m, 14H) ppm; ¹³C NMR, DEPT (75 MHz, CDCl_3): δ 62.8 (CH_2), 51.4 (CH_2), 32.7 (CH_2), 29.5 (CH_2), 29.4 (2x CH_2), 29.1 (2x CH_2), 28.8 (CH_2), 26.7 (CH_2), 25.7 (CH_2) ppm.

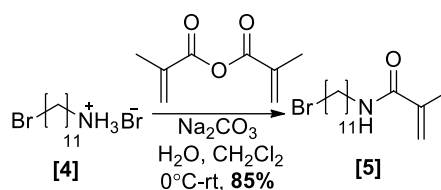


Synthesis of 11-aminoundecan-1-ol [3]. The 11-azidoundecan-1-ol ([2], 6.830 g, 32.02 mmol, 1 equiv.) was placed in a 500 mL round-bottom flask containing tetrahydrofuran (246 mL) and water (74 mL). Then, triphenylphosphine (25.193 g, 96.06 mmol, 3 equiv.) was added to the solution and stirred at room temperature for 48 hours. After that, the reaction mixture was concentrated under the reduced pressure to

generate a white solid. The 4 M HCl (150 mL) and dichloromethane (200 mL) were slowly added to the solid and stirred for 30 minutes. The solution was then transferred to 1,000 mL separatory funnel. The aqueous layer was separated, washed with dichloromethane (100 mL, 3 times), and basified using 4 M NaOH until pH 12. The basified aqueous layer was extracted with dichloromethane (70 mL, 4 times). The combined organic layer was dried over sodium sulfate, and concentrated to provide **[3]** (5.536 g, 92%) as a white solid. Melting point: 77-79 °C; FT-IR (neat): ν_{\max} 3341 (brs), 2919, 2850, 1467, 1219, 1057 cm^{-1} ; ^1H NMR (300 MHz, CDCl_3): δ 3.62 (t, J = 6.9 Hz, 2H), 2.66 (t, J = 6.9 Hz, 2H), 1.53 (m, 4H), 1.26 (m, 14H) ppm; ^{13}C NMR, DEPT (75 MHz, CDCl_3): δ 62.4 (CH_2), 42.1 (CH_2), 33.6 (CH_2), 32.9 (CH_2), 29.6 ($2\times\text{CH}_2$), 29.5 ($3\times\text{CH}_2$), 26.8 (CH_2), 25.9 (CH_2) ppm; HRMS (ESI): m/z $\text{C}_{11}\text{H}_{26}\text{NO}^+$ $[\text{M}+\text{H}]^+$ calculated 188.2009, found 188.2014.

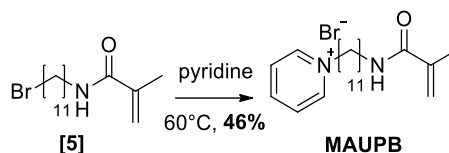


Synthesis of 11-bromoundecan-1-aminium bromide [4]. The 11-aminoundecan-1-ol (**[3]**, 6.218 g, 33.20 mmol, 1.0 equiv.) was transferred to a 50 mL round-bottom flask followed by the addition of concentrated hydrobromic acid (24.9 mL). Subsequently, the reaction mixture was refluxed at 100 °C for 12 hours prior to cooling to room temperature. The resulting solid was filtered, washed with cold acetone (10 mL, 2 times), and recrystallized in acetone to provide **[4]** (10.038 g, 92%) as a gray solid. Melting point: 150-151 °C; FT-IR (neat): ν_{\max} 3341 (brs), 2980, 2920, 2853, 1599, 1221 cm^{-1} ; ^1H NMR (300 MHz, $\text{DMSO}-d_6$): δ 3.50 (t, J = 6.6 Hz, 2H), 2.75 (q, J = 6.6 Hz, 2H), 1.76 (quin, J = 6.6 Hz, 2H), 1.48 (m, 2H), 1.23 (m, 14H) ppm; ^{13}C NMR, DEPT (75 MHz, $\text{DMSO}-d_6$): δ 39.2 (CH_2), 35.7 (CH_2), 32.7 (CH_2), 29.3 (CH_2), 29.3 ($2\times\text{CH}_2$), 29.0 (CH_2), 28.6 (CH_2), 28.0 (CH_2), 27.3 (CH_2), 26.26 (CH_2) ppm.



Synthesis of *N*-(11-bromoundecyl)methacrylamide [5]. A solution of 11-bromoundecan-1-aminium bromide (**[4]**, 4.110 g, 12.41 mmol, 1 equiv.) in dichloromethane (51 mL) was transferred to a 250 mL round-bottom flask, and cooled down to 0 °C. Then, sodium carbonate solution (3.950 g, 37.27 mmol, 3 equiv.) in distilled water (27 mL) was added to create a two phase-mixture. The reaction was vigorously stirred for 5 minutes at 0 °C. prior to dropwise addition of methacrylic anhydride (5.52 mL, 37.2 mmol, 3 equiv.). Then, the reaction mixture was stirred at room temperature for 48 hours and transferred to a 250 mL separatory funnel. The organic layer was separated, washed with saturated sodium carbonate solution (20 mL, 3 times), distilled water (20 mL, 2 times), brine (10 mL), dried over sodium sulphate and concentrated to provide a yellow oil. Crude oil was purified by column chromatography using 100% dichloromethane to provide **[5]** (3.347 g, 85%) as an amber oil.

$R_f = 0.57$ (100% dichloromethane, UV); FT-IR (neat): ν_{\max} 3352 (brs), 2926, 2855, 1727, 1659, 1548, 1460, 1177, 1134 cm^{-1} ; ^1H NMR (300 MHz, CDCl_3): δ 5.68 (s, 1H), 5.32 (s, 1H), 3.42 (t, $J = 6.9$ Hz, 2H), 3.31 (q, $J = 6.9$ Hz, 2H), 2.01 (s, 3H), 1.87 (quin, 2H), 1.67 (m, 2H), 1.60-1.20 (m, 14H) ppm; ^{13}C NMR, DEPT (75 MHz, CDCl_3): δ 168.5 (C), 140.5 (C), 119.0 (CH_2), 39.8 (CH_2), 34.0 (CH_2), 32.9 (CH_2), 29.6 (CH_2), 29.5 (CH_2), 29.4 ($2\times\text{CH}_2$), 29.3 (CH_2), 28.8 (CH_2), 28.2 (CH_2), 27.0 (CH_2), 18.7 (CH_3) ppm.



Synthesis of 1-(11-methacrylamidoundecyl)pyridin-1-ium bromide (MAUPB). A 10 mL round bottom flask was charged with a solution of *N*-(11-bromoundecyl)methacrylamide ([5], 3.578 g, 11.24 mmol, 1 equiv.) in pyridine (4.75 mL, 180 mmol, 16 equiv.). The reaction mixture was heated at 60 °C for 48 hours and transferred to a 125 mL separatory funnel containing DI water (40 mL) and dichloromethane (40 mL). The organic layer was separated and extracted with DI water (20 mL, 5 times). The combined aqueous layer was lyophilized to provide **MAUPB** (4.467 g, 46%) as yellow oil. FT-IR (neat): ν_{\max} 3287 (brs), 2927, 2856, 1722, 1654, 1634, 1538, 1488, 1219, 1048 cm^{-1} ; ^1H NMR (300 MHz, methanol- d_4): δ 9.05 (d, $J = 7.8$ Hz, 2H), 8.62 (t, $J = 7.8$ Hz, 1H), 8.11 (t, $J = 7.8$ Hz, 2H), 5.67 (s, 1H), 5.35 (s, 1H), 4.66 (t, $J = 7.5$ Hz, 2H), 3.22 (t, $J = 7.5$ Hz, 2H), 2.04 (m, 2H), 1.93 (s, 3H), 1.53 (m, 2H), 1.40-1.20 (m, 14H) ppm; ^{13}C NMR, DEPT (75 MHz, methanol- d_4): δ 169.8 (C), 145.5 (CH), 144.6 (CH), 140.1 (C), 128.2 ($3\times\text{CH}$), 118.9 (CH_2), 61.7 (CH_2), 39.3 (CH_2), 31.2 (CH_2), 29.2 (CH_2), 29.1 (CH_2), 29.0 ($3\times\text{CH}_2$), 28.7 (CH_2), 26.6 (CH_2), 25.8 (CH_2), 18.6 (CH_3) ppm; HRMS (ESI): m/z $\text{C}_{20}\text{H}_{33}\text{N}_2\text{O}^+$ [M]⁺ calculated 317.2587, found 317.2593.

4.2 Antibacterial Experiment

Antibacterial activities of **MAUPB** and **MDPB** were tested using serial microdilution assay to determine their MIC (minimal inhibitory concentration) and MBC (minimal bactericidal concentration) against the common bacteria in deteriorated tooth, *S. Mutan* and *E. Faecalis*. The bacteria strains were prepared in blood agar plate using Brain-Heart Infusion broth (BHI, Difco, Detroit, USA) supplement with 5 g/L yeast extract. The bacteria were incubated at 37°C in anaerobic environment for 24 hours. Then, both bacteria were adjusted into 1×10^8 colony forming unit (CFU)/ml with BHI broth. The monomers were dissolved in DMSO and then transferred into sterilized water to reach final concentration of 10 mg/mL. Series of two-fold microdilution were performed on the initial solution to give 0.1 mL of each BHI broth. Solutions of various concentrations were transferred to 96-well plate with same amount of the inocula. After 24 hours in anerobic culture, the turbidity of each wells indicating bacterial growth was recorded. MIC is the lowest monomer concentration where no turbidity could be detected in comparison to the control. A 50 μL of an aliquot from each well without turbidity was inoculated on BHI agar plates and incubated at 37 °C in anaerobic environment for 48 hours. MBC is the lowest monomer concentration that shows no bacterial colonies on the plate. The experiment was repeated twice. BHI

broth containing DMSO without monomer and chlorohexidine were used as a negative and a positive control, respectively.

4.3 Cytotoxicity Assays

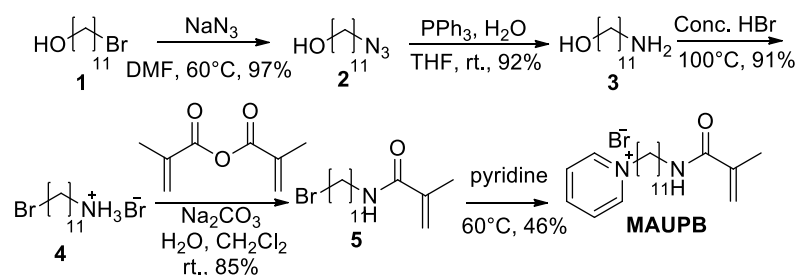
All culture reagents were purchased from Thermo Fisher Scientific, USA. The non-cancerous human embryonic kidney 293T and African green monkey kidney fibroblast Vero cell lines were obtained from Prof. Dr. Mathurose Ponglikitmongkol (Mahidol University) and Dr. Sittirak Roytrakul (The National Center for Genetic Engineering and Biotechnology, Thailand (BIOTEC)), respectively. Both cell lines were maintained in Dulbecco's modified Eagle's (DMEM) medium supplemented with 10% fetal bovine serum, 100 U/mL penicillin and 100 µg/mL streptomycin at 37 °C in humidified atmosphere containing 5% carbon dioxide. Log phase cells were seeded onto 96-well culture plate at a density of 2.5×10^3 cells/well and incubated for overnight. Then, cells were exposed to various concentrations of tested compounds (0-25 µM in 0.2% v/v DMSO). After 72 hours of incubation, cell viability was determined by MTT assay (Wanichwatanadecha, P. *et al.*, 2012). Each experiment was performed in triplicate and was repeated at least three times. DMSO and doxorubicin were used as a negative control and positive control, respectively. Data was expressed as IC₅₀ (means ± SD) where the 50% of cells were growth inhibited.

4.4 Hydrolysis Experiment

The hydrolysis experiment of monomers was conducted using the method similar to that described by Nishiyama, N. *et al.* (2004). The 6.8×10^{-2} mmol of each monomer was dissolved in 500 µL of the acidic (pH 0.97) deuterium oxide. The pH 0.97 was used to simulate the occasionally acidic environment in the oral cavity and to accelerate the hydrolysis reaction. The solution was kept at room temperature and hydrolysis was tracked using the ¹H NMR spectroscopy at day 0, 1, 3, 5, 7, 14, 21, 30 and 60, respectively.

5. Results and Discussion

Synthesis of methacrylamide monomer, **MAUPB** was achieved in 5 steps as shown in **Scheme 1**. The bromo functional group of **[1]** was converted to azido group via substitution reaction with sodium azide to afford 97% of azido alcohol **[2]**. Then, azido alcohol **[2]** was reduced via Staudinger reaction to achieve 92% of the amino alcohol **[3]**. Bromination of amino alcohol **[3]** using hydrobromic acid yielded 92% of ammonium salt **[4]**. Substitution reaction of **[4]** with methacrylic anhydride yielded 85% of methacrylamide **[5]**. Completion of **MAUPB** can be achieved via quaternarization of methacrylamide **[5]** with pyridine.



Scheme 1 Synthetic route of **MAUPB**

Antibacterial properties of synthesized monomer **MAUPB** and commercially available antibacterial monomer, **MDPB**, were tested by using the commonly used dental resin adhesive monomer, **Bis-GMA** and bactericide agent chlorohexidine as negative and positive controls, respectively (**Table 1**). **MAUPB** showed significantly higher MIC and MBC values against both *S.mutans* and *E.faecalis* than those of **MDPB**. The lower antibacterial properties might come from the higher polarity of the methacrylamide group, and the shorter chain length. However, **MAUPB** can still be used as an effective, albeit less potent, antibacterial agent in resin composite.

Table 1 Antibacterial properties of **MAUPB**, **MDPB** and controls

| | <i>S. Mutans</i> | | <i>E. Faecalis</i> | |
|-----------------------|------------------|-------|--------------------|-------|
| | MIC (mg/mL) | MBC | MIC | MBC |
| MDPB | 0.0195 | 0.039 | 0.078 | 0.156 |
| MAUPB | 2.5 | 5 | 2.5 | 5 |
| Bis-GMA | - | - | - | - |
| Chlorohexidine | + | + | + | + |

The synthesized monomer, **MAUPB**, **MDPB** and **Bis-GMA** were tested for cytotoxicity against two non- cancerous cell lines: human embryonic kidney (293T) and Vero (African green monkey kidney fibroblast) cell lines using MTT assay (**Table 2**). **MAUPB** showed much lower cytotoxicity against both vero cells and 297T cell lines than those of **MDPB** and **Bis-GMA**. Therefore, **MAUPB** should be safe for clinical trial.

Table 2 Cytotoxicity of **MAUPB**, **MDPB** and **Bis-GMA**

| | Vero Cells | 293T |
|----------------|-----------------------|-----------------------|
| | IC ₅₀ (μM) | IC ₅₀ (μM) |
| MAUPB | >200 | 43.5 |
| MDPB | 92.5 | 32.9 |
| Bis-GMA | 31.4 | 24.9 |

Regrading to the hydrolysis experiment, the hydrolyzed product was methacrylic acid consisting of peak signals of the vinyl protons in deuterium oxide at 5.84 and 5.43 ppm (**Fig.3** and **Fig.4**). According to **MDPB**, the peak signals of methacrylic acid were visible on the spectrum after 3 days, indicating hydrolysis of the ester bond. The peak signal intensities of the methacrylic acid in **MDPB** increased every passing day from 0.02: 1 in day 3 to 1.59: 1 in day 60. This revealed that the methacrylate was prone to hydrolysis. However, the methacrylamide monomer, **MAUPB** did not exhibit the sign of hydrolysis even after 60 days.

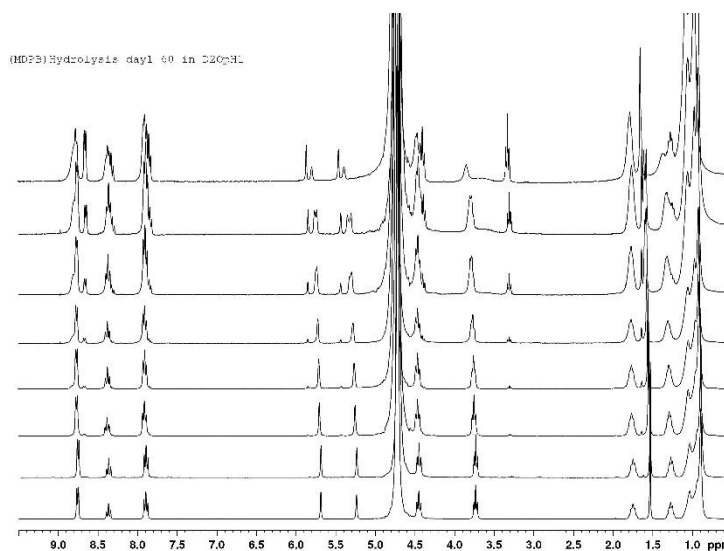


Fig.3 ¹H NMR spectra of **MDPB** in deuterium oxide, pH 1 from day 0 to day 60 (bottom to top)

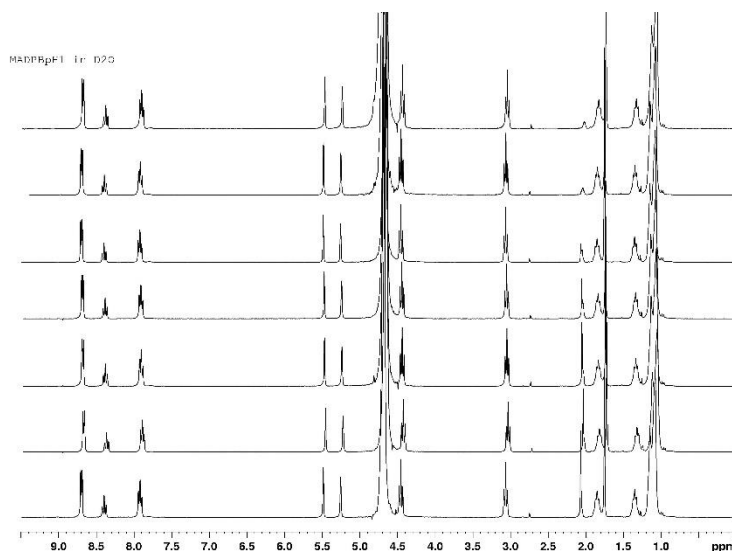


Fig.4 ¹H NMR spectra of **MAUPB** in deuterium oxide, pH 1 from day 0 to day 60 (bottom to top)

6. Conclusions

MAUPB was synthesized via 5 steps with overall yield of 35%. It showed the antibacterial properties against *S.mutans* and *E.faecalis* as well as lower cytotoxicity against the non-cancerous human embryonic kidney 293T and African green monkey kidney fibroblast Vero cell lines than **Bis-GMA** and **MDPB**. Additionally, **MAUPB** showed no sign of hydrolysis even being submerged in deuterium oxide, pH1 for 60 days indicating resin composite with **MAUPB** should have a significantly longer lifetime as well.

7. Suggestions

7.1 Application

After **MAUPB** was incorporated in resin adhesive, the resulting resin composite should have a significantly longer lifetime than the methacrylate-based resin adhesive. This will solve the problem of resin composite-based tooth restoration, and thus leading to the fade out of the amalgam-based tooth restoration as well as reducing the chance of secondary caries disease.

7.2 Future Development

The synthesis of other methacrylamide monomers that have a longer chain length, and thus improving the antibacterial properties of the resin adhesive are necessary.

8. Acknowledgements

1. Division of Physical Science, Faculty of Science, Prince of Songkla University
2. Center of Excellence for Innovation in Chemistry, Faculty of Science, Prince of Songkla University
3. Research assistantship, Faculty of Science, Prince of Songkla University

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INCOBOTULINUM TOXIN TYPE A FOR THE TREATMENT OF CONTOURING TRAPEZIUS HYPERTROPHY

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ABSTRACT

Asian women tend to prefer long elegant neck and shoulder. Oversized, masculine shoulder and scapular can cause psychological stress in women. Reduction of the trapezius muscle can make the neck longer and thinner which makes the collarbone stand out. Also, Trapezius myalgia, chronic pain from the upper trapezius muscle is the most frequent type of neck pain in occupational group.

Both conditions whether trapezius hypertrophy or myalgia could be treated with Botulinum toxin type A.

Incobotulinum toxin A was applied in 3 case studies to observe the result of trapezius myalgia relief and trapezius size reduction which was evaluated by using Computer tomography scan.

Keywords: trapezius hypertrophy, Incobotulinum toxin A

1. Introduction

The benefit of botulinum toxin injection in trapezius muscle is the pain relief and reduce muscle spasm for myofascial pain, cervical dystonia and spasmodic torticollis. Previously, neurologists have reported this treatment and complication such as mild dysphagia and neck weakness¹.

Neck and shoulder pain are widespread among office workers due to intensive computer use. Trapezius myalgia, chronic pain from the upper trapezius muscle, is the most frequent type of neck pain in this occupational group².

The botulinum neurotoxin (BoNT) is produced by *Clostridium botulinum*, a gram positive, rod-shaped anaerobic bacterium³. Strains of *C. botulinum* produce seven antigenically distinct toxins (A, B, C1, D, E, F, and G). Only serotypes A and B are therapeutically used.⁴

Incobotulinum toxin A is isolated from *C. botulinum* which is complex free botulinum toxin, for many muscle hypertrophy conditions such as masseter and calf hypertrophy including trapezius hypertrophy⁵.

2. Research Objectives

- (1) To evaluate the efficacy of Incobotulinum toxin A for the treatment of trapezius hypertrophy.
- (2) To evaluate the efficacy of Incobotulinum toxin A for the treatment of trapezius muscle myofascial pain.

3. Literature Review

3.1 Theory, Concept and Related Research

Trapezius hypertrophy and spasm are usually a result of muscle hyperactivity or the others such as cervical dystonia or neck torticollis. Most of healthy people are suffered from hypercontraction of the trapezius muscles. Botulinum neurotoxin type A (BoNT-A) has been used in clinical practice to treat trapezius spasm and pain relief. Injection of BoNT-A into the muscle can causes a reversible reduction in muscle contractions by inhibition of acetylcholine released from the cholinergic nerve terminal innervating the muscle.²

3.2 Research Framework

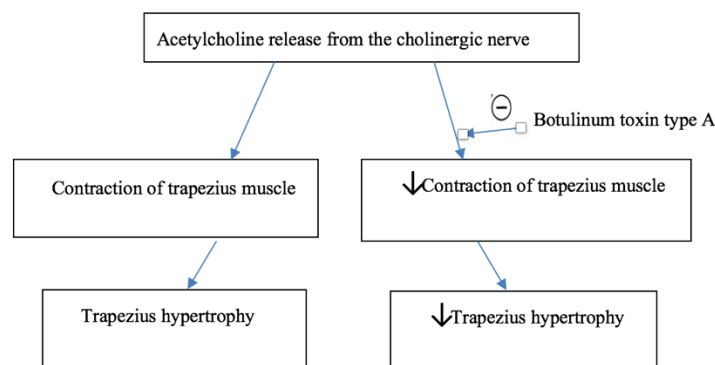


Figure 1 Research Framework

3.3 Research Hypotheses

Incobotulinum toxin A is effective in the treatment of trapezius hypertrophy and trapezius myalgia.

4. Research Methodology

4.1 Research Design

Three cases with the shoulder's appearance were selected for the observation of myalgia treatment at trapezius. They were randomly selected to be treated with injection Incobotulinum toxin A of 40 units to four

point of trapezius along the imaginary line from 7th cervical spine to acromion process and divide into three part then perform four point of injection in the middle part to avoid accessory nerve which align in the middle.

After days 30, trapezius was photographed and evaluated using CT scan at day 30 in comparison to day 0. Pain score was also recorded in the same period. The land mark of measurement point was at the imaginary line between horizontal line of T1 and vertical line of scapular blade.

4.2 Population and Sample

Patients with trapezius hypertrophy of, ages between 20-45, from Mea Fah Luang hospital from 1 may 2019 to 1 may 2020 were randomly assigned to the study.

4.3 Research Instrument

Computer tomography scan was applied for data analysis.

4.4 Data Collection

Patients with trapezius hypertrophy of ages between 20-45, at dermatology clinic from Mea Fah Luang hospital were randomly assigned to the study during 1 may 2019 to 1 may 2020.

4.5 Data Analysis

The data were analyzed from minimization of trapezius muscle size from CT scan measurement and visual analog scale of pain score.

5. Research Findings

Incobotulinum toxin injection to treat trapezius hypertrophy and trapezius myalgia was performed.

The CT scan of case 1, 35 years old woman, showed that trapezius thickness was decreased from 1.6 cm. to 1.48 cm. after one month of Incobotulinum toxin A injection. In addition, the pain score of trapezius myalgia was decreased from 8 to 4. However, the shoulder's area fatigue was observed within two weeks after the treatment but this was later recovered. Finally, the trapezius area appeared smaller and patient was more relief from myofascial pain.

Similarly, the CT scan of case 2, 38 years old woman revealed that trapezius muscle thickness was decrease from 1.68 cm. to 1.35 cm. after one month of Incobotulinum toxin A injection. The trapezius myalgia visual analog scale of pain score was decreased from 7 to 3. The neck and shoulder size were significantly slimmer and pain relief was noticed after two weeks without any complications.

According to CT scan of case 3, 41 years old woman, the trapezius thickness was decrease from 1.7 cm. to 1.5 cm after one month of Incobotulinum toxin A injection. The trapezius myalgia visual analog scale of pain score was decreased from 9 to 5. Previously, this patient was suffered from chronic myofascial pain at trapezius, shoulder and neck area for at least 5 years. This patient was undergone MRI (Magnetic resonance imaging) scan to rule out any neuro deficit conditions from cervical spine disease and acupuncture and radiofrequency therapy was failed for pain relief. After Incobotulinum toxin A treatment, result was quite dramatic after two week of the treatment. The myofascial pain at trapezius area was diminished while neck and shoulder area appeared dramatically smaller. However, bruising at some area of needle sites were observed but were disappeared within two weeks.

According to the CT scan and pain score, all 3 cases obviously showed smaller of trapezius muscle and trapezius myofascial pain of all 3 cases were improved after ncobotulinum toxin A treatment.

Table 1 Trapezius thickness before and after Incobotulinum toxin A injection.

| Age | Trapezius thickness (before) cm. | Trapezius thickness (after) cm. |
|-----|----------------------------------|---------------------------------|
| 35 | 1.6 | 1.4 |
| 38 | 1.68 | 1.2 |
| 41 | 1.7 | 1.5 |

Table 2 Myofascial pain before and after Incobotulinum toxin A injection

| Age | Pain score (before) | Pain score (after) |
|-----|---------------------|--------------------|
| 35 | 8 | 4 |
| 38 | 7 | 3 |
| 41 | 9 | 5 |

6. Discussion

Incobotulinum toxin A could be effectively useful for treatment of trapezius hypertrophy and trapezius myalgia. Muscle reduction and pain relief after Incobotulinum toxin type A injection were clearly observed. However, some complications such as muscle pain, muscle weakness and bruising were mentioned but were relieved within 2 weeks.

In this study, the proper point of Botulinum toxin type A in trapezius area were achieved which could be a proper guide for landmark of the injection.

7. Suggestion

Botulinum toxin type A dosage less than 40 unit per side should be considered to decrease side effect such as muscle weakness and fatigue after injections. Measurement of trapezius thickness was more accurate when compare to MRI (Magnetic resonance imaging) scan.

8. Acknowledgement

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EFFECTS OF PROBIOTIC SUPPLEMENTATION ON STRESS, SERUM CORTISOL AND DIGESTION

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ABSTRACT

Background: Probiotics produce various biologically active chemicals, including neurotransmitters. Several chemicals with neuro-active functions such as gamma-aminobutyric acid, serotonin, acetylcholine and catecholamines can be produced by intestinal bacteria. When these neurotransmitters are secreted within the intestine, they may stimulate endothelial cells to release chemicals which signal brain function and affect behavior. They appear to act on the brain by regulating the stress response system of the body, involving the brain and adrenal glands. This system is known as the hypothalamic-pituitary-adrenal (HPA) axis. Psychobiotics are hypothesized to act on the brain through their anti-inflammatory actions. Psychobiotics have been shown to help animals and human under stressful situations

Aims: The study aimed to examine the effects of synbiotics supplement on quality of life (QOL) evaluated by morning serum cortisol, Thai stress test, WHOQOL-BREF-THAI and Bristol Stool Chart

Methods: This research comprised an experimental study with prospective, double-blind, randomized controlled trial among 57 Thai female subjects divided in 2 groups (29 for experimental and 28 for placebo group). The subjects aged 30-50 years old, visited Mae Fah Luang University Hospital, Bangkok. Materials included oral synbiotics (probiotics from synbiotics in this study were live and active bacteria) and placebos. Subjects were randomly treated with oral synbiotics or placebo 1 sachet daily for 12 weeks. The subjects (morning serum cortisol, Thai stress test, WHOQOL-BREF-THAI and Bristol Stool Chart) were evaluated during 4 visits (baseline, week 4, 8 and 12, respectively).

Results: Overall QOL using WHOQOL-BREF-THAI were at baseline 88.14 ± 8.79 ($p = 0.051$), week 4 90.17 ± 9.58 ($p = 0.056$), 8 94.62 ± 9.55 ($p = 0.139$). QOL improved significantly at week 12 99.17 ± 11.76 ($p = 0.002$).

Morning serum cortisol were at baseline 9.35 ± 2.79 ($p = 0.473$), and at week 4 8.06 ± 2.31 and decreased significantly at week 8 6.89 ± 1.87 ($p = 0.005$) and at week 12 6.41 ± 1.71 ($p < 0.001$).

The Thai Stress Test metric scores were 3.83 ± 1.44 at baseline, 3.38 ± 1.52 at week 4, 2.66 ± 1.67 at week 8 and 2.76 ± 1.77 at week 12 on the synbiotics treated side and were 3.46 ± 1.69 at baseline, 3.96 ± 2.05 at week 4, 4.00 ± 1.56 at week 8 and 3.86 ± 1.72 at week 12 on the placebo treated side. The improvement was significant at weeks 8 ($p = 0.002$) and 12 ($p = 0.012$).

Digestion measured by Bristol Stool Chart was 4.14 ± 1.53 at baseline, 4.59 ± 1.15 at week 4, 4.28 ± 0.70 at week 8 and 4.03 ± 0.33 at week 12 on the synbiotics treated side and were 4.04 ± 1.37 at baseline, 3.64 ± 1.37 at week 4, 4.11 ± 1.10 at week 8 and 4.39 ± 0.88 at week 12 on the placebo treated side.

Digestion measured by Bristol Stool Chart, comparing between synbiotics treated and placebo treated groups, was significant at week 4 ($p = 0.001$).

Conclusion: Oral synbiotics supplementation can improve overall QOL in terms of reducing stress and improving digestion.

Keywords: synbiotics, probiotics, stress, cortisol, digestion

1. Background and rationale

Probiotics produce various biologically active chemicals, including neurotransmitters. Several chemicals with neuro-active functions such as gamma-aminobutyric acid, serotonin, acetylcholine and catecholamines can be produced by intestinal bacteria. When these neurotransmitters are secreted within the intestine, they may stimulate endothelial cells to release chemicals which signal brain function and affect behavior. They appear to act on the brain by regulating the stress response system of the body, involving the brain and the adrenal glands. This system is known as the hypothalamic-pituitary-adrenal (HPA) axis.

Psychobiotics are hypothesized to act on the brain through their anti-inflammatory actions. Psychobiotics have been shown to help animals and humans under stressful situations. A study about fermented milk drink or kefir containing *Lactobacillus casei* strain Shirota prevented stress-related increase of cortisol and

helped to increase serotonin levels among medical students under stressful situations. (Kato-Kataoka et al., 2016)

The probiotic drinks have been shown to decrease stress-related physical symptoms such as cold and abdominal pain. *Lactobacillus helveticus* NS8 was compared with citalopram (an SSRI) in mice with anxiety, depression and cognitive dysfunction due to chronic stresses. The probiotic worked better than citalopram in reducing stress-induced anxiety, depression and cognitive dysfunction. It reduced cortisol and restored serotonin and other levels to normal. *Lactobacillus helveticus*, containing probiotics has also been shown to reduce stress-related anxiety and depression by affecting cortisol, serotonin, and other brain chemical compounds in animal studies. For example, a study of effects of *Lactobacillus helveticus* R0052 and *Lactobacillus rhamnosus* R0011 supplementation reported improved anxiety-like behavior and learning and memory impairments in immune-deficient mice with hypothalamic-pituitary-adrenal (HPA) axis dysfunction (Ohland et al., 2013).

Effects of probiotics concern the gastro-intestinal tract system. Among patients hospitalized for acute rotavirus diarrhea, *Lactobacillus* strain GG (ATCC 53103) as fermented milk or as freeze dried powder, significantly decreased the duration of diarrhea compared with a placebo group given pasteurized yogurt (Isolauri et al., 1991). The effect has been described by stabilized indigenous microflora, reduced intestinal permeability caused by rotavirus infection, reduced duration of rotavirus shedding and an increase in IgA secreting cells to rotavirus. Probiotics have also been shown to be effective in preventing acute infantile diarrhea. A double-blinded placebo-controlled trial studied hospitalized infants who were randomized to receive a standard infant formula or the same formula with *Bifidobacterium bifidum* (later renamed as *Bifidobacterium lactis*) and *Streptococcus thermophiles* supplementation. Within a 17-month follow-up, the prevalence of rotavirus shedding was significantly reduced in those receiving the formula with probiotics supplementation (Saavedra et al., 1994). Probiotics supplementation also resulted in a significantly reduced incidence of diarrhea among undernourished Peruvian children in a 15-month follow-up (Oberhelman et al., 1999).

Probiotics supplementation also helps some of the symptoms of constipation. Natren's DIGESTA-LAC contains a probiotic strain that promotes regularity and healthy digestion. *Lactobacillus bulgaricus* LB-51 super strain passes through the gastro-intestinal system with foods during the digestive process. The research showed certain strains of *L. bulgaricus* can promote regularity by stimulating function in the gastro-intestinal system. Probiotic supplements containing *L. bulgaricus* may reduce the need for laxatives, which is important in treating constipation among patients with serious illnesses and older patients. A study on constipated pregnant women receiving probiotics *Lactobacillus* and *Bifidobacterium* 4.8×10^{10} CFUs daily for 4 weeks have been shown to improve constipation according to the constipation checklist based on the Rome III criteria (Mirghafourvand et al., 2016).

2. Objective of the study

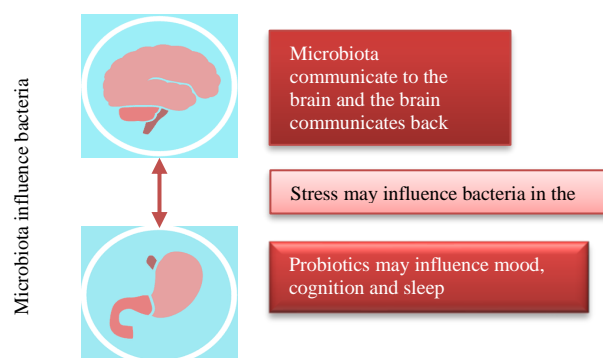
The study aimed to examine the effects of synbiotics supplement on improving the quality of life (QOL) of healthy female subjects attending Mae Fah Luang Hospital, Bangkok (evaluated by WHOQOL-BREF-THAI, morning serum cortisol, Thai stress test and Bristol Stool Chart)

3. Literature reviews

3.1 Concept, theory and related study

Feelings of stress relate to several chemicals and substances. Probiotics are shown to help reduce cortisol and restore serotonin levels resulting in improved stress score on questionnaires. For digestive health, GI motility is regulated by several factors. Some are related to probiotics. Colonization of some strains and reduced pathogens has been shown to improve GI motility. The mechanism involves the probiotics themselves and some chemicals they produce.

3.2 Conceptual framework



Picture 1 Conceptual framework

3.3 Hypothesis

Synbiotics supplement is effective in improving QOL in terms of reducing stress and improving digestion (evaluated by WHOQOL-BREF-THAI, Thai stress test and Bristol Stool Chart)

4. Method

4.1 Study design

This research is an experimental study with prospective, double-blind, randomized controlled trial of subjects in experimental and placebo groups.

4.2 Population and sample

The subjects of this study comprised Thai females, aged 30 to 50 years old, without underlying medical illness and no personal medication or supplement attending Mae Fah Luang University Hospital.

The protocol of the study had been approved by the Mae Fah Luang Ethics Committee in Human Subject, Protocol number: EC 19307-20.

4.3 Materials

1. Oral synbiotics (TS6, 50×10^9 billions CFUs) produced by TENSALL BIO-TECH CO., LTD, Taiwan).
2. Placebos
3. Informed consent forms
4. Qualification letters
5. Patient profile records
6. Side effect record forms
7. Treatment satisfactory questionnaires
8. Bristol Stool Chart
9. Morning serum cortisol
10. Thai stress test
11. WHOQOL-BREF-THAI

4.4 Data collection

Patients were selected to enroll in the study in agreement with the selection criteria. The researcher intensively explained in details about the purpose of the research, processes of the study, benefits, risks and possible complications of the treatments. The patients signed an informed consent form to participate in the study.

1. History taking and recording of patients' profiles were conducted including underlying condition(s), allergy(ies) and Fitzpatrick skin photo type.
2. Patients were randomly allocated to the TS6 administration group or the placebo group using Random Sequence Generator from the website (<http://www.random.org/sequences/>); the sample totaled 57, divided in treatment group, 29 and control group, 28.

The physician and patients were blinded to this allocation. Patient characteristics were analyzed and listed.

3. Oral synbiotics (TS6, 50×10^9 billions CFUs) consisted of six combined strains of probiotics, produced by TENSALL BIO-TECH CO., LTD Taiwan or placebos (identical powder without synbiotics: skim milk powder, lactose, maltodextrin and citric acid) were given according to the Random Sequence Generator result.

Morning serum cortisol from 8.00 to 9.00 am was collected at baseline and weeks 4, 8 and 12, respectively.

The Thai stress test, WHOQOL-BREF-THAI and Bristol Stool Chart was self-reported by all volunteers at baseline and weeks 4, 8 and 12, respectively.

The side effect record forms and treatment satisfactory questionnaires were assessed by both the researcher and volunteers at weeks 4, 8 and 12, respectively.

4.5 Data analysis

Descriptive and analytical statistics

1. Descriptive statistics was used to analyze data in number, percentage, mean and standard deviation. Data of general characteristics

2. The data of QOL (morning serum cortisol level, Thai stress test score and Bristol Stool Chart score) between the two groups were analyzed using repeated ANOVA test and the significance was considered at P-value <0.05

5. Results

5.1 General characteristics and demographic data

The general demographics from this study were recorded with descriptive statistics as shown in Table 1

Table 1 Demographic characteristics of participants

| Demographic | All n (100%) | Synbiotics n (50.9%) | Placebo n (49.1%) | p-value |
|------------------------------------|-----------------|-------------------------|----------------------|---------|
| Underlying Disease | | | | |
| yes | 6(10.53) | 5(17.24) | 1(3.57) | 0.194 |
| no | 51(89.47) | 24(82.76) | 27(96.43) | |
| Personal medication and supplement | | | | |
| yes | 0 | 0 | 0 | N/A |
| no | 57(100.00) | 29(100.00) | 28(100.00) | |
| History of following treatment | | | | |
| Yes | 4(7.27) | 4(13.79) | 0 | 0.113 |
| No | 51(92.73) | 25(86.21) | 28(100.00) | |

According to Table 1, when comparing the demographic characteristics between both groups, no significant difference was found between the two groups concerning underlying disease, medication and supplement.

5.1 Demographic data on dietary intake

Table 2 Comparison of dietary intake in synbiotic treatment and placebo groups at baseline (Week 0)

| Variable (Unit) | Group | | Paired Difference | p-value |
|--------------------|------------------|------------------|-------------------|---------|
| | Synbiotics | Placebo | | |
| | Mean±SD | Mean±SD | | |
| ENERGY | 1520.93 ± 395.84 | 1496.73 ± 326.58 | 24.21 ± 156.38 | 0.762 |
| CHO% | 55.20±7.23 | 56.03 ± 7.38 | -0.83 ± 2.98 | 0.585 |
| PRO% | 15.35 ± 2.77 | 15.45 ± 3.74 | 0.10 ± 1.24 | 0.869 |
| FAT% | 29.45± 6.11 | 28.51 ± 6.03 | 0.93 ± 2.64 | 0.487 |
| Choles | 258.50±52.64 | 251.09±55.02 | 7.41 ± 25.12 | 0.563 |
| Fiber | 9.43±2.96 | 9.52±4.29 | -0.09 ± 1.5 | 0.907 |

Table 3 Comparison of dietary intake between synbiotic treatment and placebo groups at baseline and week 4

| Variable (Unit) | Group | | Paired Difference | p-value |
|-----------------|----------------|----------------|-------------------|---------|
| | Synbiotic | Placebo | | |
| | Mean±SD | Mean±SD | | |
| ENERGY | 1595.03±273.43 | 1503.36±261.71 | 91.68±156.38 | 0.251 |
| CHO% | 54.83±5.15 | 56.61± 5.49 | -1.78±2.98 | 0.242 |
| PRO% | 14.93 ± 1.62 | 16.04 ± 2.43 | -1.10±1.24 | 0.079 |
| FAT% | 30.24 ± 4.94 | 27.36 ± 4.95 | 2.88±2.64 | 0.032* |
| Choles | 255.97±47.90 | 248.39±43.38 | 7.57±25.12 | 0.555 |
| Fiber | 8.93±2.30 | 9.39±3.31 | -0.46±1.51 | 0.547 |

Table 4 Comparison of dietary intake between synbiotic treatment and placebo groups at baseline and week 8

| Variable (Unit) | Group | | Paired Difference | p-value |
|--------------------|----------------|----------------|-------------------|---------|
| | Synbiotic | Placebo | | |
| | Mean±SD | Mean±SD | | |
| ENERGY | 1551.76±299.34 | 1483.11±267.83 | 68.65±156.39 | 0.390 |
| CHO% | 53.90±4.33 | 55.46 ± 4.70 | -1.57±2.98 | 0.302 |
| PRO% | 15.24 ± 1.41 | 15.71 ± 2.43 | -0.47±1.23 | 0.452 |
| FAT% | 30.86 ± 4.23 | 28.82 ± 4.36 | 2.04±2.63 | 0.129 |
| Choles | 256.24±47.34 | 245.5±44.58 | 10.74±25.12 | 0.402 |
| Fiber | 9.66±1.84 | 9.71±3.28 | -0.06±1.50 | 0.939 |

Table 5 Comparison of dietary intake between synbiotic treatment and placebo groups at baseline and week 12

| Variable (Unit) | Group | | Paired Difference | p-value |
|--------------------|----------------|----------------|-------------------|---------|
| | Synbiotic | Placebo | | |
| | Mean±SD | Mean±SD | | |
| ENERGY | 1567.79±329.10 | 1494.86±271.50 | 72.93±156.39 | 0.361 |
| CHO% | 54.76±5.76 | 55.93 ± 5.96 | -1.17±2.89 | 0.441 |
| PRO% | 15.34 ± 1.80 | 15.36 ± 2.38 | -0.01±1.23 | 0.984 |
| FAT% | 29.90 ± 5.29 | 28.71 ± 5.04 | 1.18±2.63 | 0.379 |
| Choles | 261.03±52.32 | 248.86±49.45 | 12.18±15.12 | 0.342 |
| Fiber | 9.76±2.28 | 9.29±2.69 | 0.47±1.51 | 0.538 |

According to Table 2, mean dietary intake between synbiotic supplementation treated and placebo treated groups found that energy, carbohydrate, protein, cholesterol and fiber decreased comparing between

baseline week 0 and week 12 while only fat% increased. According to Table 2, when comparing the mean dietary intake between follow-up phases for both groups, no statistical significance was found for any factor.

5.2 Overall QOL

Overall QOL was measure by WHOQOL–BREF–THAI. It contained two types of questions: perceived objective and self-report subjective four domains such as physical domain, psychological domain, social relationships and environment. The score used a 26-item, 5-point Likert scale. The questions that were meaningful and positive totaled 23 questions and those that were negative totaled 3 items.

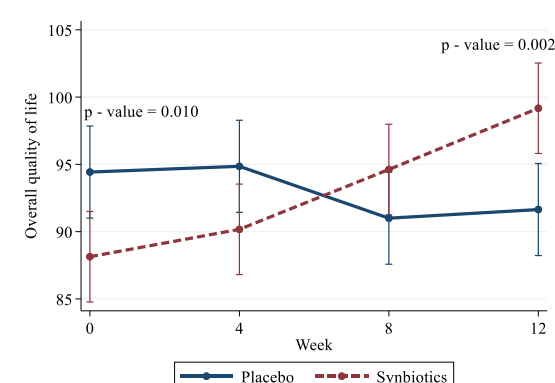
Table 6 Overall QOL measured by WHOQOL–BREF–THAI between synbiotic treated and placebo treated groups at baseline, and weeks 4, 8 and 12 (n=57)

| Variable | Baseline (0 th week) | Week 4 | Week 8 | Week 12 |
|----------------------|------------------------------------|------------|------------|-------------|
| Synbiotics (n = 29) | | | | |
| Physical domain | 24.86±2.70 | 26.14±3.27 | 26.20±3.10 | 26.80±3.48 |
| Psychological domain | 21.72±2.72 | 22.10±3.27 | 23.64±4.00 | 23.72±4.52 |
| Social relationships | 10.31±1.93 | 10.66±1.88 | 11.20±2.02 | 10.80±1.66 |
| Environment | 27.45±4.67 | 26.93±4.37 | 26.48±4.09 | 28.32±4.43 |
| Overall | 88.14±8.79 | 90.17±9.58 | 94.62±9.55 | 99.17±11.76 |
| Placebo (n = 28) | | | | |
| Physical domain | 25.75±2.76 | 27.29±3.99 | 25.74±3.54 | 26.96±3.41 |
| Psychological domain | 22.54±3.29 | 23.07±3.04 | 21.67±3.06 | 22.83±3.47 |
| Social relationships | 10.43±1.73 | 10.93±1.84 | 10.89±1.80 | 11.58±1.35 |
| Environment | 26.54±4.67 | 27.00±3.90 | 25.96±4.69 | 25.88±3.65 |
| Overall | 94.43±9.73 | 94.86±8.04 | 91.00±8.16 | 91.64±9.02 |

According to Table 6, overall QOL of the synbiotic treated group increased from baseline at weeks 0 88.14±8.79, 4 90.17±9.58, 8 94.62±9.55 and 12 99.17±11.76. However, overall QOL of the placebo treated group tended to decrease from baseline at weeks 0 94.43±9.73, at 4 94.86±8.04, 8 91.00±8.16 and 12 91.64±9.02.

Table 7 Statistical analysis of overall QOL compared between synbiotic treated and placebo treated groups at baseline, weeks 4, 8 and 12 (n=57)

| QOL Measurement | Synbiotic | Placebo | Paired Difference | p-value (a) |
|-----------------|-------------|------------|-------------------|-------------|
| | Mean±SD | Mean±SD | | |
| Week 0 | 88.14±8.79 | 94.43±9.73 | -6.29±4.8 | 0.1 |
| Week 4 | 90.17±9.58 | 94.86±8.04 | -4.68±4.8 | 0.056 |
| Week 8 | 94.62±9.55 | 91.00±8.16 | 3.62±4.8 | 0.139 |
| Week 12 | 99.17±11.76 | 91.64±9.02 | 7.53±4.8 | 0.002* |

**Figure 1** Overall QOL

According to Table 7, results of overall QOL between the synbiotic treated and placebo treated groups, were significant at baseline 88.14±8.79 ($p = 0.010$), but not significant at weeks 4 90.17±9.58 ($p = 0.056$) and 8 94.62±9.55 ($p = 0.139$), and significant again at week 12 99.17±11.76 ($p = 0.002$).

5.3 Stress level measured by morning serum cortisol level

Table 8 Statistical analysis of stress level measured by morning serum cortisol level compared between synbiotic treated and placebo groups treated at baseline, weeks 4, 8 and 12 (n=57)

| Cortisol Level Measurement | Synbiotic | Placebo | Paired Difference | p-value (a) |
|----------------------------|-----------|-----------|-------------------|-------------|
| | Mean±SD | Mean±SD | | |
| Week 0 | 9.35±2.79 | 8.73±4.35 | 0.62±1.7 | 0.473 |
| Week 4 | 8.06±2.31 | 8.79±4.47 | -0.73±1.7 | 0.402 |
| Week 8 | 6.89±1.87 | 9.33±3.98 | -2.44±1.7 | 0.005* |
| Week 12 | 6.41±1.71 | 9.70±3.91 | -3.29±1.7 | <0.001** |

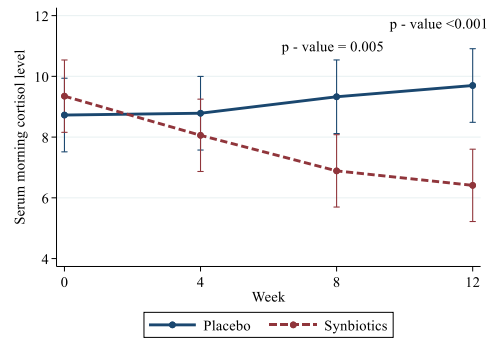


Figure 2 Stress level measured by morning serum cortisol level

According to Table 8, result from stress level measured by morning serum cortisol were not significant at baseline 9.35 ± 2.79 ($p = 0.473$) and at week 4 8.06 ± 2.31 ($p = 0.402$), but significant at weeks 8 6.89 ± 1.87 ($p = 0.005$) and 12 6.41 ± 1.71 ($p < 0.001$).

5.4 Stress level measured by the Thai stress test

Table 9 Thai Stress Test score between synbiotic treated and placebo treated groups at baseline and weeks 4, 8 and 12 (n=57)

| Variable | Baseline (0 th week) | Week 4 | Week 8 | Week 12 |
|--------------------|------------------------------------|-------------|-------------|-------------|
| Synbiotic (n = 29) | | | | |
| Positive score | 23.86±9.24 | 22.28±11.22 | 24.03±10.55 | 24.41±10.48 |
| Negative score | 5.86±3.70 | 5.55±3.95 | 5.00±4.23 | 4.38±3.99 |
| Matric score | 3.83±1.44 | 3.38±1.52 | 2.66±1.67 | 2.76±1.77 |
| Placebo (n = 28) | | | | |
| Positive score | 24.36±8.79 | 21.96±9.90 | 20.64±9.65 | 20.68±9.03 |
| Negative score | 7.43±4.57 | 7.36±4.83 | 7.79±4.02 | 6.11±4.31 |
| Matric score | 3.46±1.69 | 3.96±2.05 | 4.00±1.56 | 3.86±1.72 |

Table 10 Statistical analysis of Thai Stress Test score between synbiotic treated and placebo treated groups at baseline and weeks 4, 8 and 12 (n=57)

| Thai Stress Metric | Synbiotic | Placebo | Paired | p-value |
|--------------------|-----------|-----------|------------|---------|
| Score | Mean±SD | Mean±SD | Difference | (a) |
| Week 0 | 3.83±1.44 | 3.46±1.69 | 0.36±0.86 | 0.407 |
| Week 4 | 3.38±1.52 | 3.96±2.05 | -0.58±0.86 | 0.182 |
| Week 8 | 2.66±1.67 | 4.00±1.56 | -1.34±0.86 | 0.002* |
| Week 12 | 2.76±1.77 | 3.86±1.72 | -1.10±0.86 | 0.012* |

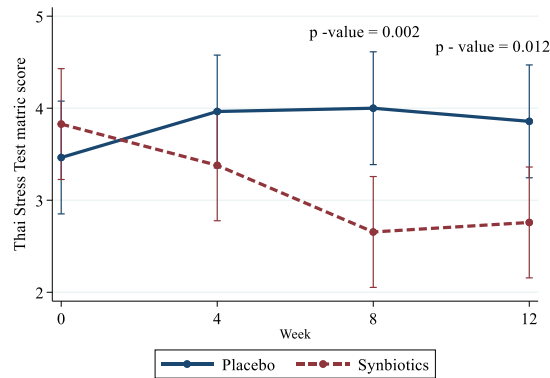


Figure 3 Thai Stress Test matrix score

According to Table 9, result with Thai Stress Test metric score were 3.83 ± 1.44 baseline, 3.38 ± 1.52 at weeks 4, 2.66 ± 1.67 at 8 and 2.76 ± 1.77 12 concerning synbiotics treated side and were 3.46 ± 1.69 at baseline, 3.96 ± 2.05 at weeks 4, 4.00 ± 1.56 8 and 3.86 ± 1.72 12 concerning the placebo treated side.

When comparing the Thai Stress Test metric score between synbiotic treated and placebo treated groups (Table 10), it revealed significance at weeks 8 ($p = 0.002$) and 12 ($p = 0.012$). However, greater significance was found in the synbiotics treated side.

5.5 Digestion measured using Bristol Stool Chart

Table 11 Statistical analysis of digestion measured by Bristol Stool Chart compared between synbiotics treated and placebo treated groups at baseline, weeks 4, 8 and 12 (n=57)

| Bristol Stool Measurement | Synbiotic Mean±SD | Placebo Mean±SD | Paired Difference | p-value (a) |
|---------------------------|-------------------|-----------------|-------------------|-------------|
| Week 0 | 4.14±1.53 | 4.04±1.37 | 0.10±0.57 | 0.725 |
| Week 4 | 4.59±1.15 | 3.64±1.37 | 0.94±0.57 | 0.001* |
| Week 8 | 4.28±0.70 | 4.11±1.10 | 0.17±0.57 | 0.561 |
| Week 12 | 4.03±0.33 | 4.39±0.88 | -0.36±0.57 | 0.217 |

According to Table 11, results with digestion measured by Bristol Stool Chart were 4.14 ± 1.53 at baseline, 4.59 ± 1.15 at weeks 4, 4.28 ± 0.70 8¹ and 4.03 ± 0.33 12 concerning the synbiotics treated side and were 4.04 ± 1.37 at baseline, 3.64 ± 1.37 weeks 4, 4.11 ± 1.10 8 and 4.39 ± 0.88 12 concerning the placebo treated side.

When comparing the digestion measured by Bristol Stool Chart between synbiotics treated and placebo treated groups, significance was observed at week 4 ($p = 0.001$).

6. Discussion

For the WHOQOL–BREF–THAI, the results showed that the physical and psychological domains of the synbiotics treated group consistently increased until after week 12. The scores on overall QOL of the synbiotics treated group were explicitly higher. However, overall QOL scores of the placebo group were indifferent.

Stress levels were measured by morning serum cortisol level and Thai Stress Test. The test findings revealed statistically significant differences in stress levels between both groups at week 8 and 12. Stress level of both groups significantly decreased. This implied that synbiotics were effective in reducing stress, improving QOL, building confidence in social and daily life, promoting physical, social, emotional and mental health as well as alleviating stress.

Related studies have shown similar outcomes on stress reduction properties of probiotics such as the *Lactobacillus casei* strain *Shirota* can prevent stress-related increase of cortisol levels and can increase levels of serotonin among stressed medical students (Kato-Kataoka et al., 2016). *Lactobacillus helveticus* NS8 was showed more effectiveness than Citalopram in lowering cognitive dysfunction, anxiety and depression from chronic stresses. The probiotic decreased cortisol level and serotonin and other brain neurotransmitters recovered back to optimal levels. Other *Lactobacillus helveticus* containing probiotics have likewise been demonstrated to decrease anxiety and depression from stresses by affecting cortisol, serotonin and other neuro-active substances in animal model studies (Ohland C.L. & et al., 2013)

Statistically significant differences were found in digestion measured by Bristol Stool Chart between both groups. The synbiotics treated group's digestion continually improved while no difference was observed in the placebo group.

One research investigated fermented milk containing *Lactobacillus casei* strain *Shirota*. The results of this research showed that milk preserves the diversity of the intestinal microflora and relieves abdominal dysfunction among healthy medical students under academic stress (Kato-Kataoka et al., 2016). Other related studies investigated probiotics on the gastro-intestinal tract system. In cases hospitalized for acute diarrhea from rotavirus, *Lactobacillus* strain *GG* (ATCC 53103) decreased the duration of diarrhea in hospitalized cases significantly compared with a placebo group (Isolauri et al., 1991). One double-blinded placebo-controlled trial was conducted among hospitalized infants randomized to receive a standard infant formula with *Bifidobacterium bifidum* (later renamed as *Bifidobacterium lactis*) and *Streptococcus thermophiles* supplementation or standard infant formula without the probiotics. By 17 months, the prevalence of rotavirus shedding was reduced significantly among those receiving the formula with probiotics supplementation (Saavedra et al., 1994). Further, probiotics supplementation resulted in a significantly reduced incidence of diarrhea in undernourished Peruvian children after a 15-month follow-up (Oberhelman et al., 1999). Probiotics supplementation also helped with some constipation symptoms. Natren's DIGESTA-LAC contains a probiotic strain that promotes healthy digestion and regularity. The *Lactobacillus bulgaricus* LB-51 super strain travels through the intestinal tract with food during the digestive process. The study showed certain strains of *L. bulgaricus* can promote regularity by stimulating

digestive tract function. Probiotics supplementation containing *L. bulgaricus* may reduce the need for laxatives, which is important in constipation treatment among older patients and cases with serious diseases. A study concerning constipated pregnant women receiving probiotics Bifidobacterium and Lactobacillus 4.8×10^{10} (CFUs) daily for four weeks was shown to improve constipation according to the constipation checklist based on Rome III criteria (Mirghafourvand et al., 2016).

7. Suggestion

This research data may be tested to enhance the synbiotics/probiotics to improve QOL including stress and digestion.

More research regarding the efficacy and safety of synbiotics/probiotics on other QOL aspects such as sleep quality should be conducted.

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STUDY OF THE WATER MANAGEMENT PROBLEMS IN CHIANG KRUEA SUB-DISTRICT MUNICIPALITY, SAKON NAKHON DISTRICT OF SAKON NAKHON PROVINCE

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ABSTRACT

This research studied water demand and satisfaction of water management problem solving in the Chiang Kruea Sub-district Municipality, Sakon Nakhon District, Sakon Nakhon Province. It consists of two parts: quantitative research (Survey research) and qualitative research (Interviews). The research population is 17 villages in Chiang Kruea, of 5,307 households. A stratified random sample was determined and performed by 7% of 372 samples. **7% being deemed a good cross reference of the concerned area. The tools used were a multiple choices questionnaire and 5-level scale.** The data was analyzed using statistical values of frequency, percentage, mean and standard deviation. The interviews were done by administrators and officials of Chiang Kruea Sub-district water management and data analyzed for content analysis and synthesis for conclusions. It was found from the overview of all water demand levels, the average was a high level ($\bar{X} = 4.01$, $S = 0.92$), showing different needs for water, including consumption, agriculture and industry in high level, with most being consumption. People were satisfied overall with water management at a high level ($\bar{X} = 3.58$, $S = 0.96$) for the groundwater recharge pond method (opened-system).

Qualitative results were 1) Water resource problems during the dry season with large flooding in plains near the village roads. Most daily water consumption involved agriculture due to demand from June to September. A lack of water in cool season due to climate change is increasing. Problems include no main river in the area, the hydrogeological condition, a low aquifer potential and 3) some rock salt contamination problems from drilling wells.

2) The solution applied recently with success is the aquifer recharge method. Chiang Kruea Sub-district can store and reserve a large amount of water in a pond. A concrete circle pond was made to help solve the problem. An enhancement of academic knowledge potential and technology learning on groundwater

management is needed. Chiang Kruea Sub-district Municipality needs to get a support budget for well-monitoring and an automatic groundwater level measurement device.

Keywords: Water demand, Satisfaction in water management, Community-based water management

1. Introduction

The policy on groundwater recharge in Thailand is a national policy, included as a national agenda on the government water resources management. The delivery of groundwater recharge policies and missions to local departments, especially the local government organizations is integral. In the past, local government organizations have tried to help themselves in solving water resource problems and to help people have sufficient water resources. In the first phase of water solutions, Chiang Kruea Sub-district has adopted groundwater recharge techniques applied from the United States and taken as a guideline for solving problems (Chiang Kruea Sub-District Municipality, 2020).

Other areas of Thailand where management systems were set up are as follows. These other local government successfully used groundwater recharge methods in the water management solutions of problems and established as a groundwater recharge learning center. These are; 1) Ban Phueng Subdistrict Administrative Organization, Nakorn Panom District, Nakorn Panom Province. 2) Wang Ham Hae Subdistrict Administrative Organization, Khanu Worakabsaburi District, Kamphaengphet Province and 3) Nan Provincial Administrative Organization, Nan District, Nan Province.

After some use, Chiang Kruea Sub-District has adjusted techniques and made suitable methods for problem solving, learned and developed more techniques and methods for groundwater recharge from the manual/guidelines for groundwater recharge in Thailand, which was published by the Department of Groundwater Resources as a standard and issued to various agencies so it could be adapted to solve problems and context of the area, with cooperation and support in hydrogeology from American Groundwater Solution-AGS (Non Profit) and the Hydrogeologist Association of Thailand who provided and transferred knowledge, principles, technical procedures in groundwater recharge operations, suitably applied to the problem in Chiang Kruea Municipality as well.

Generally, water problems in the Chiang Kruea Sub-district Municipality have many aspects and need to be solved for all people. One of the problems faced every year is water management in the rainy and dry seasons and to be enough for general consumption. The water problems of Chiang Kruea Sub-District are flooding, drought and salt water depending on areas and seasons, causing insufficient water for daily consumption and water shortage for agriculture. The water problems can be summarized as follows:

1) Flooding; this is a condition that occurs after heavy rain due to flat terrain, soil which does not absorb water from the surface layer to the ground and the community expansion, non-standard soil filling when construction of houses blocks the water flow.

2) Water shortage and drought; these are caused by non-seasonal rain and when there is a lack of rain for a long period, as well as being affected by the ecosystem change. Results of the community expansion, economic activities, including agricultural expansion both in irrigated and non-irrigated areas, resulting in increased water demand all cause water shortages in the dry season.

However, knowledge of water management at the community level is needed for modern technology and innovation and applying new concepts for improving and development. The important mechanism in knowledge transfer and practice is an experienced operator who is necessary to have knowledge and technology transfer for solving problems with stakeholders in the community. Initially, the operator must have to know the basic needs of the local area people, such as problems, needs of water and feelings of people involved. The operator needs satisfaction with the model for solving water management problems of the community, knowing problems will make a plan model development, methods and apply appropriate technology in management, so as to continue learning and developing as a model for sustainable water management.

2. Research Objectives

1) To Study the water demand of the community in Chiang Kruea Sub-district, Sakon Nakhon District, Sakon Nakhon Province.

2) To study the level of satisfaction with the model for solving water management problems, in Chiang Kreua Sub-district, Sakon Nakhon District, Sakon Nakhon Province.

3. Literature Review

3.1 Theory, Concept and Related Research

3.1.1 Services Learning

Service learning is the approach to apply knowledge from the classroom to the field application. After the learning process completed, there will be a reflection as to learn that is valuable and meaningful in the work. Learning changes according to social and environmental conditions. Effective learning must come from thinking and acting on the realities of life. In the 21st century, the community has developed knowledge holistic in form of local wisdom over a long period of time. As a result, living together with learning does not feel that education is different from the community. Rather, it is an essential tool that helps to fulfill the learning process of community members through valuable wisdom and maintains a good meaning for life (Prasad Nuengchalerm, 2014).

3.1.2 Knowledge Management

Knowledge Management (KM) is collecting, organizing, creating, sharing and applying knowledge in the organization, by developing a system from data and information to achieve knowledge and intelligence (Source: https://thi.wikipedia.org/wiki/Knowledge_Management).

Knowledge Management or KM is a compilation of knowledge, that exists in a person or documents for systematic development, so that everyone in the organization can access that knowledge and

develop themselves to be more knowledgeable. To apply the acquired knowledge for efficiency, which will result in the organization's ability to be in the highest competition (refer to the Office of the Public Sector Development Commission; OPDC).

3.1.3 Managed Aquifer Recharge

Managed Aquifer Recharge: MAR, formerly, a groundwater specialist or hydro-geologist knows this as Artificial Recharge to Groundwater or Groundwater Recharge in Aquifer. The meaning taken that surface water that is more than enough in the flood season, through quality improvement processes allow groundwater standard (in Thailand refer to Groundwater's Law standards, 1977), to recharge into the aquifers better than release it to flow into rivers, canals, sea and the ocean. The target aquifer may be an unconfined aquifer or a confined aquifer. The groundwater recharge objectives (MAR) are as follows:

1. Increase an efficiency of the aquifer's ability to transmit groundwater pumping usage during the dry season, to ensure for the sustainable groundwater usage.
2. To improve groundwater quality in cases of being brackish aquifer or contaminated water, recharging fresh water into aquifer will improve the groundwater quality and can be utilized.
3. To prevent saltwater intrusion on coastal aquifer.
4. Reduce water loss from evaporation or maintain groundwater flow in original environment and ecosystems that are involved with groundwater which affects the value of the biodiversity.

Source: Adapted from Managed Aquifer Recharge: Introduction, Peter Dillon et al, 2009.

The Department of Groundwater Resources has published guidelines for groundwater recharging in Thailand which is an updated document for more details from the Thailand Groundwater Recharge Guide in 2019, along with a set of groundwater recharge suitability maps that show forest, saline soils and saline groundwater (Department of Groundwater Resources, 2020).

In India, cooperative groundwater management is increasingly recognized. It is a challenge for all stakeholders, who have the ability and take part in operations for efficiency and sustainability, in particular, the ability to be an effective participation at the community level. It is for groundwater recharge monitoring and groundwater managing as water resources that can be used together. The main purpose of this research is to study about the applied training and management processes and lessons learned from the project of participatory groundwater management, under the project name of "Managing Aquifer Recharge and Sustainable Groundwater Use through Village-level Intervention (MARVI)". In this project, the researchers who carried out the project developed, designed and worked together with local people, in participatory monitoring of groundwater level in 11 villages from the Dharta and Meghraj river basins in the states of Rajasthan and Gujarat, India. (Y. Jadeja et al., 2018.)

3.2 Research Framework

This research studied each type of water demand, and people's satisfaction with the model of water management problem solving such as drought and flood problems in Chiang Khreua Sub-district Municipality, Mueang Sakon Nakhon District, Sakon Nakhon Province. This research is part of Phase 1 research with a

conceptual framework to studied water demand and people's satisfaction on water management problem solving, by research concept model as shown in Figure 1, the next research will be apply the concepts of Knowledge Management and Services Learning, combined with technology and innovation in water management (Water Resource Management) with community participation, to create a new model of knowledge in educational technology for Chiang Khreua Sub-District Municipality (Chiang Khreua Model).

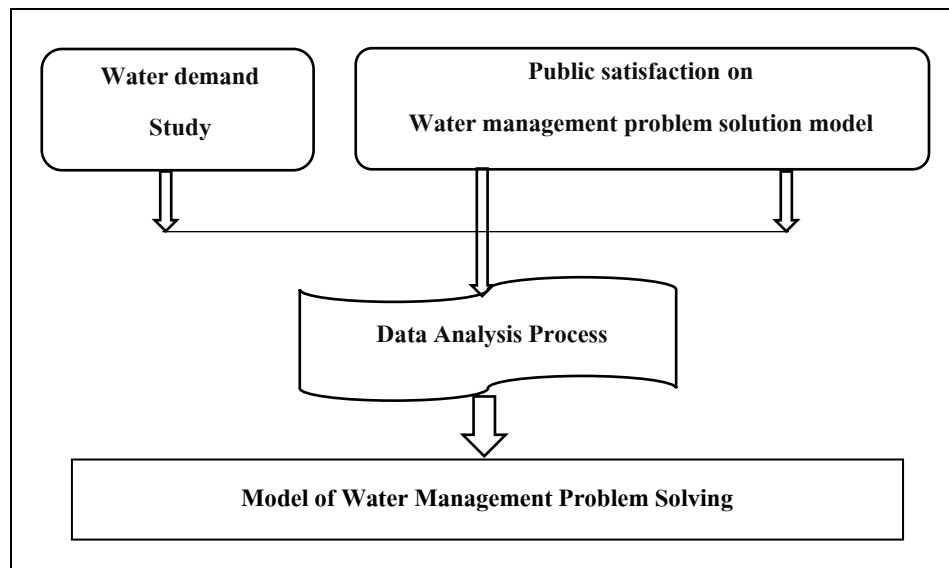


Figure 1 Research Framework

4. Research Methodology

4.1 Quantitative Research

4.1.1 Research Design

This research is survey research to study each type of water demand, and to study people's satisfaction with the model of water management problem solving in Chiang Khreua Sub-district Municipality, Mueang Sakon Nakhon District, Sakon Nakhon Province.

4.1.2 Population and Sample

This research survey aim was to study each type of water demand, and to study people's satisfaction with the model of water management problem solving in Chiang Kreua Sub-district, Sakon Nakhon District, Sakon Nakhon Province.

1) Population there are 17 villages in Chiang Kreua Municipality with 5,307 households, specifying the unit of study is households.

2) The sample was households in Chiang Kreua Sub-District, representing the population of 17 villages. To determine the proportion of the sample to properly represent the population, by 17 class of village, a random sample by stratified random sampling was made. To determine the sample size using percentage criteria, according to the criteria of Suvimol Trikanon (2557. Cited in Thanin Ratana-olarn. 2562: 13) the size of the population (households) in thousands, the sample size is between 5-25 percent of the population (households), so

population 5,307 households should have a suitable number of samples between 265-326 samples. The researcher selected the sample size of 7 %, resulting in 372 samples (households).

4.2 Qualitative research

4.2.1 Research design

This is a qualitative research by designing interviews about the condition, problem, and demand of water and information about solving water resource problems for people in Chiang Kreua Subdistrict , Sakon Nakhon District, Sakon Nakhon Province.

4.2.2 Data sources

Data sources for the interview, there are 11 Chiang Kreua Sub-district Officers, consisting of Mayor, Deputy Mayor, Permanent Secretary, two officers of Permanent Secretary, two officers of Technician Division (Division director of and Chief), two officers of Education Division (General Director and Chief), 2 officers of the Division of Public Health and Environment (General Director and Chief).

4.3 Research Instrument

4.3.1 Quantitative Research Instrument

The research instrument is questionnaire for data collection, consists of 4 parts detailed as follows:

Part 1: A question about the personal information of the respondents, use closed-ended questions, each question has multiple choices only one answer can be selected, compose for 5 questions: gender, age, education level, occupation and monthly income.

Part 2: Information about water demand of people in Chiang Kreua; it is 5 levels of scale of water demand, classified by 3 types of water usage as follows:

- 1) Water usage for consumption meaning is water used in daily activities (such as drinking, bathing and washing, watering plants, used for cleaning dirt, filth, etc.).
- 2) Water usage for agriculture such as farming, growing crops, vegetables, raising animals, etc.
- 3) Water usage for industrial needs such as household industry and other industrial plants etc.

Part 3: Information of community's satisfaction on solving water management problems of Chiang Kreua Sub-district Municipality, it is a 5 measurement levels, the people's satisfaction on solving water management problems classified by water solution model as 7 forms following:

- 1) Opened-system Groundwater Recharge (Groundwater Recharge pond).
- 2) Closed-system Groundwater Recharge for housing (Rain water from the house's roof).
- 3) Closed-system Groundwater Recharge for drainage in the community (Rain water that flows along the channel in the community).
- 4) Closed-system Groundwater Recharge in large flooded area (Rain water for long time flood).
- 5) Groundwater well drilling
- 6) Water supply system / groundwater supply
- 7) Small dams (Kaem Ling System)

Part 4: An open-ended question for respondents to provide additional relevant suggestions.

Quality testing of research instruments, the tool was used to check the validity by 5 experts, it was found that the result of the Item-Objective Congruence Index (IOC) was between 0.80-1.00, using an expert's recommendations to improve the content of each questionnaire to be suitable for the purpose of research questions.

Researchers have taken a questionnaire to be tested with 50 non-sampling and then find the confidence with the statistics check of Reliability by Cronbach's method was found that the alpha coefficient was 0.71.

4.3.2 qualitative research Instrument

Instrument used in qualitative studies use the interview form as a tool for data collection, the questionnaire consists of 4 parts, details as follows:

Part 1: is personal information of the respondents in 4 items such as name of respondents, gender, age, education level, occupation, position, and agency.

Part 2: is information about the problem and water demand of the people.

Part 3: is information about solving water resource problems for people.

The interview was examined for validity by 5 experts, and found that result of an IOC value was between of 0.75-1.00.

4.4 Data Collection

4.4.1 Collecting quantitative research data

Step 1: Classified the number of samples from the total population of 5,307 households into 17 sets according to the Step 1: Classified the number of samples from the total population of 5,307 households into 17 sets according to the proportion calculated the number of samples from the population of 372.

Step 2: The researcher requests a letter requesting cooperate in collecting the questionnaire for research, from the Faculty of Industrial Education and Technology, King Mongkut's Institute of Technology Ladkrabang to the mayor of Chiang Kreua Sub-district Municipality, the questionnaires were conducted in all 17 villages, where there was a meeting to understand the details of the questionnaire and using the cooperation of the village leader of 17 villages to distribute the questionnaires to households in villages.

Step 3: The questionnaires collected and calculated according to the proportion number of households, total questionnaires 372 sets after was distributed, the data that was returned back was 352 sets and accounted for 95 percent.

4.4.2 Collecting qualitative research data

The researcher requested a letter requesting for cooperation in interviewing from the Faculty of Industrial Education and Technology King Mongkut's Institute of Technology Ladkrabang to the mayor of Chiang Kreua Sub-district conducted interviews for 11 officers of Chiang Kreua Sub-district, and then made an appointment for an individual interviews to make sure all understood details of the interview questionnaire, The interviews were conducted one by one of all 11 persons and recorded with interview information.

4.5 Data Analysis

4.5.1 Quantitative data analysis

1) An analysis of the information about personal information was done by finding the frequency and percentage.

2) Analysis of data on each type of water demand in the Chiang Kreua, measurement level as a 5 rating scales by finding for the mean and standard deviation.

3) Analysis of data of people's satisfaction with the model of water management problem solving, measurement level as a 5 rating scales by finding for the mean and standard deviation.

The data analysis uses a statistical package for analysis. The interpretation of mean values for 5 levels can be interpreted (Amonthip Thuengthamtham, 2004, p.26) as follows:

| Average score | Level |
|---------------|-----------|
| 1.00 - 1.50 | minimal |
| 1.51 - 2.50 | less |
| 2.51 - 3.40 | moderate |
| 3.41 - 4.50 | very much |
| 4.51 - 5.00 | most |

4.5.2 Qualitative data analysis

Qualitative data analysis by content analysis and summarization of the answers from interview in 2 topics: 1) information about problem condition and water demand of people and 2) information on solving water resource problems for people in Chiang Khreua Sub-district, Sakon Nakhon District, Sakon Nakhon Province.

5. Research Findings

5.1 Quantitative Research Results

5.1.1 The analysis of data on personal information

1) The sample consisted of 168 males, 47.7 percent, and 184 females, 52.3 percent.

2) The age of 240 samples was mainly over of 41 years old at 68.2 percent, followed by 74 samples age from 31 to 40 years old as 21.0 percent, and the least was the under age 20 years of 18 samples as 5.1 percent.

3) Most of the education levels of 305 samples were below a bachelor's degree as 86.6 percent, followed by 46 samples with a bachelor's degree at 13.1 percent, and the least a master's degree 1 samples at 0.3 percent.

4) Most samples of 235 people were farmers at 66.8 percent, followed by 49 samples are their own business / trade at 13.9 percent and the least of 8 people are the student at 2.3 percent.

5) Most samples of 274 interviewed had income less than 10,000 baht/month at 77.8 percent, followed by 58 people income between 10,001 - 20,000 baht/month at 16.5 percent. Income between 30,001-40,000 baht/month and more than 40,000 baht/month are the less samples of 2 people at 0.6 percent.

5.1.2 Analysis results of water demand

Results of the data analysis for water demand of the people in Chiang Kreua summarized as a rating scale 5 levels by finding mean and standard deviation as shown in Table 1.

Table 1 Analysis results for each type of water demand

| Water demand for different types of water | \bar{X} | S | Water demand level |
|---|-----------|------|--------------------|
| Consumption water demand | 4.39 | 0.82 | Very much |
| Agricultural water demand | 4.17 | 1.01 | Very much |
| Industrial water demand | 3.48 | 0.94 | Moderate |
| Total | 4.01 | 0.92 | Very much |

From Table 1, it was found the samples had water demand for all types, including consumption, agricultural and industrial, and water demand for very much level with average at 4.01 ($\bar{X} = 4.01$, $S = 0.92$) with the highest water demand is consumption demand.

In addition, it was found 59 households located in the service area of the Provincial Waterworks Authority as 16.8 percent, and 293 households located out of service area as 83.2% percent.

5.1.3 Analyzes the people's satisfaction of the model for solving water management problems

Result analysis for people's satisfaction with the model of water management problem solving, measurement level as a 5 rating scales by finding for mean and standard deviation shown in Table 2.

Table 2 Results of level analysis Public Satisfaction with Water Management Problem Solving Model

| Water management problem solution model | \bar{X} | S | Satisfaction level |
|--|-----------|------|--------------------|
| 1) Opened-system Groundwater Recharge (Groundwater Recharge pond) | 4.15 | 0.94 | Very much |
| 2) Closed-system Groundwater Recharge for housing (Rain water from the house's roof) | 3.86 | 0.81 | Very much |
| 3) Closed-system Groundwater Recharge for drainage in the community (Rain water that flows along the channel in the community) | 3.78 | 0.79 | Very much |
| 4) Closed-system Groundwater Recharge in large flooded area (Rain water for long time flood) | 3.37 | 0.89 | Moderate |
| 5) Groundwater well drilling | 3.43 | 1.29 | Moderate |
| 6) Water supply system / groundwater supply | 3.32 | 1.01 | Moderate |
| 7) Small dams (Kaem Ling System) | 3.21 | 0.98 | Moderate |
| Total | 3.58 | 0.96 | Very much |

From Table 2, it was found that the samples that represented people satisfied with the model for solving water management problem, overall average is very much level at 3.58 ($\bar{X} = 3.58$, the $S = 0.96$) with the most satisfied model is open-system Groundwater Recharge (Groundwater Recharge pond). With a use of the pond for

water storage, the problem of short water supply in the dry season was helped. Concerning flooding, this issue still needs to be addressed.

5.2 Quantitative Research Results

Qualitative research results as:

1) Water resource problems during the past 5 years, most of them faced water shortage during the dry season, and flooding problems in plain areas and beside the village roads during the rainy season and the water flows a large flooding. The most water use for daily consumption, and agriculture, People have the greatest need water for growing and agricultural during June to September of year. There was a frequent lack of water during the dry season from December to April of year. In any year the dry season is longer due to affected by the recent climate change, with the result of the water shortage problem in the community continually increasing. A summary of the problems, obstacles and limitations in water resource development. in Chiang Kruea are 1) no main river flowing through the area, 2) the hydrogeological condition, the aquifer is low potential, and 3) some villages such as Moo 5 and Moo 7 have problems of rock salt contamination in groundwater drilling wells.

2) The method for water resource solving has been applied in the past 2-3 years and has recorded success as well with the aquifer recharge method. Chiang Kruea Sub-district can store and reserve a large amount of water in the groundwater recharge pond. The groundwater was recharged in a concrete circular pond to solve the problem of flooding in communities and houses as well. In addition, they also want to systematically develop and enhance academic knowledge potential and technology learning on groundwater management with the community. In order to become a model-based community and setting standard of water management learning center, Chiang Kruea Sub-district would like to get a support budget for the monitoring wells and automatic groundwater level measurement instruments.

6. Discussions

(1) Research results from questionnaire, water demand for consumer was higher than the other, because water is the most necessary in daily life of households. For agriculture, there was a second highest demand. Some households may not need to use water for farming, but still need use water for daily life. This corresponds to the interview results which found that most people need water demand for consumption and agriculture. While water demand for industrial was less it was due to the Chiang Kruea Subdistrict Municipality not being located in the industrial zone.

(2) The model of groundwater recharge that has the greatest effect on the community's satisfaction of solving the water shortage problem is the Open-system Groundwater Recharge (Groundwater Recharge pond), which corresponds to the interviews results the officials of Chiang Kruea Sub-district. Groundwater Recharge pond is a model that has been implemented and the most effective result is that the pond can store a large amount of water reserve and it is easy to maintain.

(3) 83.2 percent of people living in Chiang Kruea Sub-District where their house are not in service area of the Provincial Waterworks Authority, so most people still have water shortage problem during the dry season.

Therefore, Chiang Kruea Sub-district has to try out a new method to support solving problems for people during the crisis.

7. Suggestions

(1) The recommendations from questionnaire question, people in Chiang Kruea Sub-District Municipality still believe that operation of the groundwater recharge project (Groundwater bank) is useful for the community and produces good long-term results and can solve the problem of water shortage during the dry season.

(2) Problems of the people is still found during the rainy season is the flooding problem in the villages, and suggestions of the municipality is to design a new method to get rain water to flow in the community channels. Perhaps some new drainage canals could be made in areas with hard flooding. Studies with engineers would be required to be most effective.

(3) For the next research, researchers will develop a model for participation in the learning process of Knowledge Management with water management and working on service learning for the officials of Chiang Kruea, to improve the efficiency on water management and solve problems for the community.

(4) Concerning the storage ponds, though the recently constructed ponds built are helping, more would be better and locations to put new ponds should be made so there is more water in the driest months. A study would be recommended for the best location and number of these new ponds.

(5) Due to the costs involved with the construction of new ponds or canals, a research team should be made to help find ways to do these projects with government funds or NGOs from other countries to help development in the area and be a model for other communities to follow as an example.

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IDENTIFYING AND PRIORITIZING SUPPLY CHAIN RISK FACTORS IN THAI TUNA INDUSTRY UNDER FUZZY ENVIRONMENT

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ABSTRACT

This paper proposes a comprehensive framework to identify and prioritize the risk factors in supply chain Thai tuna industry. This proposed framework consisted of three phases. First, twenty risk factors in supply chain are explored through extensive literature review. Second, Fuzzy Delphi technique is applied to select appropriate risk factors involved in Thai tuna industry. The result indicated that the twelve risk factors are concerned. Lastly, Fuzzy step-wise weight assessment ratio analysis (SWARA) is employed to prioritize concerned risk factors. This study revealed that supply risks, legal & regulatory risks, change in customer taste and preferences or innovation risks, price fluctuation risks and demand risks respectively are the top five risk factors. These results can help the supply chain managers to proactively initiate risk mitigation strategies in stepwise manner.

Keywords: Risk management; Fuzzy Delphi method; risk factors; risk priorities; Step-wise weight assessment ratio analysis (SWARA); tuna industry

1. Introduction

Presently, food industry operates in a rapidly changing global business landscape exposing companies to vulnerable to high level of supply chain risk. Moreover, globalization, demand uncertainty and technology disruption increase the level of risks in the supply chain. Mithun Ali, Moktadir et al. (2019) stated that food supply chains are becoming more vulnerable due to an increase in disruptive events from man-made and natural causes. In global market perspective, there are several weaknesses in the tuna supply chain in Thailand including lack of supply chain traceability, ineffective supply chain information management. Additionally, procurement

policies are not compliant with industry standards, making them more vulnerable to business compliance violations. Moreover, the information-related risk is a key to improve for the management of the supply chain tuna in industry. The factors have raised risk in supply chains are including globalization, uncertainty, and performance levels. In the last few years, these issues are expected to become even more influential along with the reduction costs, increasing profit, especially customer satisfaction. New challenges are anticipated as tighter environmental regulations likely to Ali et al., (2018) food supply chains are complicated more than the other supply chains manufacturing due to the fact food is a perishable commodity. The mentioned issues are risk determination in supply chain tuna which is motivated to improve for the supply chain tuna.

2. Research Objective

To identify and prioritize supply chain risk factors in Thai tuna industry.

3. Literature Review

3.1 Related Research

The significant relationships between principles and outcomes should focus on initial resource efforts of professional risk management. It is important to clearly define that risk management can be shared with all stakeholders to be a part of decision-making processes. Risk management has increasingly been a means of improving the likelihood of success in the complex, multi-functional, and challenging task of managing and development projects. Kırılmaz and Erol (2017) stated that all the assessments in risk management are based on the prediction of an unknown future and need to consider and explicitly address its foundation of uncertainty same as Olechowski, Oehmen et al. (2016) result of the likelihood of occurrence and consequence can be measured and managed. The process of risk management, which is an evaluation of both the positive and negative aspects of risks, organizes methodically to address the risks intrinsic their activities to achieve sustained benefit within each activity. While Ho, Zheng et al. (2015) found that supply chain risks were divided into 2 classifications; 1. macro risks 2. micro risks. They define the likelihood and impact or conditions that influence part of supply chains leading to operational, tactical, or strategic level failures or irregularities. Rostamzadeh, Keshavarz-Ghorabae et al. (2017) summarize that the supply chain risks happen because of future uncertainty and Sreedevi and Saranga (2017) show a recent survey on global supply chain and risk management shows that repeated changes in product supply and manufacturing requirements because of frequent introduction of new products and less standardization of products and services as a key drivers of supply chain complexity leading to increased supply chain risk. The risks are attributed to complex supply chains, occur frequently, and referred to supply chain operational risk. Supply chain risk management has attracted considerable attention from both academics and practitioners in recent years studies by Fan, Li, et al. (2017)

3.2 Research Framework

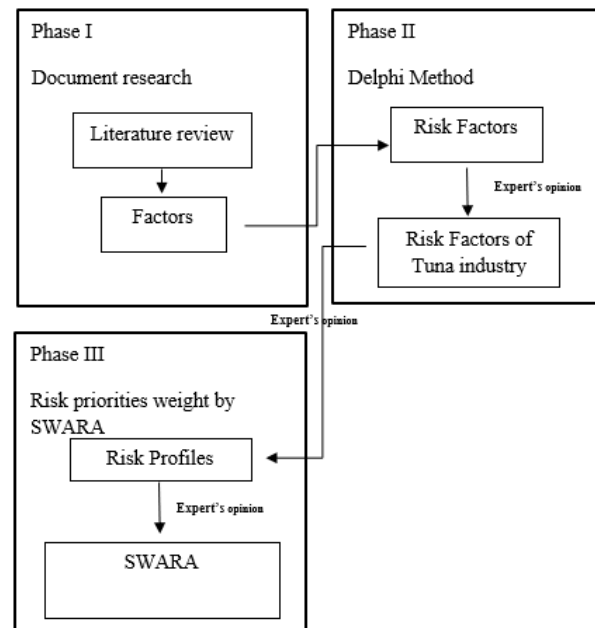


Figure 1 Research Framework

4. Research Methodology

4.1 Research Design

The research procedure is separated in three phases. First, the supply chain risk factors are identified through extensive literature review. Second, the selection of appropriate risk factors involved in Thai tuna industry by applying Fuzzy Delphi. Lastly, the relative importance weights of selected risk factors are derived by employing Fuzzy step-wise weight assessment ratio analysis (SWARA).

4.2 Population and Sample

Literature does not provide any mandatory number of experts. Different studies proposed different rules to consider while selecting the number of experts. Some studies suggested that 10 experts are sufficient to obtain reliable results Bouzon et al., (2016). Robbins et al. (1993) advised that the number of experts remains between 5 to maximum 50. Murry and Hammons (1995) concluded that opinions from 10 to 30 experts are necessary to ensure the best results. Okoli and Pawlowski (2004) suggested that the modified Delphi method can effectively collect and summarize 10 to 18 expert's opinions. Therefore, 10 experts participated in is satisfactory for this study.

4.3 Research Instrument

This study approach the Fuzzy Delphi method developed by Shen et al., (2011) to present the experts' consensus with a geometric means and to obtain the appropriated perspectives and criteria for suppliers' capability measurement, The Fuzzy Delphi method was developed to be an integration of the traditional Delphi method and

the fuzzy set theory. They are widely used in recent studies and is one of the effective methods to deal with problems of time consume, high cost and lower feedback rate of the questionnaire, and the vagueness and the uncertainty problems from experts' response likely to Lee et al., (2010) studied based on the advantages of the useful information collection on the experts' opinions. The Fuzzy Delphi method was adopted to acquire the experts' consensus by integrating the useful information from the experts' opinions in the decision-making process Chen et al., (2011). Next, a step-wise weight assessment ratio analysis (SWARA) is a calculated instrument for the relative weights of selection criteria. It was developed by Kersulienė et al. (2010) to determine the relative importance weight of criteria for the experts contribute information, acknowledge, and experience to proceed pairwise comparison between each pair of successive criteria on ranking (Nakhaei et al., 2016). In the present a step-wise weight assessment ratio analysis (SWARA) various studies and it has been applied to solve problems, e.g., Zarbakhshnia et al. (2018); Eghbali-Zarch et al. (2018); Popovic et al. (2019).

4.4 Data Collection

Collecting measurement criteria from literature review and gathering the experts' opinions of each criterion by the questionnaires.

4.5 Data Analysis

The collected data is analyzed with linguistic terms to the definition and to be identified by the triangular fuzzy numbers (TFNs) and performing the defuzzification by a center-of-gravity method for triangular fuzzy numbers (TFNs) and extracting criteria by comparing. After that the data is identified and used rating scores by respondents to rate the level by matrix to finding weight important the risk prioritize factors by using the expert's opinion group with the questionnaire and design the linguistic assessment scale link to a step-wise weight assessment ratio analysis (SWARA) is to calculate the relative weights of selection criteria.

5. Research Findings

The criteria are selected from the literature reviews in food supply chain journal shown on the table 1. Meanwhile, the experts are asked for identifying main factors for the tuna industry which are composed of twenty criteria with their perspectives.

Table 1 Summary of some risks in food supply chains.

| No. | Risk factors | Reference |
|-----|--|---|
| 1 | Demand | (Moazzam, Akhtar et al., 2019), (Mithun Ali et al., 2019), (Xiaoping, 2016) |
| 2 | Supply | (Mithun Ali et al., 2019), (Sun & Tang, 2014), (Xiaoping, 2016), (Moazzam, Akhtar et al., 2019) |
| 3 | Price fluctuations | (Xiaoping, 2016), (Mithun Ali et al., 2019), (Moazzam, Akhtar et al., 2019) |
| 4 | Capacity/Manufacturability | (Mithun Ali et al., 2019), (Sun & Tang, 2014), (Xiaoping, 2016), (Moazzam, Akhtar et al., 2019) |
| 5 | Inventory | (Mithun Ali et al., 2019), (Xiaoping, 2016) |
| 6 | Personnel skill | (Mithun Ali et al., 2019), (Xiaoping, 2016) |
| 7 | Detection of diseases in inputs | (Mithun Ali et al., 2019), (Xiaoping, 2016) |
| 8 | Customer relationship | (Mithun Ali et al., 2019), (Xiaoping, 2016), (Moazzam, Akhtar et al., 2019) |
| 9 | Quality products | (Mithun Ali et al., 2019), |
| 10 | Failure in IT system | (Mithun Ali et al., 2019), (Moazzam, Akhtar et al., 2019) |
| 11 | Legal & regulatory | (Mithun Ali et al., 2019), (Moazzam, Akhtar et al., 2019) |
| 12 | Communication with supplier and bankruptcy of supplier | (Mithun Ali et al., 2019), (Moazzam, Akhtar et al., 2019) |
| 13 | Change in customer taste and | (Mithun Ali et al., 2019), (Moazzam, Akhtar et al., 2019) |
| 14 | Poor leadership/Poor quality of employees | (Mithun Ali et al., 2019), (Xiaoping, 2016) |
| 15 | Lack of Cooperation | (Mithun Ali et al., 2019), (Xiaoping, 2016) |
| 16 | Machine/equipment failure | (Mithun Ali et al., 2019), (Xiaoping, 2016) |
| 17 | Environmental risk | (Mithun Ali et al., 2019), (Xiaoping, 2016), (Moazzam, Akhtar et al., 2019) |
| 18 | Disruption from man-made | (Mithun Ali et al., 2019), |
| 19 | Food spoilage/ waste | (Xiaoping, 2016) |
| 20 | Information | (Xiaoping, 2016), |

The data are collected from the experts' opinions are synthesized to obtain appropriate supply chain management criteria. The linguistic variable is then converted to the triangular fuzzy numbers (TFNs) by using equations and compare with the defuzzification value (D_i). If the value of defuzzification (D_i) is less than the threshold values ($S=0.7$), then reject the criterion. The transforming of TFNs is calculated by equations (1) to (4), where T_i is the fuzzy number of the criteria i ; \mathcal{X}_{ij} indicates the appraisal value of the j^{th} expert for criteria i ; L_i is the minimum of the experts' evaluation; M_i is the geometric mean of the experts' evaluation; j denotes the j^{th} expert, where $j = 1, 2, 3 \dots n$. and U_i denoted the maximum of the experts' evaluation.

$$T_i = (L_i, M_i, U_i) \quad (1)$$

$$L_i = \min (X_{ij}) \quad (2)$$

$$M_i = \sqrt[n]{\prod_{j=1}^n x_{ij}} \quad (3)$$

$$U_i = \max (X_{ij}) \quad (4)$$

Perform the defuzzification by a center-of-gravity method for TFNs; where D_i is the clear value, as follows:

$$D_i = Li + Mi + Ui$$

and the table 2 has shown as the results of criteria selected by Triangular Fuzzy Delphi.

Table 2 The results of the criteria selection by Triangular Fuzzy Delphi.

| Risk factors | Triangular Fuzzy Number | | | Defuzzification (Di) | Judgment (Accepted / Rejected) |
|--|-------------------------|---------------------|----------|----------------------|-----------------------------------|
| | Min (Li) | Geometric Mean (Mi) | Max (Ui) | | |
| Demand | 0.600 | 0.780 | 1.000 | 0.793 | Accepted |
| Supply | 0.500 | 0.820 | 1.000 | 0.773 | Accepted |
| Price fluctuations | 0.400 | 0.770 | 1.000 | 0.723 | Accepted |
| Capacity | 0.400 | 0.740 | 1.000 | 0.713 | Accepted |
| Inventory | 0.400 | 0.710 | 1.000 | 0.703 | Accepted |
| Lack of skilled personnel | 0.100 | 0.470 | 0.800 | 0.457 | Rejected |
| Detection of diseases in inputs | 0.300 | 0.640 | 0.900 | 0.613 | Rejected |
| Poor customer relationship | 0.000 | 0.520 | 0.800 | 0.440 | Rejected |
| Unsafe and poor-quality products | 0.100 | 0.770 | 1.000 | 0.623 | Rejected |
| Failure in IT system | 0.000 | 0.440 | 0.800 | 0.413 | Rejected |
| Legal & regulatory | 0.500 | 0.740 | 1.000 | 0.747 | Accepted |
| Communication failure with supplier and bankruptcy of a supplier | 0.400 | 0.760 | 1.000 | 0.720 | Accepted |
| Change in customer taste and Preferences or innovation | 0.600 | 0.820 | 1.000 | 0.807 | Accepted |
| Poor leadership | 0.000 | 0.440 | 0.800 | 0.413 | Rejected |
| Lack of Cooperation | 0.400 | 0.730 | 1.000 | 0.710 | Accepted |
| Machine/equipment failure | 0.000 | 0.560 | 1.000 | 0.520 | Rejected |
| Environmental risk | 0.400 | 0.800 | 1.000 | 0.733 | Accepted |
| Disruption from man-made | 0.400 | 0.710 | 1.000 | 0.703 | Accepted |
| Food spoilage | 0.000 | 0.600 | 1.000 | 0.533 | Rejected |
| Information | 0.400 | 0.730 | 1.000 | 0.710 | Accepted |

*Remark: If the value of defuzzification (Di) is less than the threshold values (S=0.7), then reject the criterion as shown in light shade color.

After accepted the risk factors, to identify the factors which have impacted and likelihood to the supply chain tuna for selecting the risk factors have been score between 15 to 25 to be the high-risk factors prioritized following the below table 3 shown those risk factors have high impacted and high likelihood in the supply chain of the tuna industry as expert's opinions. The score was computed from Likert scale between 2D risks of impacted and likelihood.

Table 3 The results of the risks level by matrix computation between 2D risks

| Risk factors | Score |
|--|-------|
| Demand | 19 |
| Supply | 22 |
| Price fluctuations | 20 |
| Capacity | 10 |
| Inventory | 9 |
| Legal & regulatory | 19 |
| Communication failure with supplier and bankruptcy of a supplier | 17 |
| Change in customer taste and Preferences or innovation | 19 |
| Lack of Cooperation | 4 |
| Environmental risk | 10 |
| Disruption from man-made | 10 |
| Information | 8 |

The score in the table 2 can't determine the relative importance weight of the risk factors. Then the step-wise weight assessment ratio analysis (SWARA) method approach to conduct a pairwise comparison between each pair of successive criteria by using fuzzy results of the analysis which is collected the data from expert's opinion by the questionnaire. The risk factors are score between 15 to 25 as Supply, Price fluctuations, Demand, Legal & regulatory, and Change in customer taste and Preferences or innovation. Those high risks are approach to conduct a pairwise comparison and it has shown the results following table 4.

Table 4 The results of the high-risks factors by Fuzzy weight importance

| Risk factors | Comparative importance of average value (Sj) | | | Coefficient $K_j = S_j + 1$ | | | Recalculated weight $Q_j = Q_j - 1/K_j$ | | | Wj | | | BN P |
|--|--|-----------|-----------|-----------------------------|-----------|-----------|---|-----------|-----------|-----------|-----------|-----------|-------|
| | - | - | - | 1 | 1 | 1 | 1 | 1 | 1 | 0.42 | 0.50 | 0.59 | |
| Supply | - | - | - | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 6 | 0.677 |
| Legal & regulatory | 0.66 7 | 1.00 0 | 1.50 0 | 1.66 7 | 2.00 0 | 2.50 0 | 0.40 0 | 0.50 0 | 0.60 0 | 0.23 8 | 0.25 2 | 0.25 3 | 0.237 |
| Change in customer taste and Preferences or innovation | 0.66 7 | 1.00 0 | 1.50 0 | 1.66 7 | 2.00 0 | 2.50 0 | 0.16 0 | 0.25 0 | 0.36 0 | 0.09 5 | 0.12 6 | 0.15 2 | 0.069 |
| Price fluctuations | 0.66 7 | 1.00 0 | 1.50 0 | 1.66 7 | 2.00 0 | 2.50 0 | 0.06 4 | 0.12 5 | 0.21 6 | 0.03 8 | 0.06 3 | 0.09 1 | 0.010 |
| Demand | 1.00 0 | 1.00 0 | 1.00 0 | 2.00 0 | 2.00 0 | 2.00 0 | 0.03 2 | 0.06 3 | 0.20 8 | 0.01 9 | 0.03 1 | 0.04 6 | 0.005 |
| Communication failure with supplier and bankruptcy of a supplier | 0.28 6 | 0.33 3 | 0.40 0 | 1.28 6 | 1.33 3 | 1.40 0 | 0.02 3 | 0.04 7 | 0.08 4 | 0.01 4 | 0.02 4 | 0.03 5 | 0.002 |

6. Discussion

There are 12 risk factors which have affected to the supply chain in the tuna industry Thailand. Moreover, the highest risk factor is a supply factors which highest score at 22. The result of the score from the matrix can't determine the relative importance weight of the risk factors. Then to approach the step-wise weight assessment ratio analysis (SWARA) method conduct a pairwise comparison between each pair of criteria. The results of the weight importance of risk factors by Fuzzy between 2D risks highest score is still a supply factors which is the highest risk levels, the second is legal & regulator factor and the third is change in customer taste preferences or innovation factor. The table has shown the weight importance ration as Wj blank is 0.677, 0.237, and 0.069 in order.

7. Suggestion

After prioritizing the high-risk factors and set it as a model as the PDCA method is a tool identifying which processes don't work as expected. The approach used by many different types of organizations. It allows them to formulate theories about what they need to improve, and then testing in a continuous feedback loop as the example of the supply factor details;

(1) The first is 'plan' about to the supply factor is transferring a problems at the supplier end, the company has created a department for supplier selection and evaluation. The requirements of the company are conveyed earlier to the suppliers and steps were taken to reduce the likelihood of a shortage in raw materials. The company now places a high priority on building long-term partnerships with suppliers and seeks to ensure that the quality of the supplied is good.

(2) When it comes to 'do' the supply factor should be arranged by raw material as it challenges in supply chain tuna. It should be the priority in management to contract farming with a major supplier in long term and any suppliers in short-term

(3) Moving on 'check' that supply factor which is the company should follow the feedback of operations about to the major supplier whether they can be longer partnerships and analyze the supplier by rating score if they are work to go to the next step either or back to step 1 to do the plan again

(4) Finally, 'action' the supply factor is implement and the major supplier become a long-term partnership. The result is the company will not face a risk supply factors but it is a continuous model loop the company should reserve other suppliers and do it again from the top.

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PROTECTIVE FACE SHIELD TENSILE STRENGTH FROM DIFFERENT MANUFACTURING METHODS

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ABSTRACT

In early 2020, COVID-19 pandemic has impacted Thailand nationwide. Demand of personal protective equipment has increased, especially during March to June. This bring the shortage of medical supply. One of them was face shield which was not available. 3DP technique was then applied to compensate need of that time. However, the strength of 3DP face shield was not investigated. This research then aims to compare mechanical property of three different face shields under tensile loads. The face shield are 1) PRUSA-RC1 by FDM, 2) modified PRUSA-RC3 by FDM, and 3) PRUSA-RC3 by injection molding. All materials made of face shield are Polylactic Acid (PLA). The face shield was hooked to the Universal Tensile Machine (UTM) prior the cross head. The UTM was set to apply tension at constant speed of 5 mm/min until the face shield sample was broken apart. Force and displacement from the UTM was acquired and plotted to compare their mechanical performance. From the result, it has revealed that modified PRUSA-RC3 by FDM present the greater strength than PRUSA-RC1 by FDM and PRUSA-RC3 by injection molding. Its maximum tensile force 575 N. Hence, the recommended face shield should be modified PRUSA-RC3

Keywords: Face Shield, COVID-19, Tensile Strength

1. Introduction

Since the surging of the COVID-19 pandemic, personal protective equipment (PPEs) for health care workers (HCWs) and medical staffs were in critical scarcity. A local rapid manufacturing, e.g., fused deposition modeling (FDM) was one of a popular solution to tackle this issue on time (Chaturvedi, Gupta, Krishnan, & Bhat, 2020). Recently, Polylactic acid (PLA) was environmental friendly material for FDM because it was biodegradable via hydrolysis (Lemarteleur et al., 2020). This material was not only intended to be cost effectiveness but also was reusable (Mostaghimi et al., 2020).

Two importance PPEs to protect a face of an operator under contagious environment were a protective face mask and a protective face shield. A function of the face mask was to filter droplets from coughing or sneezing infected people while the patients contain the disease within themselves not to spread out to harm the other respiratory systems (Davis, Spady, & Forgie, 2007). On the other hand, role of the face shield was to exclude contaminated aerosol and physical touching out of operator's ocular surface, and mucous membranes in the eyes, mouth, or nose effectively by a visor (Lemarteleur et al., 2020; Lu, Liu, & Jia, 2020).

The face shield was easier to be fabricated and had border functional for protection than the face mask. Moreover, an open source community that mobilized solutions, e.g., prusaprinters.org (PrusaPrinters), was provided theirs benevolent 3D models to aids this contagion. Generally, each model was comprise of inner band, outer band, positioning pins, visor, and elastic strap as shown in Figure 1.

After the COVID-19 pandemic had been progressing for several months, injection molding (IM) which was the fastest process for mass production, emerged for face shield manufacturing consequently from a long period of molding design process (Kunkel et al., 2020).

Before the face shields were dispatched, they were inspected for a quality control to pass several criterion, e. g., the flexibility between the inner and the outer bands, the mechanical resistance of the positioning pins for the face shield and the elastic strip, the rectification of the shape smoothness (Lemarteleur et al., 2020). However, the mechanical resistance of the positioning pins for the face shield and the elastic strip is the most critical issue of damage.

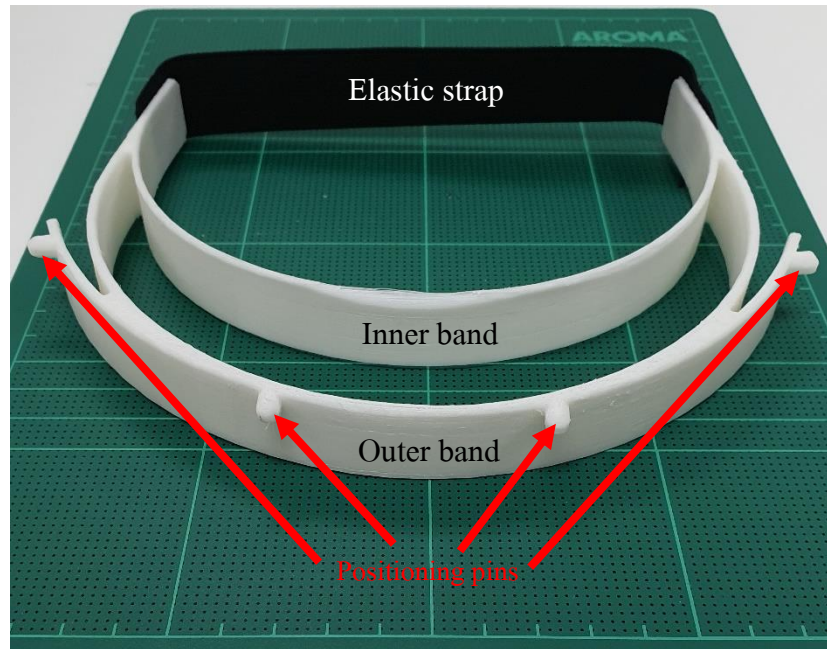


Figure 1 General components (without visor) of a face shield from PRUSA-RC3 model

As a result, tensile strength of three different protective face shields from the combination of types and manufacturing methods is under consideration in this research.

2. Research Objective

- (1) To investigate tensile strength of three different protective face shields from combination of types and manufacturing methods.
- (2) To report recommendation of uses for each types.

3. Literature Review

3.1 Theory, Concept and Related Research

Fused Deposition Modeling (FDM) is one of non-laser-based of additive manufacturing (AM) method (Chantarapanich, Puttawibul, Sitthiseripratip, Sucharitpwatskul, & Chantaweroad, 2013) which uses polymers such as Polylactic Acid (PLA), Acrylonitrile Butadiene Styrene (ABS), tricalcium phosphate (TCP), and polymer matrix composite (PMC) as a raw material (Singh & Garg, 2016). It adopts the additive layer-by-layer manufacturing concept to create a part from a CAD model which converted into an STL file format. The STL file is sliced cross-section-wise by open-source or custom preprocessing software of the FDM companies. The sliced

layers are printed atop one after another to form the desired part (Penumakala, Santo, & Thomas, 2020). The example of fabrication using the FDM method is shown in Figure 2.

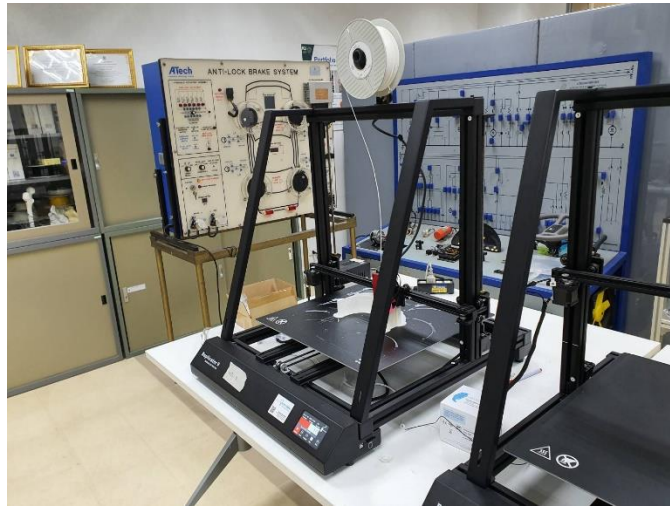


Figure 2 Fabrication of PRUSA-RC3 model under manufacturing

Injection molding is a manufacturing method by injecting molten plastic such as Polyurethane (PU) into the mold assembly via a helical screw through a nozzle. The molten plastic is then cooled down and set to become the finished part and removed by ejection pins in mold opening process (Ogorodnyk & Martinsen, 2018).

Though setting up optimal process parameters for a qualified part of injection molds is difficult, delicate, and time consumed (Finkeldey, Volke, Zarges, Heim, & Wiederkehr, 2020), there are some advantages to be traded off with FDM (Rodon, 2020) including:

- 1) High efficiency and fast productive rate for mass production;
- 2) Ability to produce complex and uniform parts, and provide millions identical parts with a little effort for finishing, and
- 3) Relatively low overhead cost in comparison with other method and yield operating cost effectiveness.

3.2 Research Framework

The research framework is shown in Figure 3.

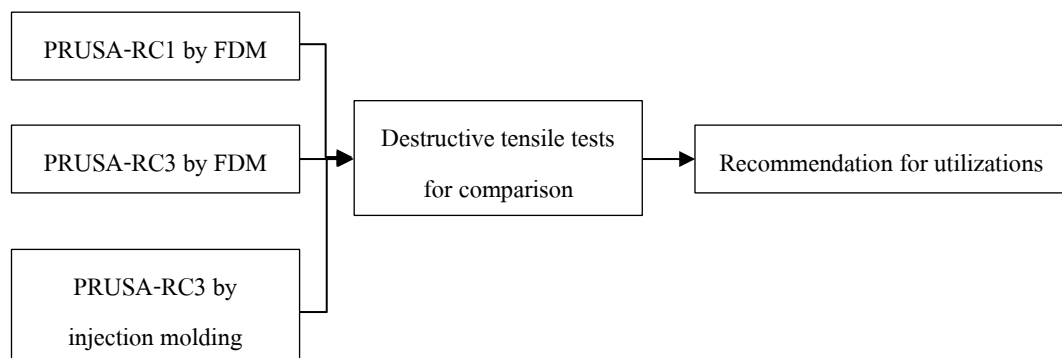


Figure 3 Research framework.

3.3 Research Hypotheses

The three different protective face shields have the same tensile strengths.

4. Research Methodology

4.1 Research Design

The three different protective face shields from combination of types and manufacturing methods are 1) PRUSA-RC1 by FDM, 2) modified PRUSA-RC3 by FDM, and 3) PRUSA-RC3 by injection molding as shown in Figure 4. The printing parameters of both specimens by FDM were set at the same; layer thickness was of 0.02 mm and nozzle temperature was 200 °C with PLA filament. During the wearing and use, the face shield is subjected to variable tension from the adjustable elastic strap. This is considered a critical performance, therefore all samples were tested under tension mode.

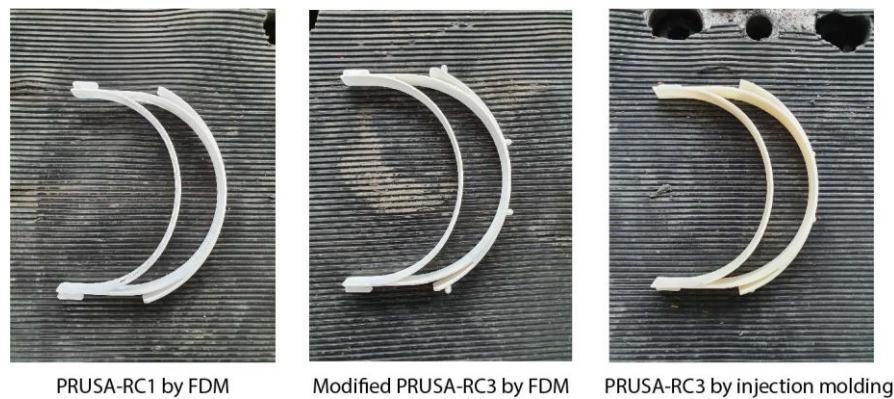


Figure 4 The three different protective face shields for tensile tests

4.2 Population and Sample

Due to the need of face shield during COVID- 19 pandemic, the sample of face shield at that time was not much available. Therefore, the authors acquired only one sample of models for the testing. The assumption was that since the manufacturing conditions were controlled, face shield should have the same strength and performance.

4.3 Research Equipment.

All specimens were tested with Shimadzu, Model UH- X® universal testing machine (UTM). Since there were no specific standard on mechanical testing of face shield, hook was applied to hold the face shield on both sides instead of standard UTM grid. The experiment was destructive testing where the cross-head velocity was constant at 10 mm/min and had been applying until the specimens' rupture were emerged as an example in

Figure 5.

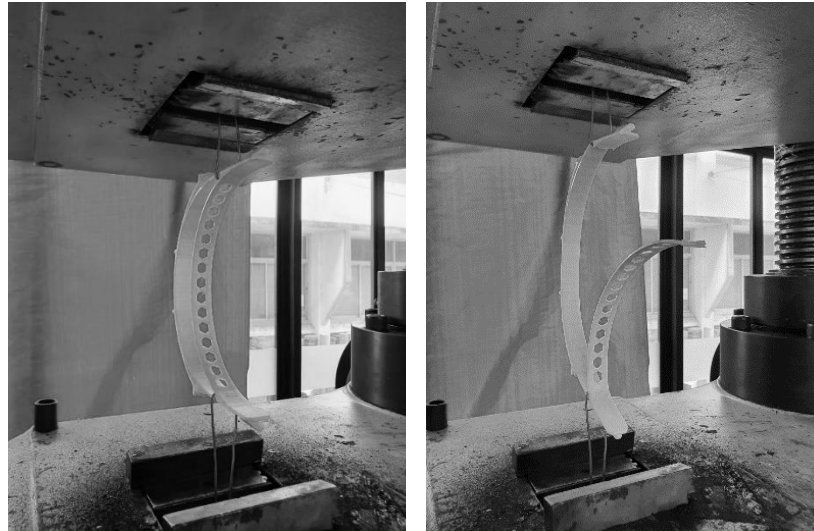


Figure 5 Test of face shield PRUSA-RC1 by FDM (Left) test setting, and (right) the rupture.

4.4 Data Collection

All raw testing data were collected by Shimadzu TRAPEZIUMX Materials Testing Software which includes force (kN), extension stroke (mm), and time. In one second, four data was obtained from the testing software. All data was exported in Comma-separated values format (CSV) to further analysis in MS Excel.

4.5 Data Analysis

The results from tensile tests were stored in CSV file. We imported the file to MS Excel and obtained number of force and extension stroke pairs as 29856, 29402, and 29845 for PRUSA-RC3 by FDM, PRUSA-RC1 by FDM, and PRUSA-RC3 by injection, respectively. The force and extension stroke of the three models were plotted in

Figure 6. All ultimate tensile force of each model were determined from the graph using the MAX function of MS Excel.

5. Research Findings

All ultimate tensile force of each model were plotted in Figure 6. The results showed that PRUSA-RC3 by FDM had the highest ultimate tensile force value of 575 N while PRUSA-RC3 by injection molding was the second best with the value of 328 N which slightly above PRUSA-RC1 by FDM with the value of 288 N. Lastly, the rupture displacements of PRUSA-RC3 by FDM, PRUSA-RC1 by FDM, and PRUSA-RC3 by injection were 49.64 mm, 48.88 mm, and 49.62 mm consecutively.

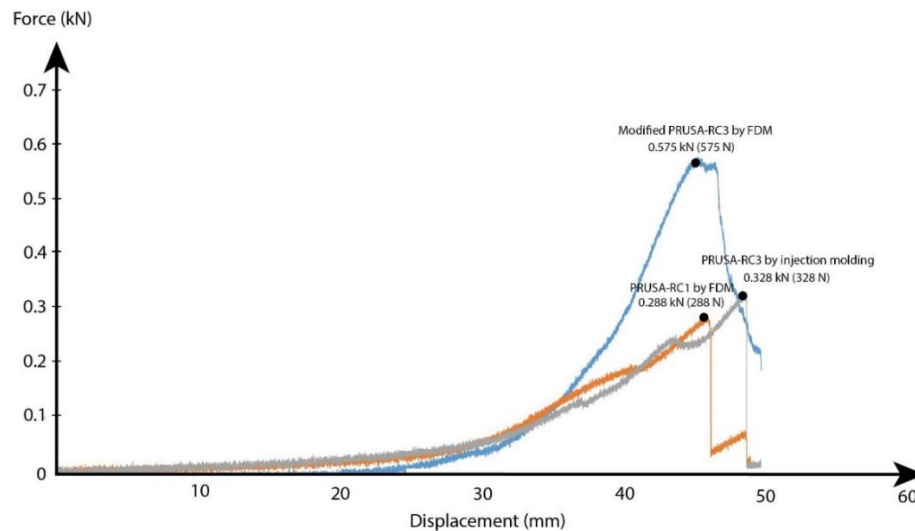


Figure 6 All ultimate tensile strengths from three different models.

6. Discussion

From the results, PRUSA-RC3 by FDM has both the highest ultimate tensile force and elongation at break which means it is the most flexible and toughest among the others. On the contrary, PRUSA-RC1 by FDM get both the lowest ultimate tensile force and elongation at break which might be because the array hexagonal holes in its inner band. This absence of material could reduce tensile stress distribution from the elastic strap. Lastly, we notice that all damage of ruptured specimens occurs either on the left or the right junction that merges the inner and outer bands together.

7. Suggestion

Since the face shield which has the highest tensile force and elongation at break is PRUSA-RC3 by FDM, we recommend this face shield type for application pertain to high tension exerted from the elastic strap. The parameters used in manufacturing for this face shield type were set in layer thickness at 0.02 mm and nozzle temperature at 200 °C. Accordingly, this should be the proper setting to face shield manufacturing of small-batch products with high quality. Finally, the designer should be more careful to reduce stress concentration on both the left and the right band-junctions in order to redesign the further face shield model.

8. Acknowledgement

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IN VITRO ANTIOXIDANT ACTIVITY, TOTAL PHENOLIC CONTENT AND ANTIBACTERIAL ACTIVITY OF *MIMOSA PUDICA* L. EXTRACT

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ABSTRACT

Mimosa pudica L. or sensitive plant is a pantropical weed that can be found in Asian countries including Thailand. This plant belongs to Fabaceae family and can be used as a traditional medicine to treat diarrhea, insomnia, headache, fever, and skin conditions. Some studies reported the presence of various bioactive compounds in this plant such as phenolic compounds and flavonoids. In this study, the investigation of total phenolic content and its antioxidant potential of *M. pudica* L. extract (MPE) were performed using Folin-Ciocalteu method and DPPH assay, respectively. Moreover, its antibacterial activity against *Staphylococcus aureus*, *Staphylococcus epidermidis* and *Cutibacterium acnes* were also determined using disc diffusion method. The data revealed that, the total phenolic content of ethanolic MPE was 33.04±0.20 µg GAE/mg and significant free radical scavenging activity with IC₅₀ value was 29.47 µg/mL. Furthermore, the inhibition zone of the ethanolic MPE was 10 mm for the *C. acnes* at 10 mg/disc while *S. aureus* and *S. epidermidis* were 11 and 8 mm at the same concentration, respectively. These results suggested that *M. pudica* L. could be a potential source of antioxidant with free radical-scavenging and antibacterial activity which will be useful for development of an active ingredient for anti-acne cosmetic products in the future.

Keywords: *Mimosa pudica* L. , Antioxidant activity, Total Phenolic Content, Antibacterial activity, *Cutibacterium acnes*

1. Introduction

Nowadays, people pay more attention to health and beauty including body shape and healthy skin, such as free of dark spot, dry or oily skin, uneven skin tone, and especially acne. The problem of acne is regarded as one of the main problems of the skin, acne vulgaris, a chronic inflammatory disorder in adolescents consisting of the pilosebaceous units (Lalla, Nandedkar, Paranjape, & Talreja, 2001). It may cause disfiguration and permanent scarring and also has an adverse effect on emotion, which may lead to withdrawal from society, social phobias, and clinical depression. The four main pathogenic factors in the development of acne are cornification of the pilosebaceous, duct increased sebum production, disorders of the microflora, and inflammatory activity (Truter, 2009). The severity of skin disorder generally increases with age and time.

Cutibacterium acnes (formerly *Propionibacterium acnes*) is an anaerobic, non-motile, and non-sporing gram-positive bacterium that colonizes in the follicular duct (Institute of Medicine Forum on Microbial, 2004). It generates mild local inflammation by producing neutrophil chemotactic factors. Accordingly, neutrophils get attached to the acne lesions and constantly release inflammatory mediators such as reactive oxygen species (ROS) (Leyden, 1997; Nand, Drabu, & Gupta, 2012). These toxic ROS can also play a role as a messenger in the induction of several biological responses. It becomes necessary to use antioxidants as free radical scavengers for removal of ROS to deduct cell damage that occurs during acne inflammation (Halliwell, 1991). Nowadays, the natural antioxidants are popular in medical, dietary supplement and cosmetic fields. In addition, it has been more popular than the synthetic antioxidants like AHA and BHA (Zhenbin, Zhongli, Haile, & Griffiths, 2011).

Mimosa pudica L., also known as sensitive plant, shy plant, touch-me-not, or Maiyarap in Thailand, is a pantropical weed that can be found in Asian countries including Thailand. This creeping annual plant belongs to the family of Fabaceae and is mostly recognized by its rapid movement in response to touch or vibration. Some studies showed the presence of various bioactive compounds in this plant like tannins, steroids, flavonoids, glycosides, non-protein amino acid leucenine (mimosine), and alkaloids (Ankit et al., 2008; Zhenbin et al., 2011). The extracts from different parts of *M. pudica* L. exhibited antibacterial activity with inhibitory effects against gram-positive bacteria such as *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Klebsiella pneumoniae*, *Streptococcus pneumoniae*, *Bacillus cereus*, and *Bacillus subtilis* as well as gram-negative bacteria such as *Escherichia coli*, *Salmonella typhi*, *Pseudomonas aeruginosa*, *Neisseria cinerea*, and *Proteus vulgaris* (Debashisha, Santosh, & Gouri, 2012; Mohan, Anand, & A, 2011; Thoa, Nam, & Minh Nhat, 2015). However, effect of *M. pudica* L. extracts on *C. acnes* inhibition has not been reported. Additionally, no anti-acne product containing *M. pudica* L. extract has been developed yet. Herein, we have studied on an antioxidant activity, total phenolic content, and antibacterial activity of *M. pudica* L. extract to use as active ingredient for anti-acne product in the future.

2. Research objectives

- (1) To determine antioxidant activity and total phenolic content of *M. pudica* L. extract
- (2) To determine antibacterial activity of *M. pudica* L. extract against *C. acnes*, *S. aureus*, and *S. epidermidis*

Epidermidis

3. Materials and Methods

Collection and preparation of plant material

The fresh aerial parts of *M. pudica* L. were collected from the field around Naresuan University, Phitsanulok, Thailand. They were washed thoroughly in running tap water to remove the surface microflora and other adherent dirt (Debashisha et al., 2012; Mohan et al., 2011). After that, the samples were cut into small pieces and dried in an oven at 40-45°C for 48h. Then, the dried samples were pulverized in a mechanical grinder to obtain coarse powder. The plant powder was kept in sealed package to avoid heat and light at room temperature.

A voucher herbarium specimen of *M. pudica* L. was made and authenticated by a botanist with an accession number of 004666. It was then kept at Naresuan University Herbarium (PNU Herbarium), Department of Biology, Faculty of Science, Naresuan University.

Plant extraction

The sample was extracted by using maceration technique (sample 100 g/ solvent 1 L) with 95% ethanol and water, at room temperature for 48h (Debashisha et al., 2012; Mohan et al., 2011). The supernatant was filtrated through a filter paper (Whatmann No. 1) in a Buchner funnel prior to evaporation by using evaporator. Then *M. pudica* L. extracts (MPEs), ethanolic and aqueous were kept at 4°C and the percent yield of crude extract was calculated.

Antibacterial activity testing of MPEs

A biosafety and biosecurity certificate of this study was successfully approved by Naresuan University (NUIBC MI 63-01-03).

S. aureus (DMST 8840), *S. epidermidis* (DMST 15505), and *C. acnes* (DMST 14916) were obtained from the Department of Medical Sciences, Ministry of Public Health, National Institute of Health of Thailand. Fresh cultures of the isolated bacteria were maintained on Mueller Hinton Agar (MHA) for *S. aureus* and *S. epidermidis*, and Brain Heart Infusion Agar (BHA) for *C. acnes*.

Antimicrobial activity was carried out using disc diffusion method with quality control testing. Firstly, 100 µl of tested bacteria suspension was spread on their nutrient agar plate and placed at room temperature to dry. Then 20 µl of the MPE was dropped into the discs (2, 4, 10 mg/disc), left dry for 30 minutes at 40°C, placed on agar plate of each bacteria stain and incubated at 37°C for 24h (*S. epidermidis* and *S. aureus*) and 37°C for 48h (*C. acnes*). Antimicrobial activity of the extracts were determined by measuring the diameter of a clear distinct zone surrounding the disc in terms of millimeter. Ethanol was used as a negative control. Tetracycline was used as a positive control of *S. epidermidis* and *S. aureus*, while clindamycin was used for *C. acnes*, respectively. The experiment was performed in triplicate and expressed as mean±SD.

Determination of total phenolic content of MPE

The total phenolic content of MPE was performed by using Folin-Ciocalteu method. Gallic acid in ethanol at various concentrations was used for standard curve construction. MPE was prepared at concentration of 1 mg/ml in ethanol. After that, 10 μ L of gallic acid at various concentrations or MPE was added into 96-well plate, and then added 130 μ L of water and 10 μ L of Folin-Ciocalteu's mixture solution. After being shaken for 5 minutes, 100 μ L of 7% (w/v) Na_2CO_3 solution was added in the mixture. Then, the mixtures were incubated in the dark for 30 minutes prior to measurement of the absorbance at 750 nm by using Microplate Spectrophotometer. The total amount of phenolic content was calculated as gallic acid equivalents (GAE) from the calibration curve. The experiment was performed in triplicate and expressed as mean \pm SD (Singleton & Rossi, 1965).

Determination of antioxidant activity of MPE

The screening of the free radical scavenging activity of the MPE was accomplished by using DPPH assay in comparison to L-ascorbic acid. Various concentrations of MPE and L-ascorbic acid were dissolved in ethanol. Then, 75 μ L of the mixture was added to 96-well plate, followed by adding 150 μ L of DPPH solution (78.8 μ g/mL). The mixture was left standing in the dark for 30 minutes at room temperature. Then, the absorbance of the remaining of DPPH was measured by microplate spectrophotometer at wavelength of 515 nm. Radical scavenging activity of the extract or L-ascorbic acid was expressed as the inhibition percentage (% R_s) and calculated using the following formula:

$$\%R_s = [(A_c - A_s)/A_c] \times 100\%$$

Where: A_c is the absorbance of the DPPH without the sample.

A_s is the absorbance of the DPPH with the sample.

The test was run in triplicate and percent inhibition was expressed as mean \pm SD. The IC_{50} , the equivalent concentration to give the 50% effect, was determined by log-probit analysis of the samples. The experiments were performed in triplicate (Bandoniene, Murkovic, Pfannhauser, Venskutonis, & Gruzdienė, 2002).

4. Results and Discussion

Antibacterial activity testing of MPEs

The antibacterial activity of MPEs was shown in Table 1. The ethanolic extracts at the concentration of 2 mg/disc showed no resistant activity while 4 mg/disc demonstrated the inhibition zone between 6-8 mm against the selected bacteria. In addition, the inhibition zone of the ethanolic extract was 10 mm for the *C. acnes* at 10 mg/disc, while *S. aureus* and *S. epidermidis* were 11 and 8 mm, respectively, at the same concentration. In contrast, the aqueous extract exhibited no resistant activity against selected bacteria of all concentration. The results were corresponded to various reports. However, the activities were weak and the zones of inhibition were generally much smaller than those in the standard. The positive controls showed significantly inhibition zone against the selected bacteria, but there was no inhibitory effect against selected bacteria of negative control.

The ethanolic extract exhibited higher antibacterial property than aqueous extract. Moreover, the inhibition zone produced by the ethanol solvent against selected bacteria was larger than water solvent.

Table 1 The antibacterial activity testing of MPEs.

| Name of the Microorganisms | Concentration of MPE (mg/disc) | Zone of inhibition (mm) | |
|-----------------------------------|-----------------------------------|-------------------------|---------------|
| | | Aqueous MPE | Ethanolic MPE |
| <i>Staphylococcus aureus</i> | 2 | 0 | 0 |
| | 4 | 0 | 7 |
| | 10 | 0 | 11 |
| <i>Staphylococcus epidermidis</i> | 2 | 0 | 0 |
| | 4 | 0 | 6 |
| | 10 | 0 | 8 |
| <i>Cutibacterium acnes</i> | 2 | 0 | 0 |
| | 4 | 0 | 8 |
| | 10 | 0 | 10 |
| Tetracycline (+) | | | |
| <i>S. aureus</i> | - | 28 | |
| <i>S. epidermidis</i> | - | 18 | |
| Clindamycin (+) | - | 28 | |
| Ethanol (-) | - | 0 | |

Therefore, the microorganism responses were different depending on type of solvent in extraction process. The antibacterial activity of these extracts might be due to the presence of secondary metabolites. It has been reported that phenolic compounds, flavonoids, and other secondary metabolites from the extracts of many medicinal plants reveal antimicrobial activity.

Determination of total phenolic content of MPE

In this experiment, total phenolic content of MPE was determined using Folin-Ciocalteu's reagent and it was expressed as μg of gallic acid equivalents (GAE)/mg of the dry weight of the plant sample. A gallic acid calibration curve was prepared at the concentrations of 0.2, 0.4, 0.6, 0.8 and 1.0 mg/mL (Figure 1), and the total phenolic content of ethanolic MPE was calculated to be $33.04 \pm 0.20 \mu\text{g GAE/mg}$.

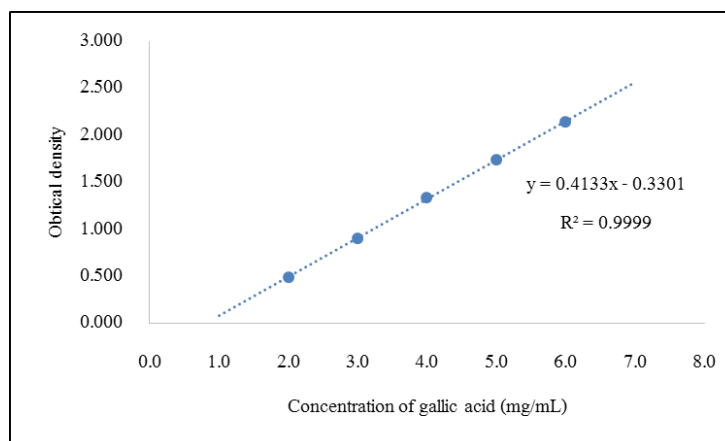


Figure 1 Calibration curve of the gallic acid standard

Polyphenolic compounds such as phenolic acids, tannins, glycosides, and flavonoids are secondary metabolites which are very important constituents of plants. Many chemical profilings and characterizations of *M. pudica* L. were reported (Ijaz, Shoaib Khan, Anwar, Talbot, & Walsh, 2019; Tunna et al., 2015; Zhang, Yuan, Zhou, Zhou, & Yang, 2011). Analysis of secondary metabolites from plants has been attracted the attention of researchers due to their potential preventive along with therapeutic effects on human health.

Determination of antioxidant activity of MPE

In general, the 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical-scavenging activity is measured by reducing the stable, violet DPPH radical to the yellow DPPH-H. The degree of color change depends on the free radical-scavenging activity of the tested samples through their hydrogen-donating ability. The sample with a strong antioxidant activity provides high percentage of radical-scavenging activity or low IC_{50} .

The result of DPPH inhibition by the extracts was shown in Figure 2. The ethanolic MPE exhibited significant free radical scavenging activity with IC_{50} value of 29.47 μ g/mL, while the standard antioxidant, ascorbic acid, had an IC_{50} value of 5.279 μ g/mL.

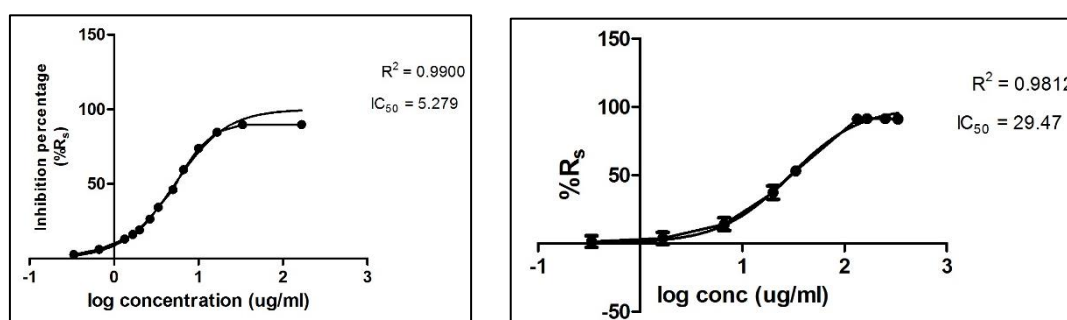


Figure 2 Percent scavenging of L-ascorbic acid (left) and MPE (right)

In this study, crude ethanolic extract was used for the evaluation of biological activities because ethanol can extract most of the polar and moderately polar constituents. The results showed that the ethanolic *M. pudica* L. extract had antibacterial activity against *C. acnes*, *S. aureus* and *S. epidermidis*. Further investigation such as toxicity of the crude extract should be investigated. Moreover, the development of anti-acne product might be considered for the application of this plant.

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**EFFICACY AND SAFETY OF STROMAL VASCULAR FRACTION (SVF)
GEL FOR REJUVENATION OF TEAR THROUGH DEFORMITY:
A CLINICAL PROSPECTIVE STUDY**

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ABSTRACT

Background: The aging process of infraorbital skin area and tear through deformity are caused from both intrinsic and extrinsic factors resulting in wrinkles, dryness, laxity, thinning, irregular pigmentation, and loss of elasticity. Infraorbital tear through correction procedures have become increasingly popular over the several decades. Many treatments have been claimed to prevention and treatment of the symptoms such as topical cream, LASER, filler and botulinum toxin. However, each treatment has their own specific benefits as well as different side effects. Recently, Stromal Vascular Fraction (SVF) gel of fat tissue has been introduced for rejuvenation treatment. Due to the minimal processed cell preparation, the SVF gel is a suitable for infraorbital skin rejuvenation therapy. This study was aimed to evaluate the efficacy and safety of autologous SVF gel transplantation to correct the tear through deformity in the infraorbital region.

Methods: Twelve candidates consisting of male and female of aged ranging between 25-60 years were selected for SVF gel isolation and transplantation. The candidates shared common signs of class 1-3 aging in the infraorbital area. Ten ml of fat tissues from abdomen of each case were collected by using the lipoaspiration procedure. Then, the SVF gel was harvested and was transplanted to each tear through area. The outcome was determined as Surface Evaluation of Wrinkles (SEW) and the skin elasticity was evaluated by Cutometer. Tear through improvements were graded according to three independent dermatologists based on photographic comparison and subjects' satisfaction by using Global Aesthetic Improvement Scale (GAIS).

Results: After 3 and 6 months of autologous SVF gel administration, the elasticity and the wrinkles of the tear through were significantly improved. In addition, the obvious phenotypic changes in the infraorbital skin area were observed as evaluated by physician and patients.

Conclusion: The SVF gel isolated from adipose tissues was achieved and significantly improved tear through. After the autologous SVF gel administration, the preliminary data revealed that the clinical outcomes were generally satisfied without any serious side effects such as edema, ecchymosis and granuloma. This suggested that Stromal Vascular Fraction gel is safe for clinical rejuvenation use. Nevertheless, the safety profile of SVF gel therapy relying on evidence – based controlled studies should be further investigated.

Keywords: Tear through /Stromal Vascular Fraction gel / Skin Rejuvenation

1. Background

Human fat tissue is composed of mature adipocytes and a stromal vascular fraction (SVF) including fibroblasts, endothelial cells, pre-adipocytes, vascular smooth muscle cells, adipose derived stem cells, lymphocytes and macrophages. Regarding Illouz's liposuction technique in the 1980s, large volumes of fat tissue were routinely discarded. At present, these tissues are accessible and useful for plastic surgery, cell therapy and regenerative medicine purposes especially for skin rejuvenation.

There are two distinct processes that will lead to skin aging, photo aging (Extrinsic) and chronological aging (Intrinsic). The characteristics of the skin aging included wrinkles, dryness, laxity, thinning, irregular pigmentation, and loss of elasticity due to both environmental and genetic factors.

There are many ways for prevention or treatment the symptoms of the aging skin at the tear through area such as topical creams, cosmeceutical products ,LASER , filler and botulinum toxin. However, each of treatments provides specific benefits as well as different side effects.

Recently, deriving SVF gel from the fat tissue is a minimal manipulation processed by a standard Coleman fat aspiration technique and the mechanical processing is achieved by passage back and forward between micro filter and two 10 ml syringes. The process of SVF gel extraction can be accomplished within in approximately 20 minutes (vary between 15 to 30 minutes).This makes this procedure suitable as a safe and fast cell therapy.

2. Objectives

To evaluate the efficacy and safety of SVF gel injection to the tear through area.

3. Literature Review

3.1 Literature Review

Stromal vascular fraction (SVF) was introduced with definition in 2001. It has been broadly examined and utilized as a considerable source of cells with developmental ability. In addition, SVF also has comparable characteristics to those of mesenchymal stem/stromal cells (MSCs) (Nguyen et al., 2016).

SVF is disconnected as portion of the fluid division derived from enzymatic assimilation of lipoaspirate (the liposuction contents). This watery division is combination of ADSCs, endothelial progenitor cells (EPCs), endothelial cells (ECs), macrophages, smooth muscle cells, lymphocytes, pericytes, and pre-adipocytes, known as the stromal vascular division (SVF). In 2007-2008, the clinical applications of SVF were detailed around 2007 to 2008 for cosmetic breast augmentation additionally within the treatment of radiation harm post-radiotherapy in breast cancer patients (Yoshimura, Suga & Eto, 2009; Rigotti et al., 2007).

In 2008, Yoshimura and colleagues used cell-assisted lipotransfer (CAL) which was upgraded fat joins with SVF for breast augmentation. The preliminary results suggest that CAL is effective and safe for soft tissue augmentation and superior to conventional lipoinjection. Since these clinical trial was reported, there has been a many essential investigates and also numerous clinical trials about SVF are ongoing.

Normally, SVF is collected from the fat tissue by using closed or semi closed systems and executed either enzymatically or non – enzymatically processes. This can be accepted to posture least hazard of bacterial and/or contagious defilement. The preparation of SVF extraction can be achieved within approximately thirty minutes, making this a rapid and exceptionally secure method for cell treatment. (Kim & Pallua, 2016).

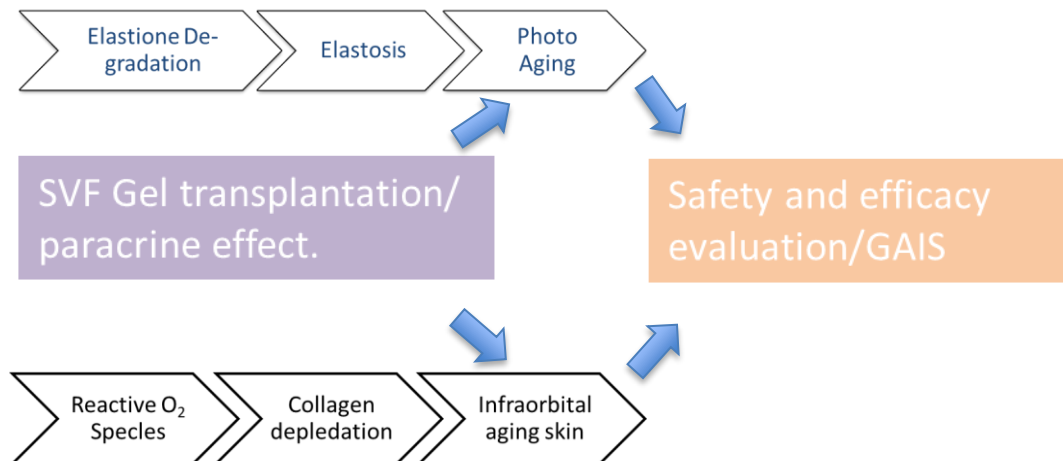
To actuate skin rejuvenation, numerous distinctive tests have been investigated to assess the safety and efficacy of SVF. In 2009, Shamban and coworkers studied the part of SVF in its derived secretory variables within the therapy of photo -damaged skin. The data revealed that the aging skin had matured outwardly. In 2013, Chang et al. performed a quantitative volumetric examination of dynamic hemifacial atrophy by using SVF. The data pointed out that the SVF transplantation was secure and productive for treatment of this atrophic skin and SVF could increase the survival rate of fat tissue within the facial area.

In 2015, You et al. and co-workers complied the process of paracrine impact of SVF that down-regulated melanogenic enzymes. Thus, melanocyte expansion and melanin synthesis are repressed, and subsequently diminished the pigmentation of skin.

In 2014, Klar et al. and colleagues demonstrated that SVF inferred endothelial cell population had a profoundly productive capillary plexus to create vascular systems.

Furthermore, Atalay et al. and co-workers showed that SVF can make strides heal the burn wounds by (a) quickening cell multiplication and expanding vascularization, (b) reducing irritation, and (c) raising fibroblasts movement.

3.2 Conceptual Framework



3.3 Hypothesis

Aging skin in the tear through region will show signs of improvement (wrinkle, elasticity, before -after photo/ GAIS) after the transplantation of autologous SVF gel.

4. Methodology

4.1 Materials and Methods

Twelve candidates of the aged between 25 to 60 years were selected for SVF gel isolation and transplantation. All the candidates shared a common problem of aging in the periorbital area class 1-3. All of the cases underwent the lipoaspiration procedure from the abdomen for sampling of 10 ml fat tissue.

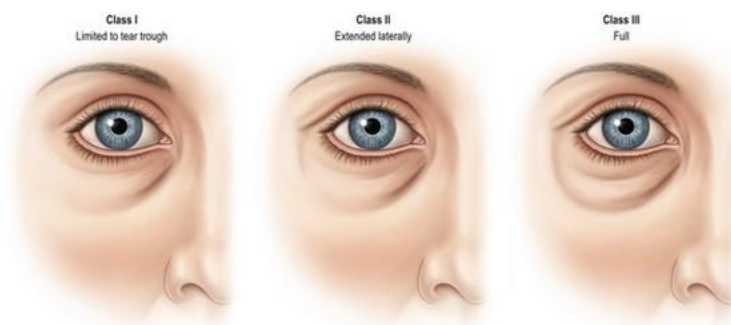


Figure 1. Signs of aging in the periorbital area class 1-3

4.2 Research Equipment

Liposuction set, Centrifuge, Visioface (D1000 ck, Germany), Cutometer, Study result record document (GAIS and side effect), Patient satisfactions Questionnaires.

| Score | State |
|-------|--------------------|
| 3 | Very much improved |
| 2 | Much improved |
| 1 | Improved |
| 0 | No change |
| -1 | Worse |

Figure 2. Global Aesthetic Improvement Scale (GAIS form)

4.3 Isolation and Characterization of SVF Gel

The fat aspiration was performed through abdominal lipoaspiration using a 4 mm cannula under topical anesthesia. The aspiration site was infiltrated with saline solution containing epinephrine (0.001%). 10 ml of the fat tissue was suctioned and processed by using a standard Coleman technique following 1 minute of mechanical processing by passage back and forward between two 10-ml syringes with a filter. This cell suspension has been assured for viability using steady shaking of trypan blue and automated cell counter.



Figure 3. Manual fat harvesting technique for SVF gel preparation.



Figure 4. SVF gel preparation technique.



Figure 5. Automated cell counter.

4.4 Transplantation of SVF Gel

The 1 ml of SVF gel (at the average dose of 1.2×10^6 total nucleated cells) was injected into the subcutaneous layer of each side of the tear trough area. According to injection at the tear trough area, a 1 ml syringe with an 18-gauge blunt needle was used due to its safety and the diffuse distribution of the SVF gel.

4.5 Clinical Evaluation

When the transplantation procedure was accomplished, human subjects were examined evaluated on day 7, 90 and 180.

Multi-probe adapter Cutometer (CK Electronic, Cologne, Germany) was used to determine the skin elasticity (R2) and firmness before and after SVF gel transplantation.

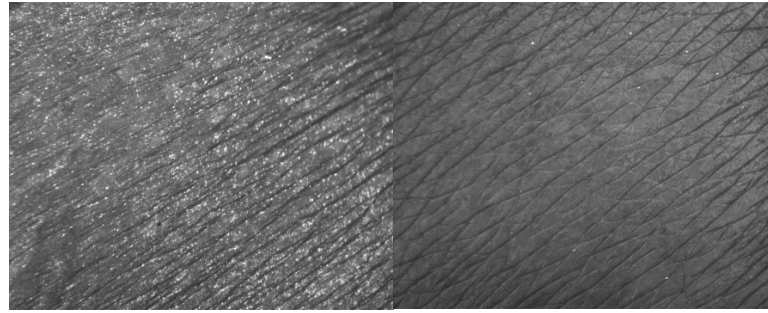


Figure 6. SELS (SEw) Wrinkle and fine line evaluation.

Assessment of the skin geology by the Vision Scan with examining programming SELS (Surface Evaluating of Living Skin) under the unique strategy called “Light and Electronic Process” and portrayed into Wrinkle evaluation (SEw).

Alternatively, the clinical results were evaluated by the subjects themselves via questionnaire and GAIS rating by three independent dermatologists.

4.6 Side Effect Evaluation

The side effect evaluation is included allergy, bruises, infection, lumping and blurred vision. Each of these effects was evaluated using the interval scales mentioned above. All the patients were evaluated in form of five-point Likert scales that were adapted from Washington State Department of Social and Health Services (2015).

4.7 Statistical Analysis

This research was classified into two types. The first type was included descriptive statistical analysis tools including frequency, percentage, mean and standard deviation (SD) by using SPSS 22.0 software. The second type was calculated by using unpaired two-tailed t-tests (two groups) or one-way ANOVA (homogeneity of variance, three groups).

5. Results

The patients’ data received autologous SVF gel transplantation was summarized in table 1 and table 2. Surface Evaluation of Wrinkles (SEw) , after the treatment of 3- 6 months, the wrinkles decreased with statistical significance ($p < 0.05$) (Table 1), and the skin elasticity (R2) with Cutometer, after the treatment of 6 months revealed the elasticity increased with statistical significance ($p < 0.05$) (Table 2) . And Table 3 showed that the improvement by GAIS evaluation after 3- 6 months of treatment.

Table 1. Statistical analysis of Surface Evaluation of Wrinkles (SEw)

| | <i>Before treatment</i> | <i>After 3 months of</i> | <i>After 6 months of</i> |
|--------------|-------------------------|--------------------------|--------------------------|
| Mean | 169.5758333 | 160.5625 | 157.6475 |
| Variance | 2324.874899 | 2395.568602 | 3030.484511 |
| Observations | 12 | 12 | 12 |
| df | | 11 | 11 |
| t Stat | | 1.938200483 | 2.02235497 |
| P <0.05 | | *0.039340992 | *0.034070056 |

As found in table 1, the mean of Surface Evaluation of Wrinkles (SEw) in the tear through area of the patients before treatment, 3 months after treatment and 6 months after treatment were 169.57, 160.56 and 157.64 respectively. After the treatment of 3 and 6 months, the wrinkles decreased with statistical significance ($p < 0.05$)

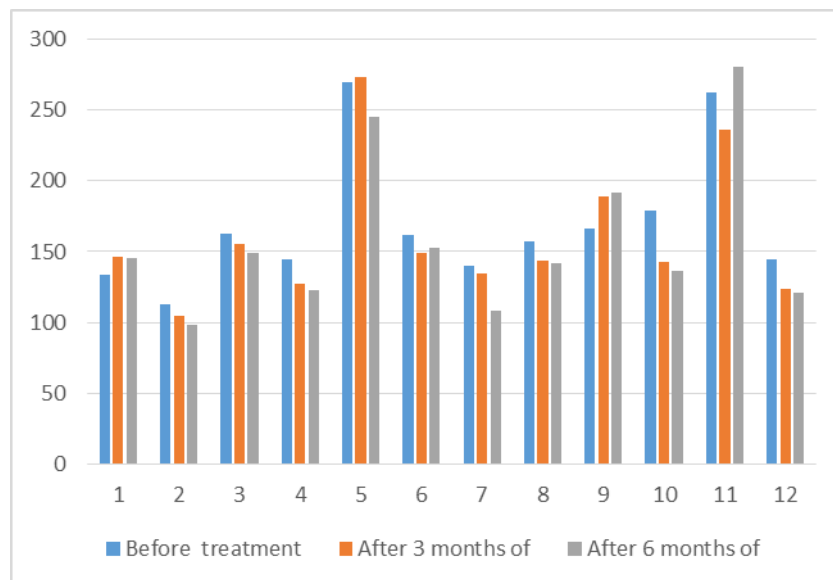
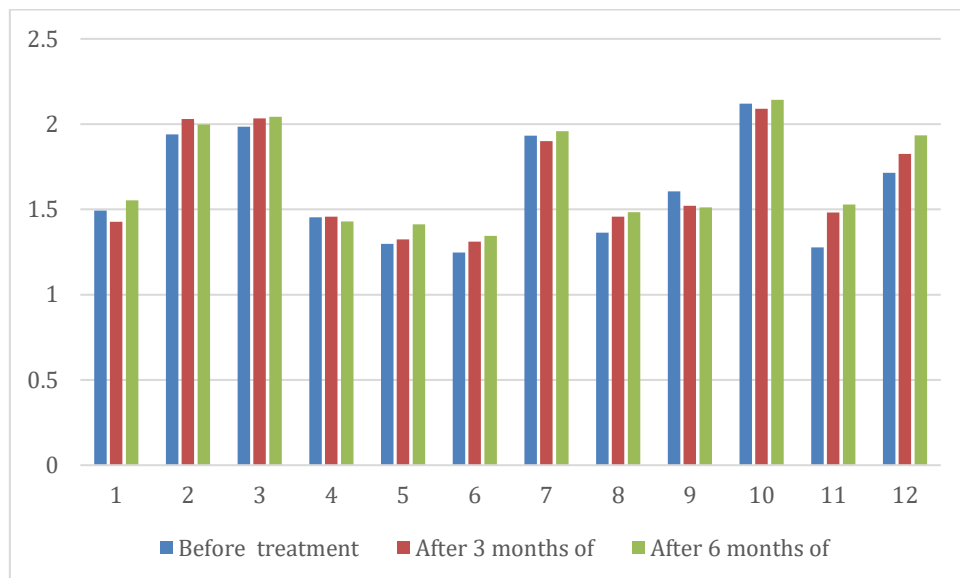


Figure 7. Graph showing the Surface Evaluation of Wrinkles (SEw) of the tear through area before and after 3 and 6 months of treatment. Assessment of the Surface Evaluation of Wrinkles (SEw) of the tear through area found that on 3 months after treatment 75 % of patients were improved and 25% of patient were not improved and at the 6 months after treatment found that 75 % of patients were improved and 25 % of patients were not improved.

Table 2. Statistical analysis of Skin elasticity (R2) at the tear through area.

| | <i>Before treatment</i> | <i>After 3 months of</i> | <i>After 6 months of</i> |
|---------------------|-------------------------|--------------------------|--------------------------|
| Mean | 1.619116667 | 1.654891667 | 1.695058333 |
| Variance | 0.096614114 | 0.088086406 | 0.085527906 |
| Observations | 12 | 12 | 12 |
| Pearson Correlation | | 0.963696574 | 0.951769759 |
| df | | 11 | 11 |
| t Stat | | -1.492452795 | -2.756785668 |
| P <0.05 | | 0.081847567 | *0.009331417 |

As found in table 2, the mean of the skin elasticity in the tear through area of the patients before treatment, 3 months after treatment and 6 months after treatment were 1.610, 1.65 and 1.69 respectively. The skin elasticity increased with statistical significance ($p < 0.05$) after 6 months of treatment.

**Fig 8.** Graph showing the skin elasticity (R2) of the tear through area, before and after 3- 6 months of treatment.

Assessment of the skin elasticity (R2) of the tear through area found that on 3 months after treatment 66 % of patients were improve and 34% of patients were not improved and at the 6 months after treatment found that 83 % of patients were improved and 17% of patients were not improved.

Table 3. GAIS evaluation of 3 dermatologists after 3- 6 months of the treatment.

| | After 3 months | | | Summary | After 6 months | | | Summary |
|--------|----------------|------|------|---------|----------------|------|------|---------|
| | Dr.1 | Dr.2 | Dr.3 | | Dr.1 | Dr.2 | Dr.3 | |
| Mean | 2.72 | 2.68 | 2.36 | 2.47 | 2.38 | 2.25 | 2.61 | 2.45 |
| SD | 0.81 | 0.57 | 0.71 | 0.68 | 0.63 | 0.59 | 0.47 | 0.44 |
| Median | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 2 |
| Mode | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 2 |

Shown the improvement of GAIS evaluation by three dermatologists (GAIS > 2) after 3- 6 months of the treatment.

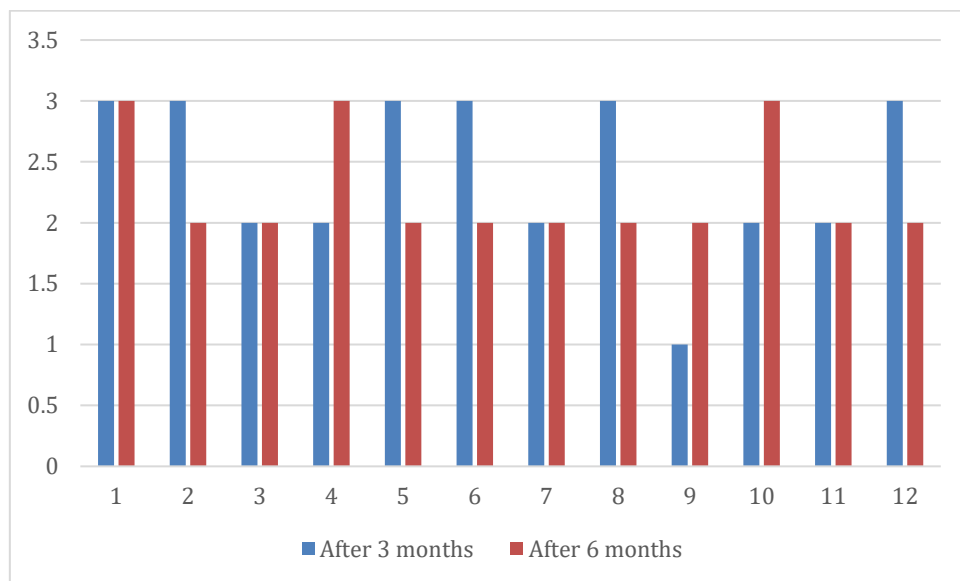


Figure 9. Graph showing the Subjects' satisfaction by Global Aesthetic Improvement Scale / GAIS. Assessment of patient-rated satisfaction on Global Aesthetic Improvement Scale found that on 3 months after treatment 50% of patients were much improved and 40% of patient were improved and at the 6 months after treatment found that 25 % of patients were much improved and 75% of patients were improved.

Discussion

Our findings in this clinical trial indicated that transplantation of autologous SVF gel into the tear through region showed a decrease in the average value for wrinkle after 6 months of treatment with statistical significance. ($P < 0.05$) (Table1) .These data was corresponded to the study of Yao et al. (2018) . From their studies , SVF gel showed effective anti- wrinkle and skin rejuvenation effects. Moreover, from their conclusion the SVF gel is effective for both volumization and rejuvenation which is superior for conventional fat injection for facial contouring.

To induce skin rejuvenation by SVF, a wide variety of studies have been conducted to evaluate the safety and efficacy of SVF. In 2009, Shamban surveyed the role of SVF in its derived secretory factors in the

treatment of photo-damaged skin. The results showed the efficacy of these factors in improving the extrinsic aging skin. In 2016, Rigotti et al. showed that SVF had a significant effect on skin rejuvenation 3 months after treatment. Our study by SVF gel transplantation into tear through area after 3 to 6 months follow-up confirmed these ideas as well.

According to the skin elasticity (R2) in the patients receiving the implantation of SVF gel on the tear through, the data showed a statistically significantly increased of the skin elasticity on 6 months after treatment. ($P < 0.05$) (Table 2). The result was correlated with the study of Mohammad Amirkhani and colleagues (2016) about the rejuvenation of facial skin and improvement in the dermal architecture by transplantation of autologous stromal vascular fraction. Their study showed that after the SVF administration it was found that the skin density was increased significantly in all cases ($P < 0.001$).

In addition, the clinical results were observed by the subjects themselves via questionnaires and GAIS rating by three independent dermatologists. The preliminary data from both physicians and patients in our study showed that clinical outcomes were generally satisfactory without leaving any serious effect. Therefore, this SVF technology was considered beneficially for the tear through treatment and facial rejuvenation.

Conclusion

In conclusion, the SVF gel of adipose tissue represents an attractive cell therapy. This study revealed that the tear through was significantly improved after the autologous SVF gel administration. The data also showed that clinical outcomes were generally satisfied without leaving any serious side effects such as erythema, edema, ecchymosis and lumping. According to these results, it can be said that Stromal vascular fraction gel is safe for clinical rejuvenation use. In a word, this study supported the data of the safety profile of SVF gel therapy in the future.

Ethical approval

Written informed consents were obtained from all the patients. According to the protocol approved by Mae Fah Luang University of Medical Sciences Ethic Committees. The candidates were also made aware about the study purpose, procedure, potential risks, and benefits. They were informed at the beginning of the procedure that they may leave any time during the study.

Acknowledgments

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WASTEWATER RECOVERY OF AIR CONDITIONING FOR INDOOR CANNABIS PRODUCTION

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ABSTRACT

This research studies an optimal process of wastewater recovery from air conditioning for indoor cannabis production. The thermal selection working fluid, computational fluid dynamics (CFD), and microcontroller techniques are used to design a wastewater recovery system. Indoor cannabis room at a sizing of 2.4 m × 3.4 m × 2.5 m is used to contain five lighting sets at each sizing of 1.0 m × 1.0 m × 1.8 m, which consists of one-violet light emitting diodes (LED) at a power of 300 W_e and two-daylight LEDs at each power of 100 W_e. A commercial of R-32 air conditioning at a cooling capacity of 12,300 BTU/h (3.6 kW) is selected from the optimal thermal behavior. The CFD simulation also supports the thermal result in terms of airflow pattern, pressure drop, and temperature at an air flow rate of 0.182 m³/s, an average pressure of 101.322 kPa, and an average room temperature of 25.41 °C, respectively. Wastewater recovery at a volume of 18 L/day is supplied to 20 cannabis plants by using Arduino board, solenoid valve, and drip emitter. These controlled systems can produce a harvest time of approximately 4 months, which is lower than a greenhouse system of approximately 6 months.

Keywords: Wastewater recovery; Air conditioning; Cannabis production; Computational fluid dynamics

1. Introduction

Smart farming topic is a popular technology and a hot issue in Thailand, especially for the high-value medicinal plant. Internet of things (IOT) is used to control and monitoring the optimal conditions for plant propagation and cultivation such as air temperature, relative humidity, lighting, and fertilizer. Cannabis is promoted for using in the medical process. Indoor greenhouse is general technique for cannabis cultivation. The advantage of this method is low-investment cost, low-operating cost from solar energy, and low-maintenance cost. However, the disadvantage in terms of the uncontrollable of air temperature and relative humidity, light

intensity, wind speed, and harvest time. Thus, a new concept of wastewater recovery from indoor cannabis cultivation is presented in this study.

Various research works of design, simulation, and construction of indoor cultivation technologies were presented such as Vanhove et al. [1] reported a computational fluid dynamics (CFD) method to evaluate the suitable condition for indoor planting, which was corresponded with Zhang et al. [2], Niam et al. [3], and Lim and Kim [4]. The CFD is used to analyze the air contribution and uniform, sizing and position of air conditioning, and reducing harvest time. In addition, Yongson et al. [5] used the CFD technique to design the optimal condition of operating cost for plant cultivation. In the topic of air conditioning simulation, Chaiyat and Kiatsiriroat [6] compared thermal performance of R-32 and R-410a air conditioning units by testing process under the controlled conditions. R-32 refrigerant revealed a higher thermal behavior of approximately 5%. Taira et al. [7] presented heat pump performance by using the mixed refrigerants of R-32:R-125:R-1234yf (67%:7%:26% by weight) and R-32:R-1234ze(E) (70%:30% by weight) to compare with the pure refrigerants of R-410a and R-32. Both mixed fluids could replace instead of R-410a and R-32 at a lower energy efficiency ratio (EER) compared with R-32 working fluid. Dalkilic and Wongwises [8] simulated mixed refrigerants of R-152a, R-32, R-290, R-1290, R-1270, R-600, and R-600a to replace instead of the banned refrigerant of R-12 and R-22. It found that R-290:R-600a at a mass ratio of 40%:60% could be used in the R-12 vapor compression air conditioning, and R-290:R-1270 at a mass ratio of 20%:80% could be replaced in the R-22 unit.

From the above study works, it could be found that the CFD and thermal simulation techniques were popularly used in the optimization process of air conditioning. These methods were not represented for indoor cannabis production. Thus, the objective of this study is to investigate the optimal conditions for cannabis cultivation by using the CFD and thermal simulation methods. In addition, a new conceptual design of the control and monitoring systems are also developed for automatic plant watering system from wastewater of air conditioning.

2. Conceptual framework

Figure 1 shows a schematic diagram of wastewater recovery system from air conditioning. Cooling load (Q_E) from cannabis production in the insulator room releases heat into an evaporator of air conditioning (fan coil unit). After that heat from the returned air transfers to refrigerant, which changes phase from the mixture (liquid and vapor) to be the pure vapor. This fluid is increased pressure and temperature by a compressor ($W_{Comp,e}$), which is driven from electricity. Then, the high-temperature fluid rejects heat to the ambient temperature at a condenser (condensing unit, Q_C). The vapor refrigerant is condensed to be the pure liquid refrigerant, and sent through an expansion valve to be the mixture fluid. After that the new cycle of air conditioning is restarted. At the evaporator, in the transfer heat between the moist air and refrigerant, the condensed water is found as wastewater from air conditioning. A wastewater tank is used to storage the condensed water, and supplied through a plant watering system for cannabis production. An air ventilation system in the cannabis room is controlled by blower of the evaporator, and rejects a part of moist air by a releasing air blower. In this study, this waste fluid is considered by

using the thermal simulation and CFD techniques to select the suitable refrigerant for indoor cannabis process.

The cooling efficiency of air conditioning unit in terms of EER_{AC} can be defined as shown follows:

$$EER_{AC} = \frac{Q_E}{W_{Comp,e}}, \quad (1)$$

$$Q_E = \dot{m}_{da,E} (h_{a,E,i} - h_{a,E,o}) - \dot{m}_w h_{fg,w}, \quad (2)$$

$$\dot{m}_w = \dot{m}_{da,E} (\omega_{a,E,i} - \omega_{a,E,o}). \quad (3)$$

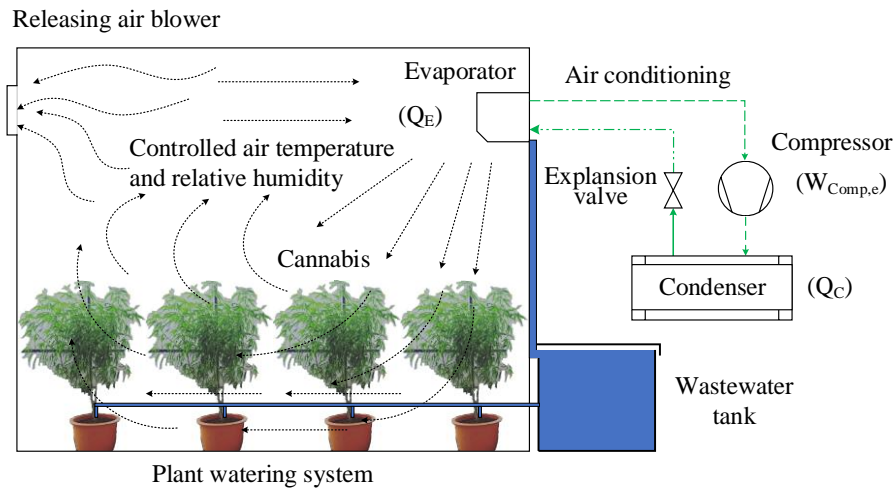


Figure 1 A schematic diagram of wastewater recovery system from air conditioning.

3. Methods and apparatus

The methods and apparatus of this study are as follows:

3.1 The indoor cannabis room and lighting set are designed by using a Solidworks program [9] in form of three dimensions (3D) model.

3.2 The air ventilation in the cannabis room is simulated by using the CFD technique from the Solidworks program (flow simulation). The airflow pattern, pressure drop, and temperature parameters in the controlled room are considered to select the suitable size of air conditioning. A Daikin R-32 commercial types are used to refer the specification data, as shown in Table 1. The CFD process is assumed under the initial conditions of a room temperature of approximately 25 °C and a relative humidity of 55%.

Table 1 Specifications of commercial air conditioning [10].

| Cooling capacity (BTU/h) | Volume flow rate (m ³ /s) |
|--------------------------|--------------------------------------|
| 9,200 | 0.165 |
| 12,300 | 0.187 |
| 15,000 | 0.197 |
| 18,100 | 0.215 |

3.3 The thermal and CFD simulation results are used to design the microcontroller system of plant watering system.

3.4 The new design concept of indoor cannabis room, air conditioning, lighting set, and of plant watering system from the previous part are constructed and tested to evaluate the system performance.

4. Results and discussion

4.1 Conceptual design of indoor cannabis room

A 3D drawing of indoor cannabis room is illustrated in Figure 2. Cannabis room at a sizing of approximately $2.4\text{ m} \times 3.4\text{ m} \times 2.5\text{ m}$ is designed by using insulator from Isowall at a thickness of 2 inch. The optimal sizing chamber of cannabis room is designed for 1-unit small split type air conditioning unit at a sizing lower than 24,000 BTU/h. In addition, lighting set at a sizing of approximately $1.0\text{ m} \times 1.0\text{ m} \times 1.8\text{ m}$ is developed for using with four cannabis pots at each volume of approximately 12 L, which consists of one-violet light emitting diodes (LED) at a power of 300 W_e and two-daylight LEDs at each power of 100 W_e. The LED set is specially designed for generating a wavelength of approximately 600 nm, a spectral irradiance of approximately $200\text{ mW/m}^2\text{nm}$, and a photosynthetic photon flux density (PPFD) of approximately $100\text{ }\mu\text{mol/m}^2\text{s}$. Air conditioning is installed with the wall at a high of 2.0 m, which the suitable sizing of cooling unit will be optimized in the next part. The moist air is managed by a 6 inch-releasing air blower at a power of 16 W_e, that installed at the opposite of cooling unit.

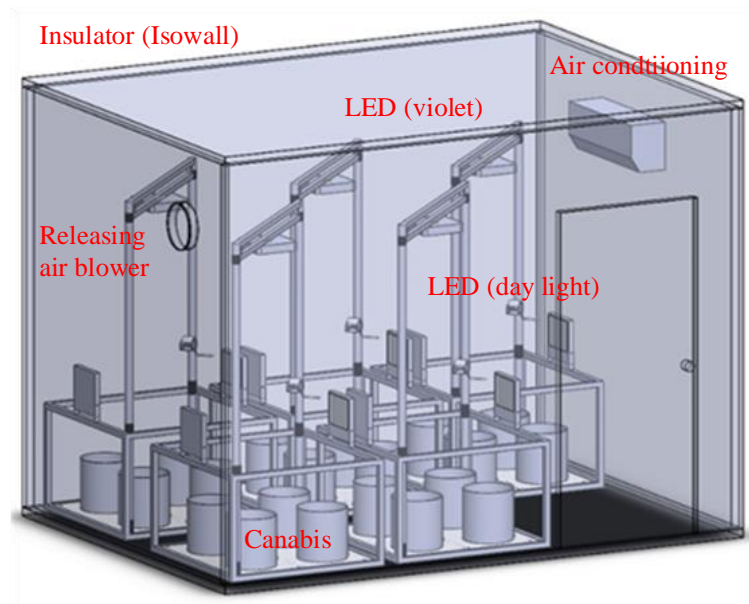


Figure 2 A 3D drawing of indoor cannabis room.

4.2 CFD

Four Daikin commercial air conditioning models are used to investigate the suitable sizing cooling unit, as shown in Figures 3-6. An air conditioning of 9,200 BTU/h reveals a low-air ventilation and nonuniformly. In

the cases of air conditionings at the cooling capacity of 15,000 BTU/h and 18,100 BTU/h, the results imply that a high-air ventilation (nonuniformly) is found from the over size of both air conditioning units. Thus, the optimal size of air conditioning in this study is a 12,300 BTU/h model, as presented in Figure 4. The air flow rate of approximately 0.212 m³/s or 0.19 m/s is suitable for the indoor cannabis room of 2.4 m × 3.4 m × 2.5 m.

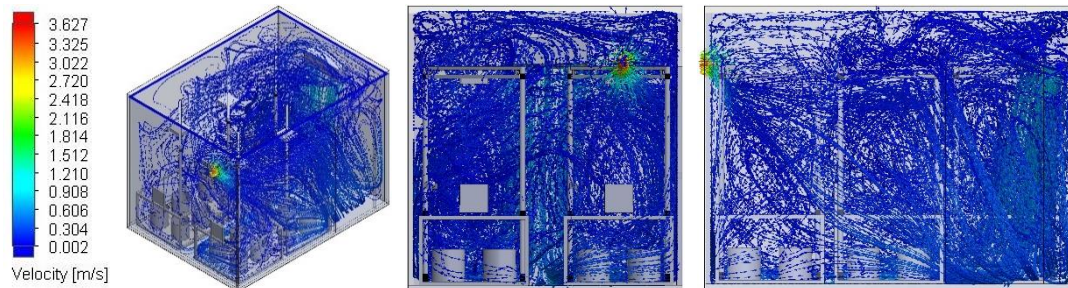


Figure 3 An air ventilation of 9,200 BTU/h-air conditioning.

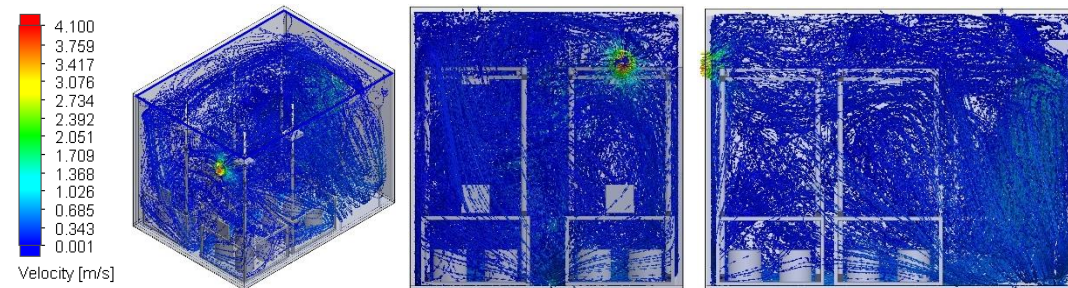


Figure 4 An air ventilation of 12,300 BTU/h-air conditioning.

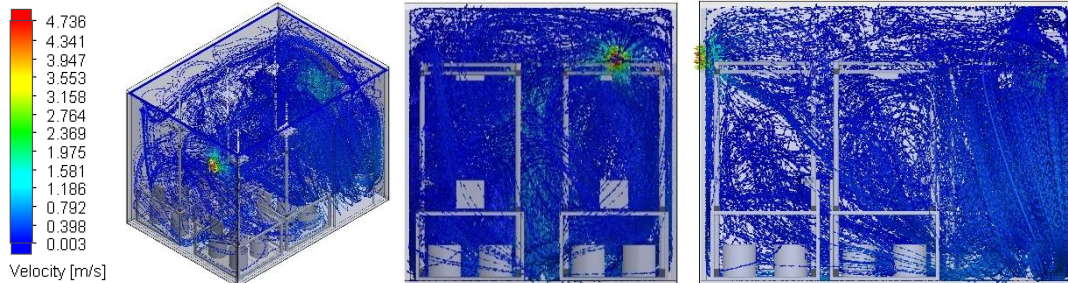


Figure 5 An air ventilation of 15,000 BTU/h-air conditioning.

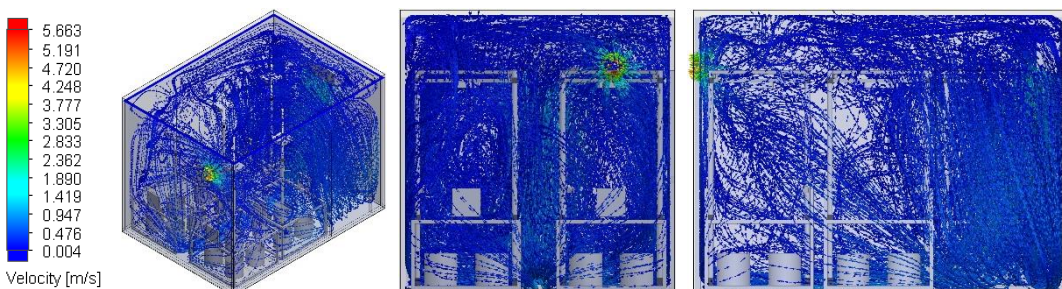


Figure 6 An air ventilation of 18,100 BTU/h-air conditioning.

The 12,300 BTU/h model also shows an average room pressure of 101.322 kPa, as shown in Figure 7, which is nearly with the environmental pressure of 101.325 kPa. In the temperature profile in cannabis room is

found that a LED temperature is approximately 49.25 °C, while an average air temperature is approximately 25.41 °C, as shown in Figure 8.

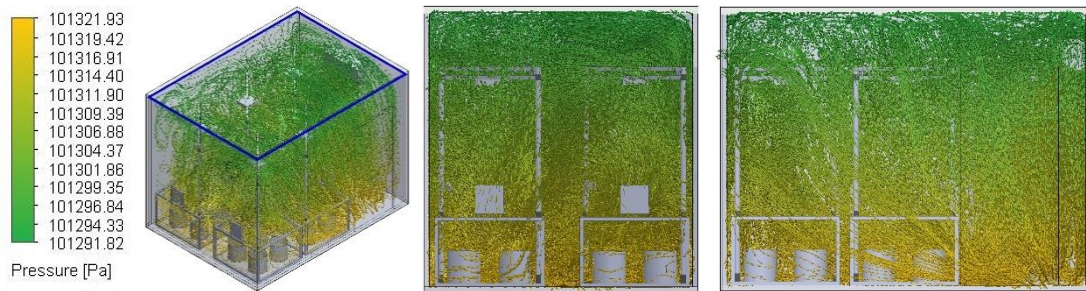


Figure 7 An average room pressure of 12,300 BTU/h-air conditioning.

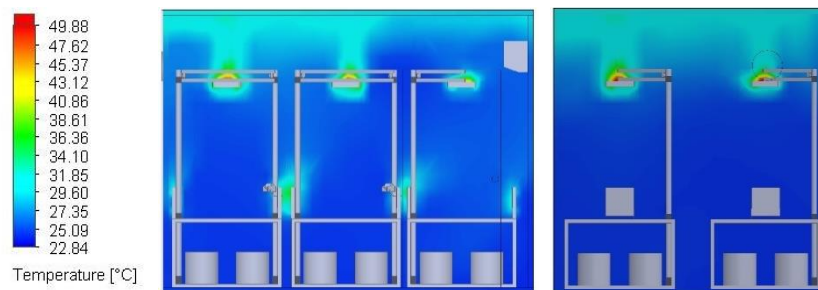


Figure 8 A temperature profile of 12,300 BTU/h-air conditioning.

4.3 Wastewater recovery of air conditioning

From the thermal simulation, wastewater from the 12,300 BTU/h air conditioning is approximately 18.302 L/day or 0.76 L/h. This volume of water can be used to supply for the 12 L-cannabis pot of 20 plants (5 lighting sets). Thus, the conceptual design of control part for plant watering system is set as three modes of 24 h, 48 h, and 72 h, respectively. These setting times are programmed for various kinds of cannabis, as presented in Figure 9. The control elements of Arduino board, solenoid valve, selector switch, LCD monitor, and drip emitter are selected to develop plant watering system.

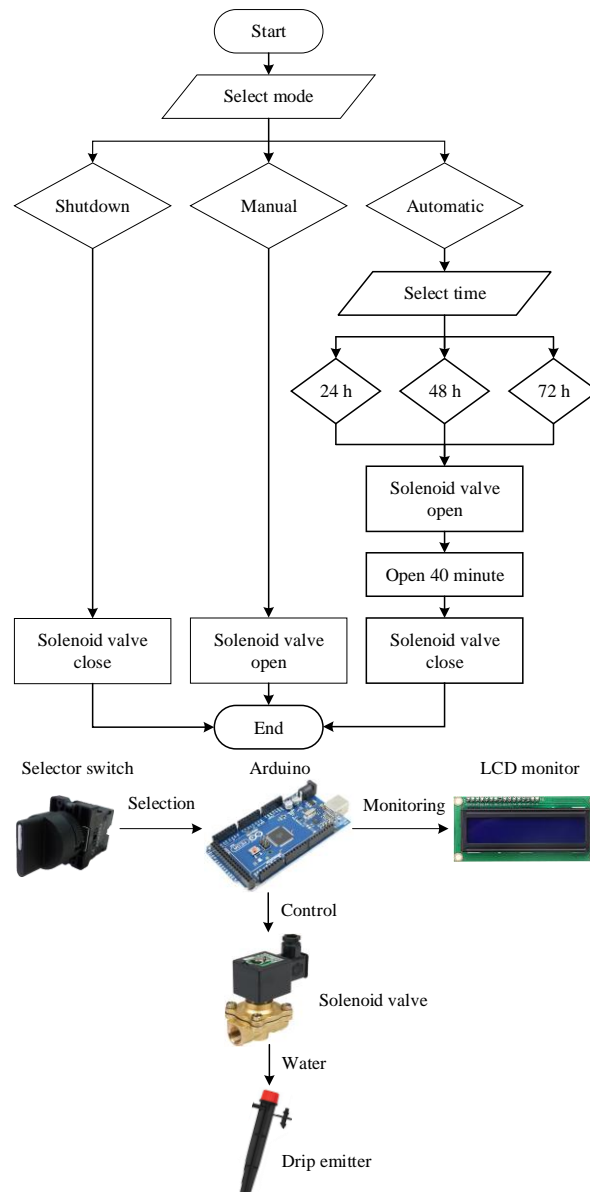


Figure 9 The conceptual design and control devices of plant watering system.

4.4 Prototype of wastewater recovery of air conditioning

A prototype of wastewater recovery from air conditioning is illustrated in Figure 10. All conceptual designs of indoor cannabis room, air conditioning, lighting set, and plant watering system are considerably performed. The cannabis production from the controlled cultivation can produce output production at a harvest time of 4 months, which is lower than the cannabis greenhouse at approximately 2 months (6 months for general process of greenhouse system).

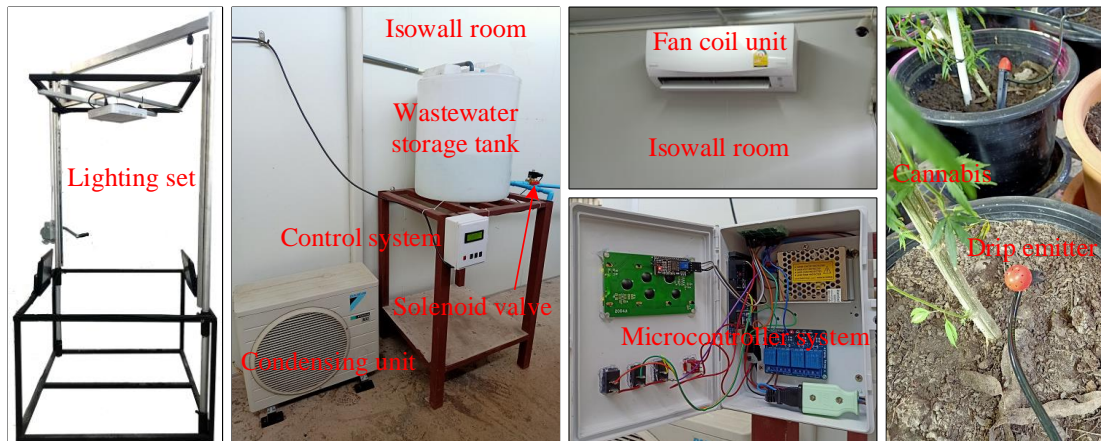


Figure 10 A prototype set of wastewater recovery of air conditioning.

5. Conclusions and recommendations

From the above study results, it can be concluded as follows:

- The cannabis room of 2.4 m x 3.4 m x 2.5 m is design, which uses for the lighting set of 1.0 m x 1.0 m x 1.8 m, cannabis pot of 12 L, violet LED of 300 W_e, and 2-daylight LEDs at each of 100 W_e.
- The optimal size of air conditioning is 12,300 BTU/h (3.6 kW) model for supplying the air flow rate of 0.212 m³/s, average pressure of 101.322 kPa, average air temperature of 25.41 °C.
- The 12,300 BTU/h air conditioning generates the wastewater of 18.302 l/day, which is suitable for supply for the 12 L-cannabis pot of 22 plants. The prototype of plant watering system is developed from Arduino board, solenoid valve, selector switch, LCD monitor, and drip emitter.
- The controlled system can produce the harvest time of approximately 4 months, which is lower than the greenhouse system of approximately 6 months.

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Abbreviations and symbols

Nomenclature

| | |
|-----------|---|
| EER | energy efficiency ratio, (kW _{th} /kW _e) |
| h | enthalpy, (kJ/kg) |
| M | mass, (kg) |
| \dot{m} | mass flow rate, (kg/s) |
| P | pressure, (bar) |
| Q | heat capacity, (kW) |
| T | temperature, (°C) |
| W | Power, (kW _e) |

Abbreviations

AC air conditioning

Greek

ω humidity ratio, (kg_w/kg_{da})

Subscript

a moist air

C condenser

Comp compressor

da dry air

e electricity

E evaporator

f liquid fluid

g vapor fluid

i inlet

o outlet

th thermal

W water

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