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## **Antecedents of Customers Purchase Intention of Residential Condominium: a Case Study of a Property Developer in Bangkok, Thailand**

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### **Abstract**

The study focuses on factors influencing customers' purchase intention of residential condominium in Bangkok. Because of the popularity of condominiums in Thailand, the expansion of investment in this sector has continuously increased year and the condominium market has become very competitive. Customers have different reasons to purchase condominium with different decision making to purchase. The main variable is the purchasing of the customers' intention in residential condominium in Bangkok, and antecedents which include property age, property size, metropolitan area, neighborhood, price, and developer reputation. Therefore, the objective of this study is to explore the effect of asset characteristics and developer reputation on purchase intention. This study extended Fishbein model and attribution theory to explain customer purchase intention of condominium and its antecedents. This study includes 282 respondents who plan to purchase or have already purchased condo in Bangkok. The linear regression result show that asset characteristics and developer reputation have positive effect on purchase intension.

**Keywords:** Purchase intention, Developer reputation, Asset characteristics, Condominium evaluation

### **Introduction**

Thailand's total foreign trade is ranked second in Southeast Asia and first in Singapore. Thailand itself is a newly industrialized country and the eighth largest economy in Asia (Ouyyanont, 2017). According to Radar (2017), the military government launched the latest economic plan in 2016 called "Thailand 4.0" to improve Thailand's economy. Thailand is strategically located in the heart of Asia, providing investors with a vibrant gateway to a rapidly growing economic market. Thailand's economic situation began to recover from 2001 to 2010. In 2019, Thailand's real estate industry is in a stage of recovery and development, and at the same time it will attract more customers to the market. In addition, Thailand's development strategy is firmly oriented towards the market and welcomes the flow of trade and investment from other places. Foreigners can legally own Thai condominiums with permanent property rights and enjoy the same rights as Thais (Global Property Guide, 2019).

In 2019, there were approximately 140,000 units of condominium in downtown Bangkok and approximately 630,000 apartments in the entire city (CB Richard Ellis, 2018). On the other hand, the prices of newly launched condominiums in the best locations in the city center will continue to rise. Due to the success of the condominiums market, the market has attracted the attention of many developers. There are more than 100's of the best developers in Thailand (Sohlbery, 2017). The current study focuses on one of the leaders of the real estate developers in Thailand.

Property investors tend to consider property age, property size, region, metropolitan area, neighborhood factors, and lease term (Worzala & Bajtelsmit, 1997) as part of their forecasting and evaluation. In terms of financially, investors are likely to payback period, return on investment, and income multiplier (Farragher & California, 2008). Therefore, the current study aims to explore the impact of asset characteristics which include property age, property size, metropolitan area, neighborhood and price as well as developer reputation on purchase intention. This study extended the Fishbein model and attribution theory to explain condominium purchase intention.

## **Literature review**

### **Resource-based view (RBV)**

Resource Based View (RBV) analyzes and interprets the organizations' resources to recognize how organizations gain sustainable competitive advantage. The RBV focuses on the firm's idea of hard to replicate qualities as sources of superior performance and competitive advantage (Barney, 1986; Hamel and Prahalad, 1996). RBV asserted that not all client capital will be strategic tools which lead to sources of competitive advantage. Competitive advantage only exists when there is a heterogeneity of resources from other firms and immobility of resources. If the resource is not ideally elastic (i.e., the resource is not free to move between companies, or if a resourceless business faces a considerable cost burden in creating, acquiring or using it that a company does not already use it), then the resource would possibly be a source of sustained competitive advantage. If a resource is imitated or substituted then any benefits gained may be short-lived. In this current era of fast changing globalized world, if an organization is able to change swiftly and be more alert to changes in the competitive market, then they are more likely to gain and sustain competitive advantage (Jazz, 2005).

In property business, the firm's resources are financial, physical such as property age, property size, metropolitan area, neighborhood, legal, human, organizational, informational, and relational. Property companies attempt to innovate their offer on condominium, develop firm's resource characteristic, and customize the offer to customers. Therefore, a company's corporate image could provide some competitive edge that could ensure a company's growth and potential survival in a highly competitive environment (Zainudin Hj Awang, 2009).

### **Attribution Theory**

The theory of attribution deals with how people use the information to pursue causal explanations for events. It looks at what information is collected and how it is incorporated into a causal decision (Fiske & Taylor, 1991). The information may include firm reputation and other property information. Attribution analysis looked at the causal inferences of customers for a number of outcomes-inferences about the consumer's own actions, the success or failure of a product, and the approval of a product by a communicator (cf. Zaltman and Wallendorf 1983). Nguyen and Leblanc's (2001) study found that consumers are more inclined to buy the products or services from companies they perceived as having a favorable reputation amongst their competitors.

### **Purchase intention Concept**

Fishbein and Ajzen (1975) asserted that person intention is a function of attitudinal (i.e., attitude toward performing the behavior) and normative (i.e., subjective norm). They further confirmed that attitude, belief, and intention are different concepts. Intention is comprised of four elements; behavior, targets, situation, and time. Behavior refers to the action that intent to perform. Target is the object toward which the conduct is directed.

The condition applies to the circumstance in which the behavior is to be carried out. Time refers to when action is to be terminated. Spear and Singh (2004) defined buying intentions as a deliberate decision for the consumer to make an effort to buy a brand.

#### **Asset characteristic and purchase intention**

Abdullah *et al.* (2012) examine a housing market. The first-time house buyers are important as they indirectly act as indicator to help regulating the housing policies and further promoting home ownership. Several factors may influence their decision-making. Among the factors are house price, location, family transition, neighborhood and others. Consistently, Żróbek (2015) attempted to identify the factors responsible for Polish property buyers' choice of residential. The questionnaire was completed by 269 residents of three Polish regions. The respondents assessed the quality of their home environment and identified environmental factors that might affect their health. Other factors that the respondents identified included the sense of security and a quiet neighborhood. Therefore, this study proposed

Hypothesis 1: Asset characteristics (i.e., property age, property size, metropolitan area, neighbourhood and price) influence condominium purchase intention.

#### **Developer reputation and purchase intention**

Sultana & Pardhasaradhi (2012) studied the factors impact on investor decision. The study identifies factors affecting investment decisions such as individual eccentric eccentricity, wealth maximization, risk minimization, brand perception, social responsibility, financial expectations, accounting information, government and media, economic expectations and advocacy factors. The study collected the data from 891 investors of various stock broking firms in India. The study confirmed the impact of firm reputation on investor decisions. In addition, Arron *et al.* (2012) examined investor reaction to signals of environmental management reputation. The study collected data from the top 100 companies and the bottom 100 companies in the 2009 Newsweek Green Rankings. The study found that the market responds positively to companies receiving favorable recognition for EM and negatively to firms receiving unfavorable recognition. Therefore, this study proposed Hypothesis 2: Developer reputation has positive effect condominium purchase intention.

## **Methodology**

### **Sample**

This study distributed self-administration questionnaires to 1,000 current and potential customers of a well-known property developer in Thailand. This study includes 282 valid respondents. 84% of respondents are female and 16% of respondents are male. 64.2% of respondents are in the age between 31 to 40 followed by between 20 to 30 year (20.9%). In terms of the Household size the majority (61.7%) is between 3 to 4 persons. Most customers earn personal income per month, between 30,001 and 50,000 baht (49.7%) and the between 50,001 to 70,000 baht (32.6%). Most of respondents are firm employees (67.7%).

### **Measurement**

Measurement items of asset characteristics adopted from Worzala & Bajtelsmit (1997). Five measurement ask the respondents to rate five items which are property age, property size, metropolitan area, neighborhood and price. For developer reputation, 19 measurement items are developed from Gardberg and Fombrun (2002). The dimensions of developer reputation are brand knowledge, vision & leadership, products

& services, emotional appeal, work environment and social responsibility. Measurement items of purchase intention are adapted from Bian and Forsythe (2012). The items are: 1.) If a condominium has all asset characteristics which I like, I intend to buy it; 2.) If a condominium comes with good Financing Arrangement, I intend to buy it; 3.) If a condominium comes from good Property Reputation, I intend to buy it; 4.) The probability I would consider buying a condo from company X.

According to table 1, the study found that asset characteristics, developer reputation, and purchase intention have sufficient convergent validity and reliability. In addition, the composite reliability and Cronbach's alpha of variables exceeded 0.7, showing internal consistency for reliability. The loadings of all measurement items for each construct were above 0.4. Two items of developer reputation were removed from the model from factor analysis. In addition, this study employed Cronbach's Alpha to test the internal consistency of measurement items of each variable. This study found that all variables have Cronbach's Alpha value above 0.8 which reflected that all variables have high internal consistency.

Table 1: Reliability and validity test

	<b>Cronbach's Alpha</b>	<b>Composite Reliability</b>	<b>Loading</b>	<b>Number of Items</b>
Asset Characteristics	0.889	0.889	>0.583	5
Developer Reputation	0.788	0.791	>0.4	17
Purchase Intention	0.895	0.896	>0.619	5

**Result**

As shown in table 2, the multiple linear regression confirmed hypothesis 1 and hypothesis 2. The multiple linear regression model is statistically significant at 95% confidence level as p-value of the model is less than 0.05. A linear regression indicated that asset characteristics and developer reputation could statistically significantly predict purchase intention,  $F(2,729) = 155.1839$ ,  $p = 0.000$ . Adjust R Adjusted R-Square of the model is 0.523, Hence, asset characteristics and developer reputation accounted for 52.3% of the explained variability in purchase intention. The effect size is medium level. Therefore, based on hypothesis 1, asset characteristics (i.e., property age, property size, metropolitan area, neighbourhood and price) have positive influence purchase intention of condominium. This study found that asset characteristics has positive impact on purchase intention ( $p = 0.000$ ). The coefficient of asset characteristic in the regression equation is 0.586. Therefore, the increase of the asset characteristics for 1 unit would lead purchase intention to increase by 0.586 while holding other variables in the model constant.

This study confirmed hypothesis 2 developer reputation have positive influence purchase intention of condominium for Sansiri company customer. This study found that asset characteristics has positive impact on purchase intention ( $p = 0.000$ ). The coefficient of developer reputation in the regression equation is 0.439. Therefore, the increase of the developer reputation for 1 unit would lead purchase intention to increase by 0.439 while holding other variables in the model constant.



Table 2: Coefficients of regression

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.077	.216		-.355	.723
	Asset Characteristics	.586	.046	.564	12.677	.000
	ReputationDit3_8	.439	.067	.290	6.526	.000

a. Dependent Variable: Intention

For correlation analysis, this study found that property age and the location (i.e. metropolitan rea) are strongly correlate to purchase intention compared to other asset characteristics as shown in table 3. For developer reputation, this study found that emotional appeal dimension has the highest correlation with purchase intention as shown in table 4.

Table 3: Correlation between asset characteristics and purchase intention

	Property age	Property size	Metropolitan area	Neighborhood factors	Price
	.239**	.206**	.239**	.187**	.212**
Purchase Intention	0	0	0	0	0

Table 4: Correlation between developer reputation and purchase intention

	Brand knowledge	Vision & leadership	Products & services	Emotional appeal	Work environment & Social Responsibility
	.318**	.226**	.400**	.471**	.362**
Purchase Intention	0	0	0	0	0.001

## Discussion

The purchase behavior is generated by uncertain factors such as property age, property size, metropolitan area, neighbourhood, price, and developer reputation. The study of consumers' intention to purchase condominium in Thailand has a significant impact on the development of Thai real estate. This study provides factors that influence customer purchase intention. This study focus on two factors that impact on condominium purchase intention which are asset characteristics and developer reputation.

According to the results of the current study, most customers purchase condominium mainly for investment. Generally, they will choose a residential condominium with a size of 25~40 sq.m and a budget per square meter between 80,000 baht and 100,000 baht. According to the analysis, this study found that in the asset characteristics, the factor most relevant to the desire to buy is the property age. At present, the Thai

condominium market adds a lot of new condo every year, and everyone wants to buy a first-hand house instead of a second-hand house. The findings current study is consistent with Wonggotwarin and Kim (2017) that product quality, product design, and brand picture are statistically important predictors of buying intention.

In terms of developer reputation, customer 'emotions are most relevant to purchase desires, such as "I really identify with this company" and "I have a good feeling about this company". They are related to purchase desires. Good products and services are like a company's living signboard. Only with good product quality and services can customers be retained. The findings current study is consistent with Zainudin Hj Awang(2009) that suggest that firms should communicate their favorable corporate reputation effectively to the market so that the customers' perception level towards their products and service would arise.

This study found that asset characteristic ( $\beta=0.586$ ) has stronger impact on purchase intention than developer reputation ( $\beta=0.439$ ). The finding is consistent with Wonggotwarin and Kim (2017) examine the impact of product quality, service quality, brand picture, and condominium product design variables on the intention of purchasing condominiums in Bangkok. Research findings indicate that product quality, product design, and brand picture are statistically important predictors of buying intention.

The results of the survey will provide details on the intent to purchase the property and the factors that will influence the intent. Therefore, this study can provide a reference for real estate market research. This will help developers understand what factors influence consumers to make purchases and apply them to marketing programs. In addition, it will enable the Thai government to understand how the new real estate industry is in the Thai economy and to establish appropriate real estate procedures and regulations for current and future plans.

#### **Managerial Implications**

According to hypotheses testing, we found that the asset characteristic factor and developer reputation factor have the least correlation with the desire to buy. That a good reputation can attract excellent employees, excellent employees. It can also produce the expected products or provide better services. Uniforms improve corporate performance, make consumers and employees more satisfied, and form a better corporate reputation. Gregory (1998) believes that companies earning a good reputation will provide consumers with more potential value. It makes consumers not only willing to buy the company's products and make more consumption, but also willing to establish long-term relationships with the company.

In terms of developer reputation, the company's vision and leadership have little effect on purchase intention. On the one hand, Although customers do not perceive the company's grand aspirations, and hope that the company can strengthen publicity in this regard. At last, the company's brand is not very impressive. In the Thai real estate market, there are thousands of real estate companies. It is hoped that sansiri can pay attention to the spread of its brand, highlight its own advantages, and have differences characteristics with other products.

#### **Recommendation for future research**

There are still some limitations found in this study. The results of this study did not fully reflect the needs of all Bangkok customers, as the survey came from a company's intended customers and only selected one place in Bangkok. As a result, the results obtained do not accurately reflect the actual customer's intention to purchase real estate across Thailand. There is limited shopping experience in contact with people in the Thai

real estate market. Culture and other types of prejudice also affected the collection of information about condominium purchases throughout the project.

Factors that influence consumer buying behavior, including cultural, social, personal, and psychological factors. Future research should be more inclined to study the psychological factors of consumers. There is an important need to research the value of variables and buying intentions to attract customers to real estate companies, and how this can shift between different real estate industries. At present, the real estate market has not developed products for individual psychological needs. Therefore, more public surveys are needed to refine this common demand, and common needs are sought from the survey.

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## **Using Game Based Learning Platform “KAHOOT” to Motivate Students’ Reading Comprehension**

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### **Abstract**

Kahoot is a teaching method that allows students to learn while they are playing a game. Kahoot incorporates social media and it enables students to create, share and exchange content with friends in their groups in the classroom. The objective of this research is to study the students’ opinions on using the game based learning platform “Kahoot” in the classroom and to gauge the students’ levels of satisfaction towards using the activities of this game. The sample group was 54 undergraduate students who had enrolled to study in the course of “English Reading” in the first semester of the academic year 2020 at Kasetsart University, Kamphaeng Saen Campus. The instruments used in this research were a lesson plan with Kahoot, Kahoot’s quiz, a computer with an internet connection, smartphones and tablets. A questionnaire was used to ask students’ opinions on using Kahoot. to develop students’ reading comprehension. The statistical methods used in data analysis were percentage and mean values and standard deviation. The students revealed that the activities on the game based learning platform “Kahoot” provided a new teaching method in reading which helped in creating a learning experience. It allowed students to participate in learning more than through lecturing and they enjoyed playing “Kahoot”. They considered it was fun, enjoyable, useful in gaining knowledge and easy to remember the content. Kahoot captured students’ focus and motivated students to be engaged and encouraged interaction in the classroom. It also minimized distractions and improved the quality of teaching and learning in a classroom.

**Keywords:** Game based learning platform “Kahoot”, Social media, Interaction, Reading

### **Introduction**

Rapid development in interactive technologies has contributed to the adoption of games in instructional science and higher education teaching to faster collaborative learning, exploration and discovery ( Ebner and Holzinger 2007; Papastergiou 2009). To motivate the students to study, many teachers have tried to use new technologies which have contributed to the evolution of gamification through mobile technology to support their teaching in the classroom. One of the most popular examples gamification is “Kahoot”. Kahoot is a teaching method that allows students to learn while they are playing a game and after they have played the game. The goal of Kahoot is to increase engagement, motivation, enjoyment and concentration. Kahoot is designed for social learning in which the students gather around a computer screen. It allows teachers to create questions, discuss, and obtain feedback from students. In questioning, the teacher creates the questions and decides the correct answer while setting the time in which the students have to answer via their smartphones within the designated time. Each question shows the winner and points are collected to offer a final ranking as they are in a competition. In Kahoot, the challenge is to answer a multiple choice question correctly and as quickly as

possible. This quiz allows the students to demonstrate what they have learnt (Young & Nichols, 2017). Students are allowed to obtain immediate formative feedback on their learning without any risk of embarrassment (Hussein, 2015). Students have fun, are competitive and learn (Wang, 2015). Kahoot provides an opportunity for the teacher to assess students' conceptual understanding and construction of new knowledge.

## **Literature Review**

Reading is a way of acquiring information and knowledge from other people and sources. It is a foundation for further reading and studying. Kahoot is a great teaching media for teachers who are looking for an interesting way to increase students' enthusiasm and motivation to learn. Gamification is the use of game design techniques. It is used in various contexts for various purposes and at all levels of education (Becker, 2007). Many schools and universities use games and game technologies to enhance learning. Bergin and Reilly (2005) stated that the use of games to promote students' learning has been done to capture students' interest as all of us learn better when we are motivated. Games can be made an integrated part of a traditional classroom lecture to improve learning, motivation and engagement (Wang, 2007; Students are engaged and motivated through games. So games can be used as an integral part of traditional classroom teaching to motivate, engage, enhance cooperative learning and improve students' learning. Students work in groups to participate in giving their answers, and in explaining and justifying their opinions (Lantz, 2010). Kahoot allows teachers to draw content to construct quizzes in which students

Participate as players in a "Game-show" (Wang 2015). Kahoot is easy to use in a classroom. Teachers can easily utilize Kahoot to project quiz questions. Students will try to get the answers right so that their names show on the leader board. Displaying students' points on the screen motivates students to discuss ideas in the game to get to the top of the board.

Many studies indicated that games help motivate students to learn. In 2013, Hamari and Koivisto conducted a research study on social motivations to use gamification: an empirical study of gamified exercise. The findings revealed that social factors were strong predictors for attitudes and intentions towards gamified services. They also found that the same features of gamification might be favored by some but frowned upon by others. Gamification attempts to affect motivations rather than attitude and/or behaviour directly, as is the case in persuasive technologies (Fogg, 2003; Oinas-Kukkonen and Harjumaa, 2009; Hamari 2013). Ismail and Mohammad (2017) investigated the effectiveness of two assessment platforms, Kahoot and an e-learning portal, and gender differences in Kahoot use. The results revealed that Kahoot was effective as an assessment tool because it was easy to use, practical, fun, and enjoyable. Kahoot could promote engagement and motivation, enhance the focus on learning, facilitate learning, offer effective feedback and promote reflection. Wichadee and Pattanapichet (2018) conducted a quasi-experimental study with 77 sophomore students at a private university in Thailand to investigate the impact of Kahoot on students' learning performance, motivation, and attitudes towards gamification in language learning. The experimental group engaged in Kahoot while the control group was tested through traditional paper quizzes. The findings were that students in the experimental group give a better learning performance and motivation than students in the control group. Moreover, students in the experimental group had positive attitudes towards Kahoot because it made the course more interesting and fun, promoted a competitive atmosphere, and increased students' motivation in the studying lessons.

Pede (2017) investigated the effects of the online game Kahoot on Science vocabulary acquisition. The findings were that all students increased their vocabulary assessment score when Kahoot was played twice weekly. The use of Kahoot also increased students focus on task behavior. Students enjoyed playing Kahoot and found it easy to use.

### **Purpose of the Study**

- 1) To study the students' opinions on using the game based learning platform "Kahoot" in the classroom of English Reading at the faculty of Liberal Arts and Science, Kasetsart University, Kamphaeng Saen campus
- 2) To gauge the students' levels of satisfaction towards using the activities of the game
- 3) To suggest ways to develop the students' reading comprehension

The research tools used in this study are Kahoot quizzes, a questionnaire and an interview. The statistical techniques used are percentage, the mean value ( $\bar{x}$ ) and standard deviation (SD). The analysis of qualitative data applies analysis and summary of key points from the interview.

### **Process**

This section will include details on the participants, the instruments, a questionnaire and a semi-structured interview, the method of data analysis and the findings

### **Participants**

The participants consisted of second year English major students including 11 males and 43 females who were enrolled in "English Reading" course from the faculty of Liberal Arts and Science at Kasetsart University, Kamphaeng Saen campus in the first semester of the academic year 2020. The recruited participants formally indicated their consent to participate as respondents in this study. All students were also informed that their identities would be kept anonymous.

### **Procedures**

1. Prepare a lesson plan, reading passages and Kahoot quizzes.
2. After teaching reading skills and strategies for 5 weeks, the teacher assigns the students to read the passages "Eat Better to Stay Smart", "Scuba Diving for Beginners" and "First Aid Treatment".
3. Divide the students into 9 groups of 6.
4. Ask students to do Kahoot quizzes. There are 3 quizzes. There are 10 questions for each quiz with 4 multiple choices.
5. Record the results of each competition in the Excel file.
6. Collect the questionnaire from google form
7. Analyze the data and draw conclusions.

### **Instruments**

The instruments used in this study were the lesson plan, Kahoot quizzes on reading, a computer connected to the Internet, smartphones or tablets. The instruments to collect the data were a questionnaire and a structured interview. A questionnaire was used to survey students' opinions on organizing teaching and learning activities with Kahoot games in a reading class.

The questionnaire was divided into 2 parts. The first part was general questions about the participants' personal information regarding gender and age. The second part was used to obtain the students attitudes

towards using Kahoot to motivate students reading comprehension. The participants' responses to the questionnaire were analyzed in terms of means scores and standard deviations on a five-points Likert scales, which were interpreted as follows:

- 4.51 to 5.00 = Strongly agree
- 3.51 to 4.50 = Agree
- 2.51 to 3.50 = Partly agree
- 1.51 to 2.50 = Disagree
- 1.00 to 1.50 = Strongly disagree

#### **Semi-structured interview**

To provide further support, 20 students were randomly selected for a semi-structured interview at the end of the experiment. Students were asked for their opinions on using Kahoot to motivate students reading comprehension.

The interviews were recorded, transcribed and coded with similar theme categorized.

#### **Data Analysis**

The researcher analyzed the data using frequency, percentage, the means and standard deviation (SD).

#### **Findings**

Findings of the Kahoot quiz

The highest score of the students who answered the questions correctly was 9 out of 10, 6 groups got 9 out of 10, 2 groups got 8 out of 10 and 1 group got 7 out of 10. The highest total score was 10,450 while the lowest total score was 6,898. The figure revealed that the majority of the students (70.2%) answered the questions correctly while a minority of the students (23.02 %) answered the questions incorrectly.

The findings of the questionnaire provide some revealing statistics

Table 1 Students' Opinions on Using Kahoot to Motivate Students Reading Comprehension

<b>Item</b>	<b>Mean</b>	<b>SD</b>
1. Kahoot games are fun.	4.52	0.58
2 Kahoot is easy to use.	4.50	0.64
3. Kahoot increases the effectiveness of the lesson.	4.38	0.67
4. Kahoot is a distraction.	4.15	0.62
5. I would like the teacher to use Kahoot in other classes as well.	4.21	0.78
6. I enjoy playing Kahoot in class.	4.52	0.58
7. Kahoot increases my interest in the lesson.	4.35	0.59
8. I pay more attention to my studies to win the game.	4.38	0.65
9. Playing Kahoot game increases my motivation in reading.	4.36	0.62
10. The scoring system of Kahoot increases my ambition to be a top five scorer.	4.33	0.69
11. Kahoot allows me to see my achievement status and improve myself in the areas of reading.	4.43	0.66
12. The use of Kahoot versus traditional teaching methods help me understand the reading lesson better.	4.44	0.58



From the above findings, it can be concluded that students considered playing the Kahoot game is fun and they enjoy playing in a reading class. Moreover, it is easy to use. Furthermore, the use of a learning method blended with the Kahoot game method helps the students to understand the reading lesson better. Kahoot also allows the students to see their achievement status and attempt to improve in the areas where they are weak in reading.

#### **Findings from the semi-structured interviews**

The following are some quotes from the students' concerning their positive attitudes towards this learning platform:

- 1) "Kahoot creates a positive classroom environment and improves the classroom atmosphere."
- 2) "The use of Kahoot helps me engage more in classroom learning."
- 3) "I like to participate in learning activities facilitated by Kahoot".
- 4) "I enjoy the quiz because it is interesting".
- 5) "Kahoot motivates me to learn and increases my confidence"
- 6) "I like the way the teacher used the Kahoot game in the classroom because it makes the lesson more interesting. I pay more attention to my studies and it helps me understand the lesson better."
- 7) "Teachers should use the Kahoot application because it is easier for me to remember the information when it is presented in a game".

However, there are some negative effects as quote below:

- 1) "An unreliable Internet connection interrupts me when playing the games".
- 2) "I have some difficulty reading questions and answers on a project screen".
- 3) "I don't like playing Kahoot game because I am not able to change answer after submission".
- 4) "I feel a stressful time pressure and I don't have enough time to answer the questions".
- 5) "While I am playing Kahoot, I focus more on the competition and having fun rather than learning."

#### **Conclusion**

Kahoot is an alternative choice for a teacher to teach the students by using smartphones, tablets and computers via Wifi. Kahoot increases students' motivation, engagement and fun. Students perceive learning through social learning activities. Kahoot is a game-based platform useful for developing reading skills. It provides feedback and checks students' understanding. Most students love and enjoy playing Kahoot with friends in a group. Students consider that it is fun, enjoyable, user friendly, not stressful, not boring, and a good way to get to know friends in a group. It increases social interaction and unity in the group. Everyone in the group is interested in playing games and helping each other to find the correct answer. In addition, the students comment that Kahoot is a new teaching method which a teacher can use to apply technology in a classroom. It is different from traditional teaching and it helps them understand the content easier. It gives students more opportunities to interact and engage with the teacher, friends and the lecture content by providing a fun platform on which to engage.

#### **Limitation**

As this study was undertaken with a small sample size of students in a reading class of Kasetsart University, the outcomes may not generalize to all lecture environments. Further research need to be conducted

on deploying Kahoot with a large number of students and in different study subjects to assess students' experience while learning in other environments. In addition, further studies need to investigate students' learning styles that account for mobile-assisted language learning.

### **Suggestions**

Before introducing the game Kahoot in a classroom, teachers should check the efficiency and speed of the internet connection and its stability in all the areas in the classroom.

### **Acknowledgement**

The author would like to thank the English Department at the Faculty of Liberal Arts and Science, Kasetsart University, Kamphaeng Saen Campus for funding and supporting this research project.

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Appendix

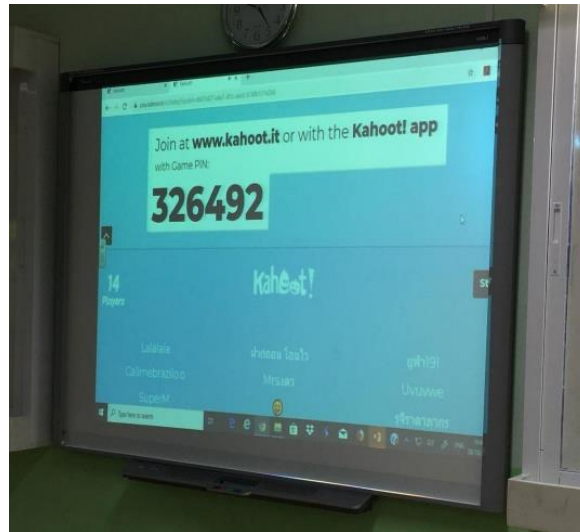


Figure 1 A Game Pin for Kahoot



Figure 2 Reading Lesson

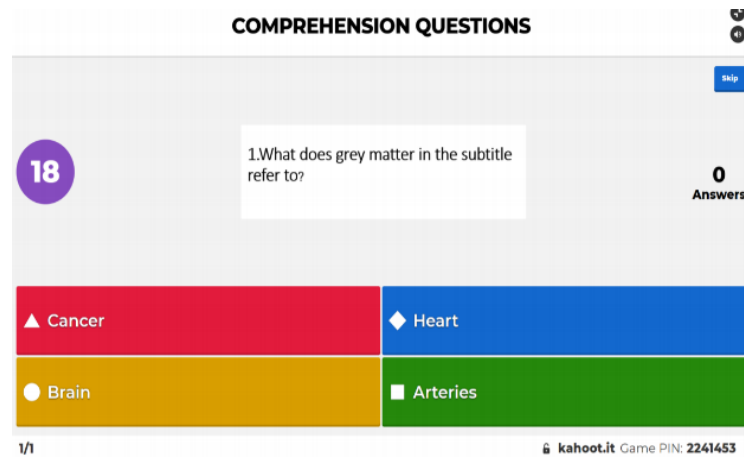


Figure 3 Reading Question

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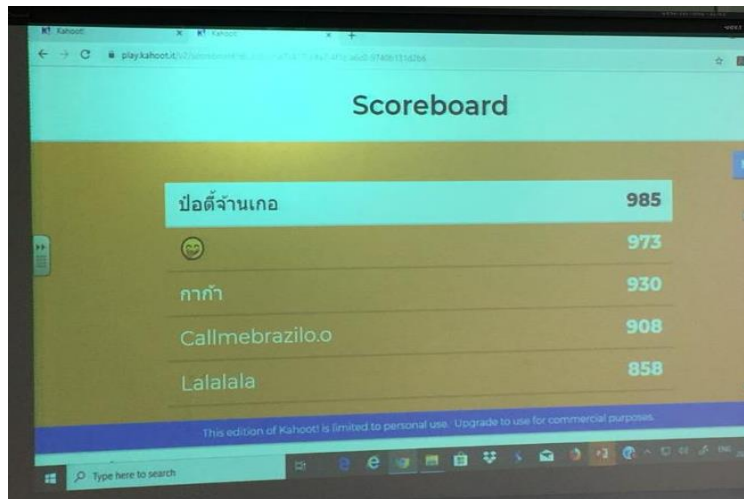


Figure 4 Scoreboard

## The Development of Application on Android Smartphone for Medical Equipment Registration in WepMEt Information System

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### Abstract

This research presents the development of WepMEt application in the part of medical equipment registration on Android smartphone in order to be used with WepMEt - the information system for managing medical equipment in the hospitals which was developed earlier. This application can independently connect to computer server of each hospital that has installed WepMEt program set. The application is consisted of 2 main parts: the part that displays the list of all medical equipment and the part that displays the details of medical equipment in a format of Barcode or QR code of such medical equipment.

**Keywords:** WepMEt application on smartphone, WepMEt information system, WepMEt program set, Registration module in WepMEt application

### Introduction

Nowadays, the development of program for Apple iOS or Google Android smartphone and tablet PC is interesting and very popular in many job fields. (Keijzers, J., et al. 2008) In particular, the mobile application in the Android operating system is popular among Thai users and the trend is still upwards. (Marketing Oops, 2019) The key main job that will maintain the medical tools and equipment in the hospital to be efficient and fully functioned throughout their period of use is medical engineering. Such medical tools and equipment are very important for giving efficient diagnosis and treatment to the patients. If such medical equipment is malfunctioned, it can cause misdiagnosis or the treatment may not be efficient enough and could lead to the death of patient or it can cause following problems: obtaining unnecessary and inefficient medical equipment that could harm user or patient and lead them to death; clustered medical equipment; unaware use of the non-standard medical equipment and waste of money. (Standard of Medical equipment Centre in Hospital, n.d.)

For Thailand, the information system for managing medical equipment in hospital called WepMEt was developed to be used as key tool for managing medical equipment in hospital efficiently. The main structure of WepMEt information system is consisted of 1) Medical equipment Registration System 2) Spare Parts Registration System 3) Maintenance System 4) Medical Equipment Spare Parts System 5) Preventive Maintenance System (IPM) 6) Data Input System and 7) Summary and Report System. All systems are connected and work harmoniously by having the medical equipment registration system as a key database center (Nutdanai, S., et al., 2016) and operating via computer network system and internet network system.

As a consequence, the researchers have developed WepMEt application that can work on Android smartphone and can efficiently work with WepMEt information system. This developed program can work via

internet network system and connect to WepMEt information system used in each hospital without interrupting each other.

#### Methodology and Program Development

##### Method and Tools

The objective of this research was to develop an application on smartphone Android, name WepMEt application in the part of medical equipment registration on Android smartphones that can efficiently link data from the database system of WepMEt information system. The application was improved from the research on the Development of Information System for Managing Medical Equipment in Hospital (Natdanai, S., et al., 2014) which was published and implemented in many hospitals. The System Development Life Cycle was used for developing programs (System development life cycle: SDLC) [12] to be well suitable for usage. The development tool is the Android studio to write commands for system development. And use adobe XD to design the UI of the application And display it through the Android SDK and use the Emulator tool to detect system errors through Functional testing.

##### Design and development

The network structure of the WEpMEt information system is shown in Figure 1, with users able to access both from a computer via Intranet network and the Internet. Application WEpMEt developed will run on Android smartphone which can be connected. With WEpMEt information system on the Intranet network in case the WEpMEt information system cannot connect to the Internet

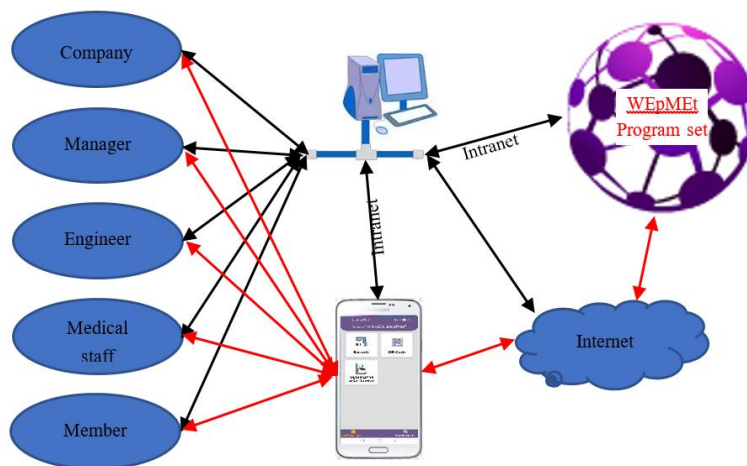


Figure 1 Network structure of WepMEt information system

##### System design

The system is designed to be optimized for operation with the UML diagram for an overview of the design system. Design the use case diagram to show the interaction between the work system and the user. Design the class diagram for showing classes and their relationships. Design the sequence diagram to show the flow of the system and design an activity diagram to show the sequence of activities.

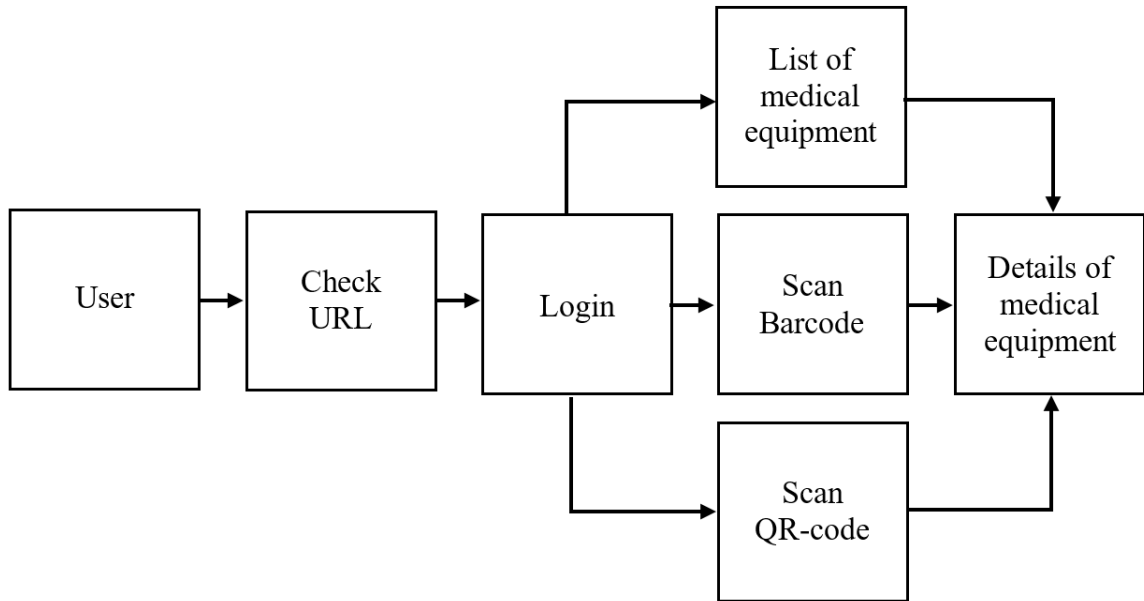


Figure 2 Design overview



Figure 3 Use case diagram

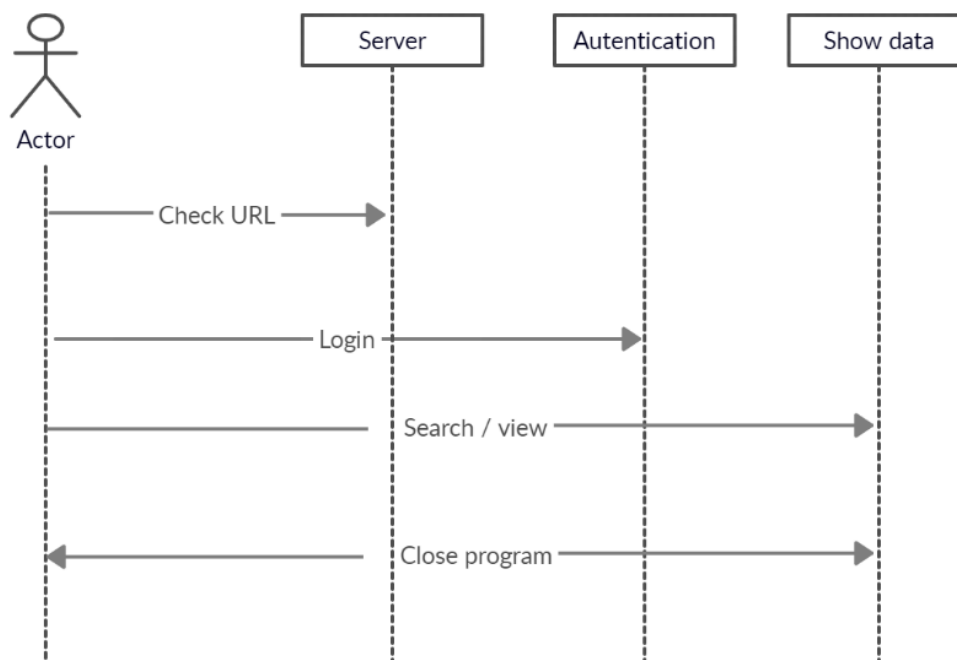


Figure 4 Sequence diagram

## Results

The results of the research on the development of WepMEt application on smartphone can be classified as follows.

### The results on developing WepMEt application

When users open the application for the first time, they need to put IP Address of WepMEt information system (Picture 4 (A)) installed in the computer server before the application can run. Once the application is connected, the Login screen will be displayed (Picture 4 (B)) to verify the membership of the system. If the membership is correct, the screen of the durable articles registration system will be displayed (Picture 5 (A)) and users can select between displaying a list of medical equipment or scanning Barcode or scanning QR-code. If users select to display a list of medical equipment, the application will show the list of medical equipment that has been registered in the system. When users click the medical equipment on the list, the application will show the details of such medical equipment. (Figure 5 (A) – (D))



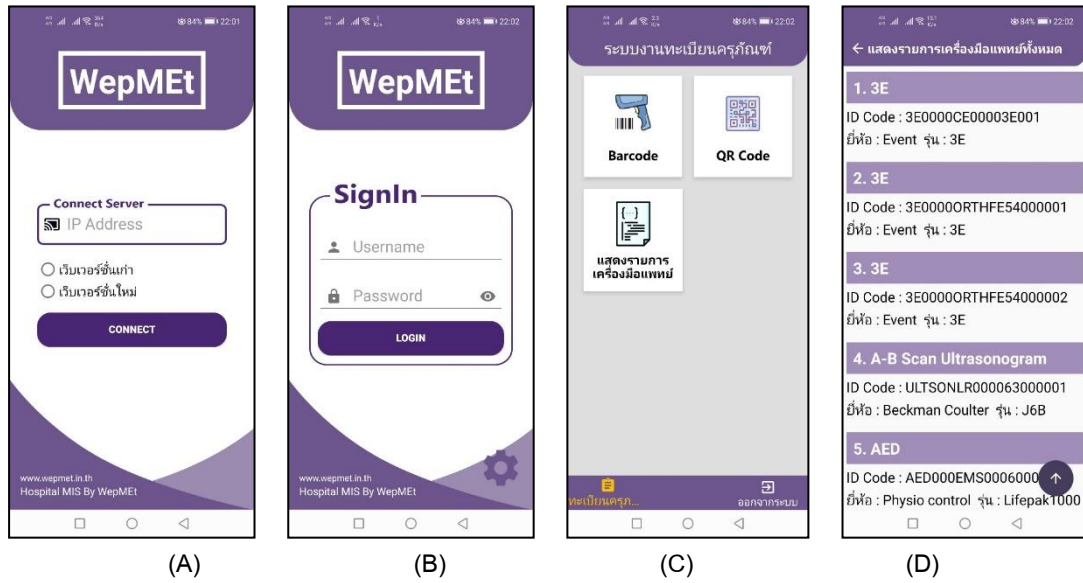


Figure 5 (A) The page to enter the IP address. (B) Page to Login (C) Main screen of medical equipment registration module (D) List of medical equipment in database.

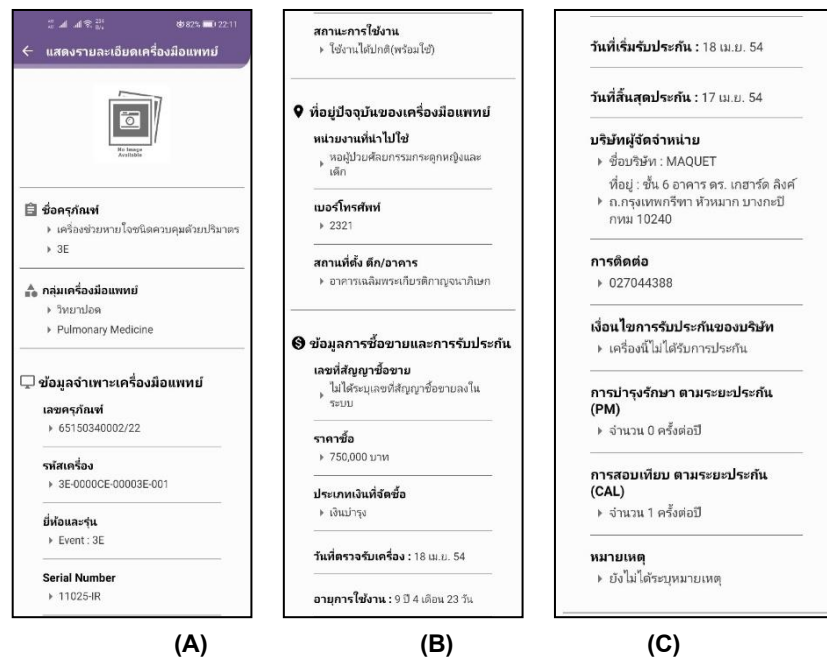


Figure 6 Medical device detail screen is shown on Application WepMEt (A) Part 1 (B) Section 2 (C) Section 3

## Discussion

This paper demonstrates the functionality of Application WepMEt, which can be linked with the WepMEt information system via the Intranet network in a hospital or via an Internet network. As for the linking of medical device data from WepMEt information system, medical devices can be listed separately according to the access rights of each user, as well as being able to show responsive to each smartphone as well. Able to scan barcodes to show detailed medical equipment without any errors. It is also possible to scan a QR-code to show the details

of a medical device. However, the WepMEt application needs to be further developed to meet the needs of all modules of the WepMEt information system.

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## **Development of Gypsum Broad Mixed with Water Hyacinth and Portland Cement Type1 for Environmental-Friendly**

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### **Abstract**

This research aims to develop the gypsum broad mixed with water hyacinth and Portland cement type1. The 6 ratios of mixture were design including: a ratio gypsum broad, 2 ratios of gypsum broads mixed with water hyacinth fibers, a ratio of gypsum broad mixed with Portland cement, and 2 ratios of gypsum broads mixed with water hyacinth fibers and Portland cement type 1. These gypsum broads were mixed, poured in the molds, and installed the gypsum board papers. The TIS.219-2009 (gypsum broad standard) was used to control the property tests of gypsum boards. From the results, the proper amount of water hyacinth fibers in gypsum broads effected to decrease the density, and thermal conductivity properties of gypsum broads and also increase the surface water absorption, water absorption, longitudinal and transverse breaking load, and nail withdrawal properties of gypsum broads. And Portland cement type1 can increase the density, longitudinal and transverse breaking load, nail withdrawal, thermal conductivity properties of gypsum broads, and Portland cement type1 also can decrease the surface water absorption, and water absorption properties of gypsum boards. When compared the results and the TIS.219-2009 standard, it was found that all ratios of gypsum boards do not meet the TIS.219-2009 standard. However, the developed gypsum boards can use as same as the common gypsum board to decorate the building, although the strength of these gypsum boards are lower than the common gypsum board in market.

**Keywords:** Gypsum board, Water hyacinth, Water absorption, Thermal insulation, Environmental-friendly

### **Introduction**

Gypsum boards are widely used in the building industry all over the world. These boards are very lightweight, low cost, and easy to install. The common gypsum boards are made from gypsum plaster, fiber glass and paper. The major problems of common gypsum boards are the high surface water absorption. When the gypsum boards expose to water, the gypsum plaster and fiber glass will spread to the environment (Weeranukul et al., 2018). In case of the water proof gypsum board, it is more expensive than common gypsum boards. Portland cement type1 is the binder which has more waterproof than gypsum plaster. And the water hyacinth is an aquatic plant native to the Amazon basin, and is often a highly problematic invasive species outside its native range. The fiber of water hyacinth is cellulose fibers which are linear chains of thousands of glucose units linked together allows a great deal of hydrogen bonding between OH groups on adjacent chains. These structures are tough, strong and lightweight (Ghosh et al., 1984). In Thailand, water hyacinth has been rapid expansion in waterways, clogging rivers and canals which caused the polluted water and the Thai government must spend too much money per year (The Secretariat of the Prime Minister, 2020). So this

research used water hyacinth fiber in conjunction with Portland cement type1 to improve the properties of common gypsum boards and to solve the water hyacinth expansion problem. Moreover, the developed gypsum boards were able to produce by small local enterprise.

### Research Methodology

The research methodology of this project can conclude as following:

#### Materials and Equipment

The materials and equipment of this research included gypsum plaster, Portland cement type 1, dried water hyacinth stalks, gypsum board paper, fiber granulator with 1 inch of sieve size, concrete mixing machine, mold sized 60x60x1.5 cm, oven, universal testing machine (UTM), and thermal conductivity testing apparatus.



Figure 1 Water hyacinth stalks.



Figure 2 Water hyacinth fibers grinded through 1 inch of sieve size.



Figure 3 Pouring the mixture into the mold.



Figure 4 Gypsum board paper installation.

#### Mix Design

In the mix design, the 6 mixture ratios were designed by varying the amount of water hyacinth fibers to gypsum plaster, and the adding of Portland cement type1 as shown in Table 1.

Table 1 The mixture ratios of gypsum boards by weight.

Ratio / Symbol	Gypsum Plaster	Portland Cement Type1	Dried Water Hyacinth Fiber	Water
G-0	1	-	-	1
G-75	1	-	0.0075	1
G-150	1	-	0.0150	1
GC-0	0.75	0.25	-	1
GC-75	0.75	0.25	0.0075	1
GC-150	0.75	0.25	0.0150	1

### Sample Casting

The sample casting processes of gypsum boards including: 1) Grinded the dried water hyacinth stalks to fiber by using the fiber granulator with 1 inch of sieve size. 2) Mixed the gypsum plaster, Portland cement type1, dried water hyacinth fiber, and water by using the concrete mixing machine as shown in Table 1. 3) Poured the mixture into the mold. 4) Sleeked and leaved the mixture in the mold for 6 hours. 5) Installed the gypsum board papers on the gypsum boards. 6) Cured the gypsum boards in the air.

### Property Testing

The gypsum boards were tested by using the TIS.219-2009 standard (gypsum board) (TISI, 2009) and related standards such as ASTM C177 (ASTM, 2012). The property testing of developed gypsum boards at 28 days of curing included general characteristic, density, surface water absorption, water absorption, longitudinal breaking load, transverse breaking load, nail withdrawal, deflection, and thermal conductivity. Each ratio was tested by using the 5 samples per ratio.

## Results and Discussion

From the property testing of gypsum boards mixed with water hyacinth fibers, the results and discussion were shown as following:

### General Characteristic and Density

The general characteristic of 6 ratios of gypsum boards and gypsum boards mixed with water hyacinth fibers were considered by following the TIS.219-2009 standard (TISI, 2009). Sharp edges and smooth surface are the general characteristic of particleboard which all ratios of gypsum boards can pass. However, the high amount of water hyacinth fibers in gypsum boards affected to the rough of surface more than gypsum boards mixed with low amount of water hyacinth fibers. In the density results of gypsum boards mixed with water hyacinth fibers, the water hyacinth fibers affected to reduce the density of gypsum boards, while the Portland cement type1 affected to increase the density of gypsum boards. These density of gypsum boards (Figure 7) depended on the density of materials which water hyacinth fibers (406 kg/m<sup>3</sup>) have the density less than gypsum board (868 kg/m<sup>3</sup>) (Davies and Mohammed, 2011; Faherty and Williamson, 1995), and Portland cement type1 (1,440 kg/m<sup>3</sup>) has the density more than gypsum board. For the chemical reaction between gypsum and

Portland cement type1, the Portland cement type1 affected to decrease the setting time of gypsum (Jindaprasert and Jaturapitakkul, 2012).

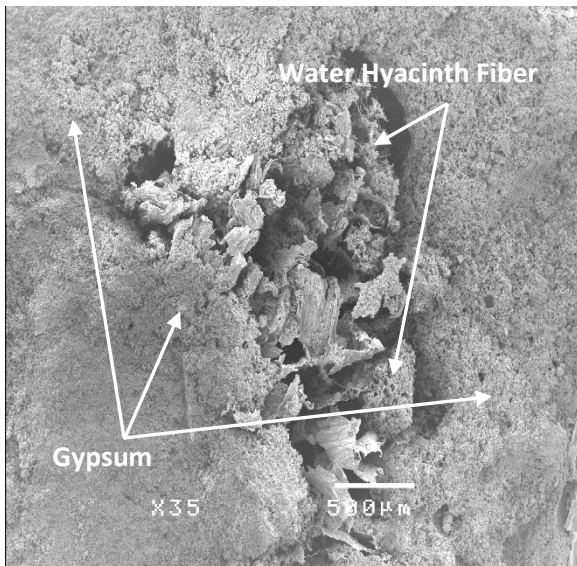


Figure 5 SEM of gypsum board mixed with water hyacinth fiber at x35.

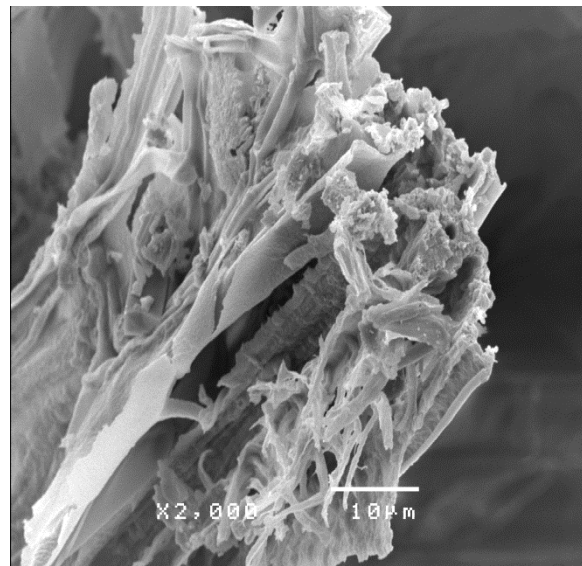


Figure 6 SEM of water hyacinth fiber at x2,000.

#### Surface Water Absorption and Water Absorption

The results of surface water absorption and water absorption test of gypsum boards mixed with water hyacinth fibers could be summarized as Figure 8 and 9. All ratios of gypsum boards cannot pass the TIS.219-2009 standard (waterproof type) (TISI, 2009) which required the surface water absorption less than 160 g/m<sup>2</sup>. When compared the surface water absorption and water absorption of gypsum boards, gypsum boards mixed with Portland cement type1, gypsum boards mixed with water hyacinth fibers, gypsum boards mixed with water hyacinth fibers and Portland cement type1, it was found that the Portland cement type1 can decrease the surface water absorption and water absorption of gypsum boards because the Portland cement type1 is an insoluble material. But the water hyacinth fibers affected to increase the surface water absorption and water absorption of gypsum boards. Because of the water hyacinth fibers is a porous material which it can absorb the water (Davies and Mohammed, 2011; Weeranukul et al., 2018).

#### Longitudinal Breaking Load and Transverse Breaking Load

From the results of longitudinal and transverse breaking load tests of gypsum boards mixed with water hyacinth fibers in Figure 10 and 11, it was found that all ratios had the longitudinal and transverse breaking load less than the TIS.219-2009 standard (it must more than 620 N and 260 N, respectively) (TISI, 2009). But the proper amount of Portland cement type1 and water hyacinth fiber can improve the longitudinal and transverse breaking load properties. According to the higher strength of Portland cement type1 when compared to gypsum, so the mixing of Portland cement type1 will improve the strength of gypsum board. In case of reinforcement of gypsum boards by using the water hyacinth fibers, the water hyacinth fiber is a cellulose material that can improve the strength of gypsum board (Sair et al., 2019; Bledzki and Gassan, 1999).

#### Nail Withdrawal

According to the test results of nail withdrawal of gypsum boards mixed with water hyacinth fibers in Figure 12, it was found that all ratios had the nail withdrawal less than the TIS.219-2009 standard (it must more than 400 N) (TISI, 2009) as same as the longitudinal and transverse breaking load test. But the proper amount of Portland cement type1 and water hyacinth fiber can improve the nail withdrawal properties of gypsum boards too. These were affected from the strength of Portland cement type1 and water hyacinth fiber which are more strength than the gypsum (Weeranukul et al., 2018).

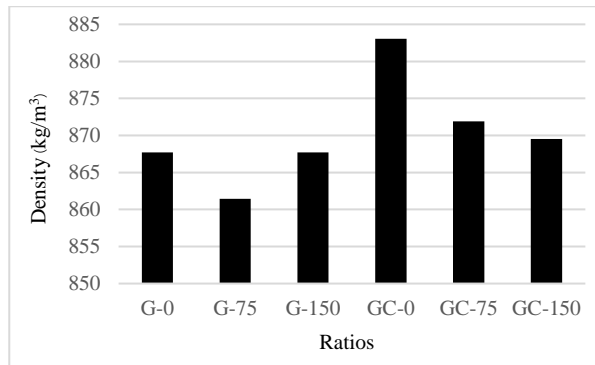


Figure 7 Density of gypsum boards.

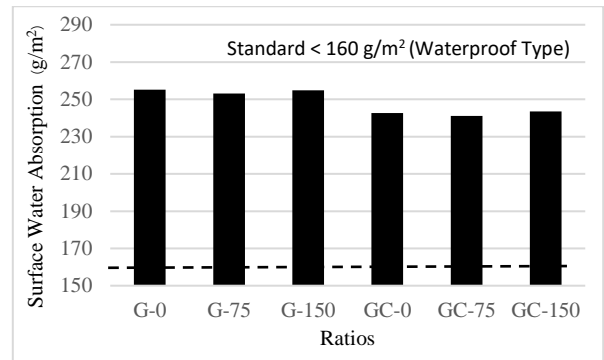


Figure 8 Surface water absorption of gypsum boards.

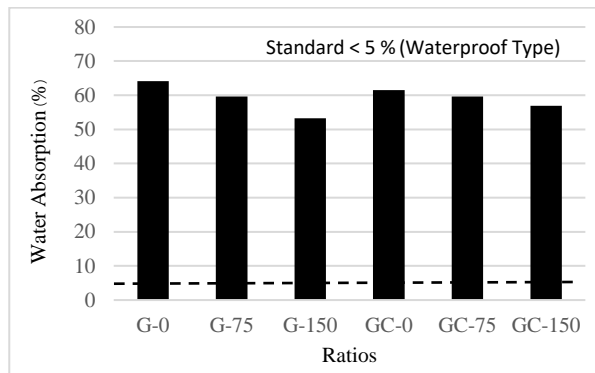


Figure 9 Water absorption of gypsum boards.

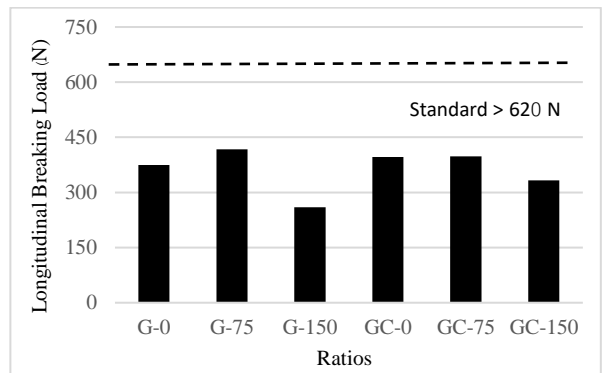


Figure 10 Longitudinal breaking load of gypsum boards.

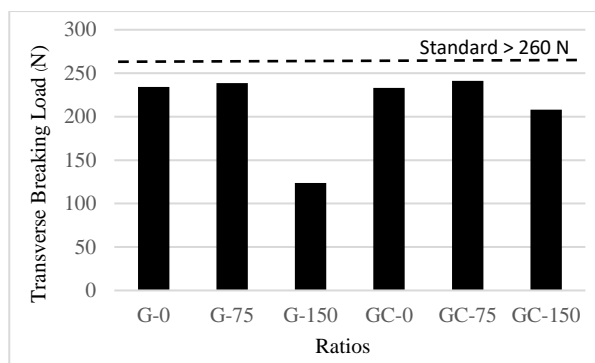


Figure 11 Transverse breaking load of gypsum boards.

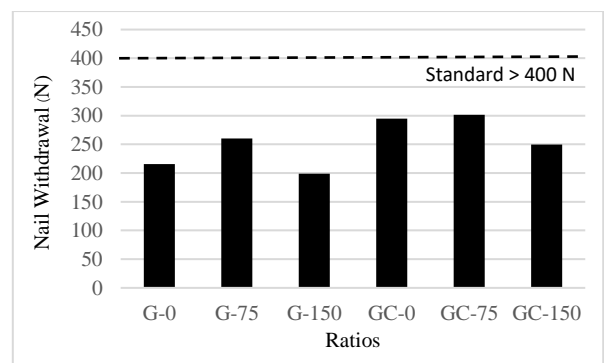


Figure 12 Nail withdrawal of gypsum boards.

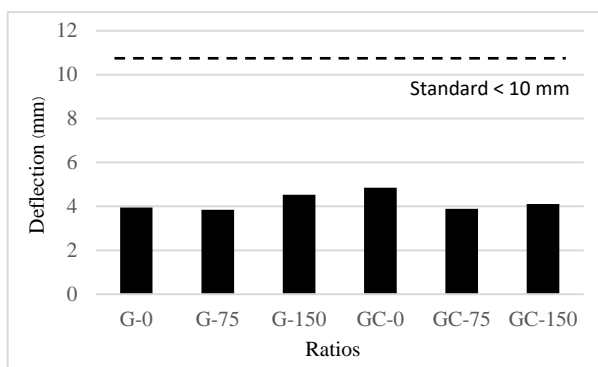


Figure 13 Deflection of gypsum boards.

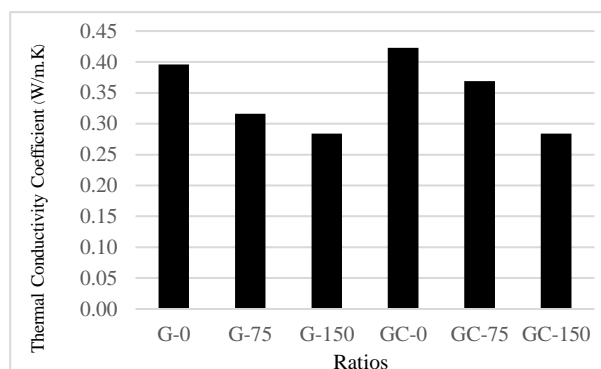


Figure 14 Thermal conductivity of gypsum boards.

### Deflection

From the results of deflection tests of gypsum boards mixed with water hyacinth fibers in Figure 13, it was found that all ratios had the deflection properties less than the TIS.219-2009 standard (it must less than 10 mm) (TISI, 2009). These results shown that the grinded water hyacinth fibers had too short, so the fibers were difficult to reinforce the deflection properties of gypsum boards (Weeranukul et al., 2018; Bledzki and Gassan, 1999). However, the high amount of Portland cement type1 can improve the deflection properties of gypsum boards mixed with water hyacinth fibers.

### Thermal Conductivity

From the results of thermal conductivity of gypsum boards in Figure 15, the water hyacinth fibers can improve the good thermal insulation of gypsum boards. Because of the water hyacinth fibers are the porous material (see Figure 6) which made the water hyacinth fibers to be low thermal conductivity coefficient (Park et al., 2019; Tanunchai et al., 2006). These gypsum boards have the thermal conductivity coefficient lower than other construction materials such as the concrete (1.95 W/m.K), concrete block (0.519 W/m.K), and brick (0.473 W/m.K) (Weeranukul et al., 2018).

### Conclusion

In conclusion, the water hyacinth fibers can use as the raw material for improving the density, longitudinal and transverse breaking load, nail withdrawal, deflection, and thermal insulation properties of gypsum boards. But the water hyacinth fibers also affected to increase the surface water absorption and water absorption values. Although the water hyacinth fibers can improve many properties of gypsum boards, but the all ratios of gypsum boards mixed with water hyacinth fibers still cannot meet the TIS.219-2009 standard. For the mixing of Portland cement type1, Portland cement type1 also can improve the surface water absorption, water absorption, longitudinal and transverse breaking load, nail withdrawal, and deflection properties excepted the density and thermal insulation properties. The developed gypsum boards can use as same as the common gypsum board to decorate the building, although the strength of these gypsum boards are lower than the common gypsum board in the market. This research shown that the water hyacinth fibers and Portland cement



type1 can use to improve the properties of gypsum board, but the developed gypsum boards have to reinforce with other materials to meet the TIS.219-2009 standard.

### Acknowledgements

The authors are grateful to the Rajamangala University of Technology Phra Nakhon for financially supporting this research.

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## Development of Particleboard from Eucalyptus Bark to Use as Decorative Materials

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### Abstract

This research aims to develop the particleboard from eucalyptus bark for using as the decorative materials. The ratios of eucalyptus bark to polymeric diphenyl methane diisocyanate (pMDI) were designed into 6 ratios which were different in pMDI amount (3% and 7%), and bark size (6 mm, 10 mm, and 6 and 10 mm). The particleboard samples were casted by using heat 150 °C for 7 minutes and were tested the properties by following the TIS.876-2004 (particleboard product). According to the results, the properties of particle boards increased with the increasing of adhesive concentration (polymeric diphenyl methane diisocyanate; pMDI) and the selecting of crushed eucalyptus bark sizes. The proper ratios of particleboard from eucalyptus bark used the 700 kg/m<sup>3</sup> of density, 7% of pMDI amount, and 10 mm or 6 and 10 mm of bark sizes. These particleboards meet the requirement of standard (TIS.876-2004) excepted the bending strength and elastic modulus properties. The developed particleboards can use as decorative materials which are the thermal insulation better than the other construction materials such as gypsum board, brick, autoclaved aerated concrete.

**Keywords:** Particleboard, Eucalyptus bark, Decoration material

### Introduction

Particleboard is an engineered wood product manufactured from wood chips and a synthetic resin or other suitable binder, which is pressed and extruded. Nowadays, particleboard is high demand trending product because it is more uniform and cheaper than real wood. However, the particleboard industry faced a shortage of wood chip problem from declining of forest resources (Yenjai et al., 2016).

Thus, the substituted materials were used to produce the particleboard which can be divided into two groups including: wood material group (eucalyptus wood, rubber wood, and other fast-growing wood) and non-wood material group (other agricultural fiber plants). Because of the wood material group is difficult to find, and non-wood material group is really difference to the real wood, the bark of fast growing tree is very interesting to use instead of wood chip, especially the eucalyptus barks which has a large quantity in all regions of Thailand. The eucalyptus bark is the wastes from wood processing plant. It refers to all the tissues outside the vascular cambium both the inner bark (living tissue) and the outer bark (dead tissue).

In this research, the objective aims to develop the particleboard from eucalyptus bark to use as decorative materials for above reasons. Moreover, this project selected the simply production processes that the small and medium enterprises can applying into the commercial.

## Research Methodology

The research methodology of this project can conclude as following:

### Materials and Equipment

The materials and equipment of this research included eucalyptus bark from Chachoengsao province (see Figure 1 and 2), polymeric diphenyl methane diisocyanate (pMDI), sprayer, fiber granulator with 6 and 10 mm of sieve size (see Figure 3), hot press compression molding machine (Figure 4), weighing machine, mold sized 300x300x10 mm, non-stick Teflon sheet, oven, universal testing machine (UTM), and thermal conductivity testing apparatus.

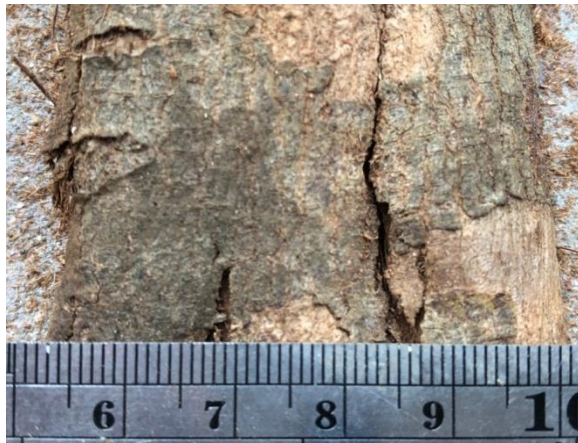


Figure 1 Eucalyptus bark.



Figure 2 Eucalyptus bark sieved through 6 and 10 mm of sieve size.



Figure 3 Fiber granulator.



Figure 4 Hot press compression molding machine.

### Mix Design

In the mix design, the 6 mixture ratios were designed by varying the amount of pMDI to eucalyptus bark, and the size of eucalyptus bark as shown in Table 1.

Table 1 The mixture ratios of particleboard from eucalyptus bark by weight.

Ratio / Symbol	Eucalyptus Bark Size		pMDI
	Fine (6 mm)	Coarse (10 mm)	
6 mm 3%	1		0.03
6 mm 7%	1		0.07
10 mm 3%		1	0.03
10 mm 7%		1	0.07
6-10 mm 3%	0.5	0.5	0.03
6-10 mm 7%	0.5	0.5	0.07

### Sample Casting

The sample casting processes of particleboard from eucalyptus bark including: 1) Mixed the eucalyptus bark and pMDI by using the sprayer as shown in Table 1. 2) Putted the eucalyptus bark mixed with pMDI into the mold. 3) Casted the particleboard from eucalyptus bark by using the hot press compression molding machine which controlled the condition included less than 10% of moisture content in eucalyptus bark, pressing temperature at 150 oC for 7 minutes, 280 ksc of pressure, and 700 kg/m<sup>3</sup> of density. 4) Cooled the particleboard from eucalyptus bark in the air. 5) Cutted the edge of particleboard from eucalyptus bark.

### Property Testing

The particleboards from eucalyptus bark were tested by using the TIS.876-2004 standard (particleboard product) (TISI, 2004) and related standards such as ASTM C177 (ASTM, 2010). The property testing of particleboard from eucalyptus bark included general characteristic, density, moisture content, water absorption, thickness swelling, tensile strength perpendicular to surface, adhesive surface, bending strength, elastic modulus, and thermal conductivity. Each ratio was tested by using the 5 samples per ratio.

## Results and Discussion

From the property testing of particleboard from eucalyptus bark, the results and discussion were shown as following:

### General Characteristic

The general characteristic of 6 ratios of particleboards from eucalyptus bark were considered by following the TIS.876-2004 standard. Sharp edges and smooth surface are the general characteristic of particleboard which all ratios of particleboards from eucalyptus bark can pass (TISI, 2004). However, the different size of eucalyptus bark in particleboards from eucalyptus bark affected to the smooth of surface (see Figure 5) (Cheng et al., 2016). The 6 mm, and 6 and 10 mm of eucalyptus bark sizes had more smooth than the 10 mm of eucalyptus bark size.

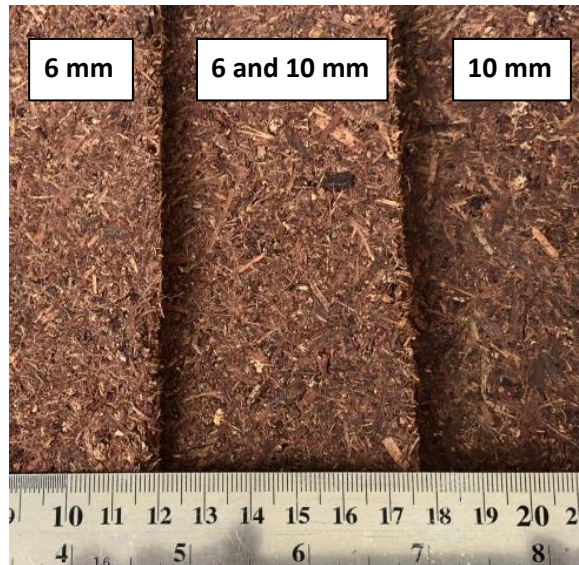


Figure 5 Surfaces of particleboards with different sizes of eucalyptus bark.

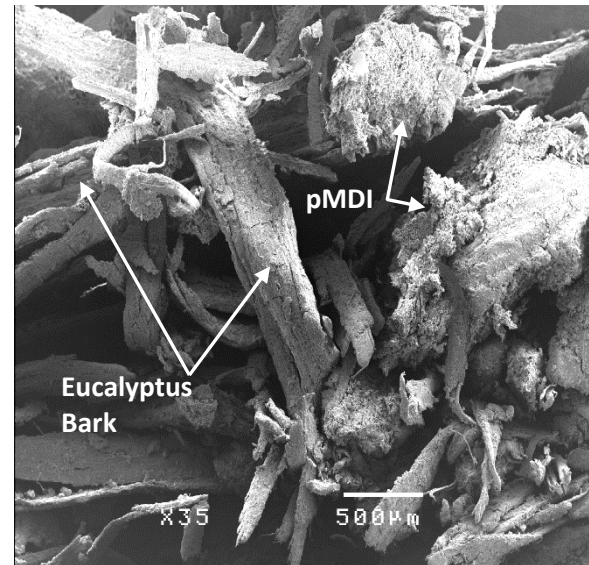


Figure 6 SEM of particleboard from eucalyptus bark at x35.

#### Density and Moisture Content

The density of 6 ratios of particleboards from eucalyptus bark in Figure 7 were approximate to the density that were measured from Table 1. When compared to the TIS.876-2004 standard, all ratios of particleboards from eucalyptus can pass the density properties (400 – 900 kg/m<sup>3</sup>). In the moisture content test results (Figure 8), the 6 ratios of particleboards from eucalyptus bark were in range of the TIS.876-2004 standard (4 - 13 %) (TISI, 2004).

#### Thickness Swelling and Water Absorption

The results of thickness swelling test of particleboards from eucalyptus bark could be summarized as Figure 9. The 6 mm 7% and 6-10 mm 7% ratios of particleboards can pass the TIS. 876-2004 standard which required the thickness swelling must be less than 12% (TISI, 2004). When compared these ratios and other ratios of particleboards from eucalyptus bark, the texture of 6 mm 7% and 6-10 mm 7% ratios had denser than other ratios. So the 6 mm 7% and 6-10 mm 7% ratios of particleboards had the thickness swelling and water absorption less than the other ratios (see Figure 9 and 10). From the results of thickness swelling and water absorption, it had shown that the high pMDI amount and proper eucalyptus bark gradation affected to reduce the thickness swelling and water absorption properties (Yenjai et al., 2016; Nemli et al., 2005).

#### Tensile Strength Perpendicular to Surface and Adhesive Surface

According to the test results of tensile strength perpendicular to surface and adhesive surface of particleboards from eucalyptus bark in Figure 11, only the 6 mm 7% and 6-10 mm 7% ratios of particleboards from eucalyptus bark that can pass the TIS. 876-2004 standard (it must more than 0.45 MPa) (TISI, 2004). Because of the pMDI is a high tensile strength material, it can help the bonding of eucalyptus bark in particleboards (see Figure 6) (Yenjai et al., 2016; Bledzki and Gassan, 1999). However, the poor gradation of

eucalyptus bark also affected to decrease the tensile strength perpendicular to surface and adhesive surface of particleboards, especially the small size of eucalyptus bark (less than 6 mm).

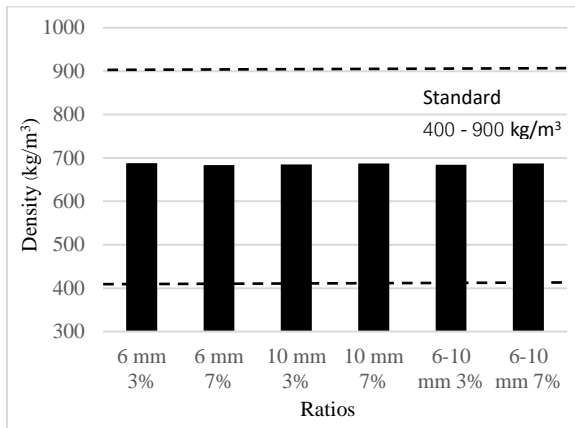


Figure 7 Density of particleboards.

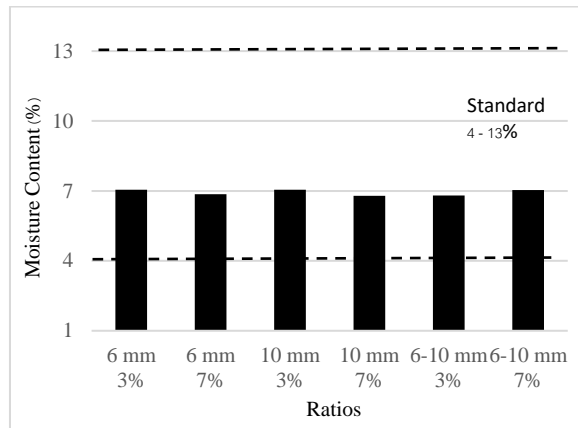


Figure 8 Moisture content of particleboards.

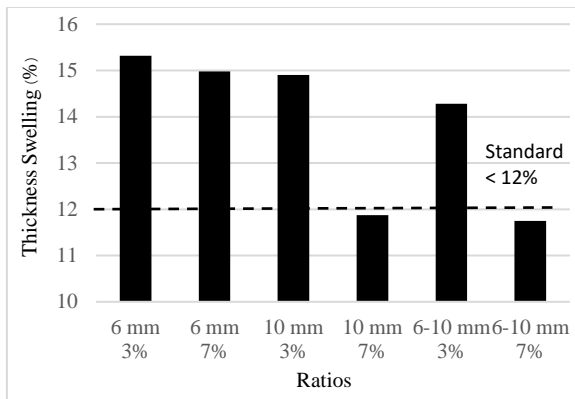


Figure 9 Thickness swelling of particleboards.

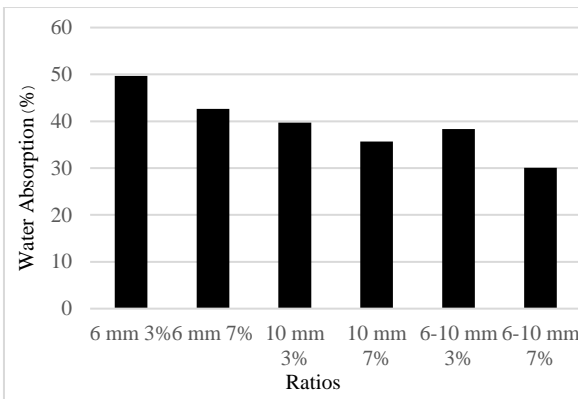


Figure 10 Water absorption of particleboards.

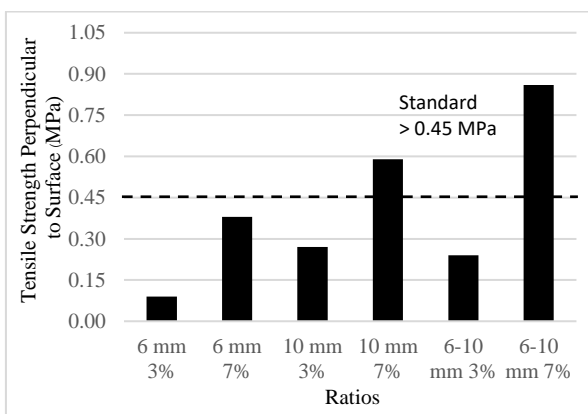


Figure 11 Tensile strength perpendicular to surface of particleboards.

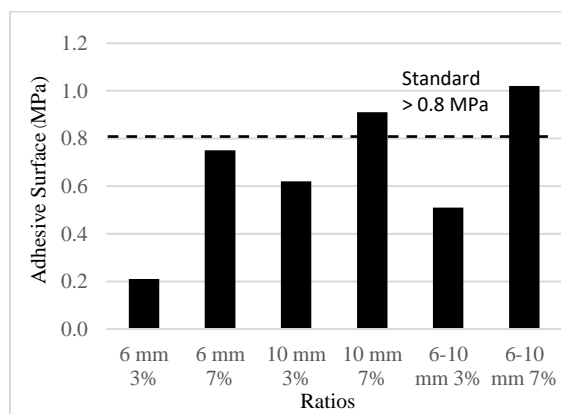


Figure 12 Adhesive surface of particleboards.

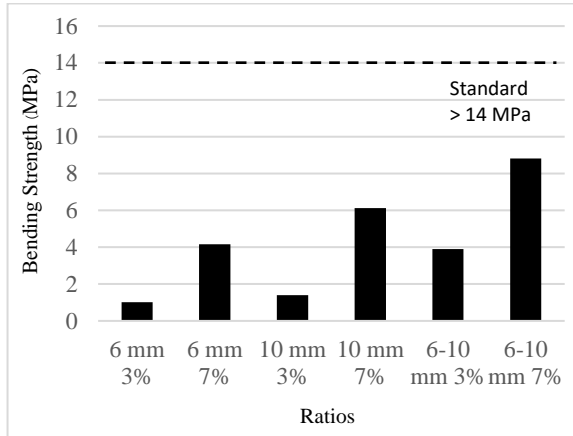


Figure 13 Bending strength of particleboards.

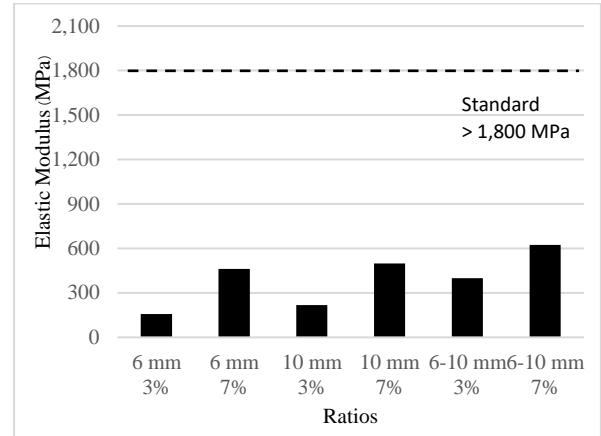


Figure 14 Elastic modulus of particleboards.

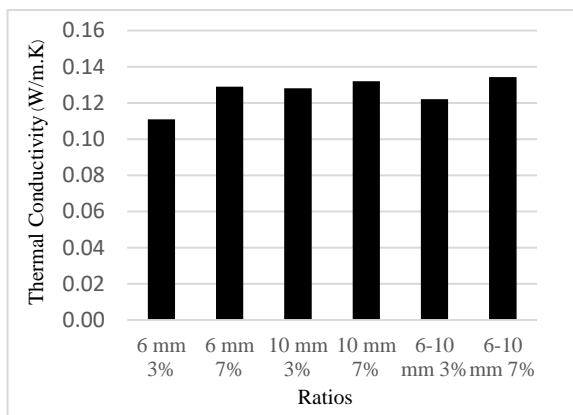


Figure 15 Thermal conductivity of particleboards.



Figure 16 The decoration of particleboards from eucalyptus bark.

### Bending Strength and Elastic Modulus

From the results of bending strength and elastic modulus properties of particleboards from eucalyptus bark in Figure 13 and 14, it was found that all ratios had the bending strength and elastic modulus properties less than the TIS.876-2004 standard (it must more than 14 MPa and 1,800 MPa, respectively) (TISI, 2004). These results shown that the eucalyptus bark fibers had too short, so the fibers were difficult to reinforce the bending strength and elastic modulus properties of particleboards (Cheng et al., 2016; Lin et al., 2008). However, when sequenced the ratios of particleboards of bending strength and elastic modulus properties, the high pMDI amount and proper eucalyptus bark gradation can improve the bending strength and elastic modulus properties of particleboards from eucalyptus bark (Sekaluvu et al., 2014).

### Thermal Conductivity

The particleboards from eucalyptus bark were the good thermal insulation materials (see Figure 15), when compared to the other construction materials such as the gypsum board (0.191 W/m.K), brick (0.473 W/m.K), autoclaved aerated concrete (0.180 W/m.K). According to the thermal conductivity test results, it can conclude that the high mechanical properties (tensile strength perpendicular to surface, adhesive surface, bending strength, and elastic modulus) of particleboards from eucalyptus bark had the thermal conductivity

higher than the low mechanical properties of particleboards. It because the porosity made the particleboards had a low thermal conductivity coefficient (Weeranukul et al., 2018; Hazrat et al., 2016).

## Conclusion

In conclusion, the eucalyptus bark can be utilized as raw material for particleboard. The properties of particle boards increased with the increasing of adhesive concentration (polymeric diphenyl methane diisocyanate; pMDI) and the selecting of crushed eucalyptus bark sizes. From the results, the proper particleboards from eucalyptus bark which properties of the particleboards mostly meet the requirement of standard (TIS.876-2004) were produced by crushing the eucalyptus bark through 10 mm or 6 and 10 mm of sieve sizes, spraying the polymeric diphenyl methane diisocyanate (pMDI) for 7 % by weight of eucalyptus bark into the crushed eucalyptus bark, and casting the particleboard samples by heating 150 °C for 7 minutes and controlling the density 700 kg/m<sup>3</sup>. These particleboards from eucalyptus bark meet the requirement of standard (TIS.876-2004) excepted the bending strength and elastic modulus properties. The developed particleboards can use as decorative materials which are the thermal insulation more than the other construction materials such as gypsum board, brick, autoclaved aerated concrete.

## Acknowledgements

The authors are grateful to the Rajamangala University of Technology Phra Nakhon for financially supporting this research.

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**The Influences of Leadership, Knowledge Management, Quality Management and  
Corporate Social Responsibility on Sustainable Organizational Performance:  
A Conceptual Model**

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**Abstract**

According to the rapid changes of the world educational situation, the knowledge, and innovation-driven economy, they bring the needs of sustainable performance to many organizations, including private vocational colleges in Thailand. So, the conceptual model to study key factors that influence sustainable organizational performance and those factors' relationships should be considered appropriately. The objectives of this paper are to study the relationships among leadership, knowledge management, quality management, and corporate social responsibility and to study their influences on sustainable organizational performance. This study employed the integrative literature review method by analyzing, criticizing, and synthesizing, then discussed the derived conceptual model that presented the important relationships of the whole key factors and their directions of influence. The study found that all key factors had direct effects on sustainable organizational performance. In conclusion, this study can be applied as guidelines for improving sustainable organizational performance in any educational business context. Moreover, it does not only offer the contributions of the theoretical, policy, and managerial aspects but also the recommendations for future research on the similar business context.

**Keywords:** Leadership, Knowledge Management, Quality Management, Corporate Social Responsibility, Sustainable Organizational Performance

**Introduction**

In view of the current situations, the Thai vocational education system has been neglected which causes its poor quality and public image (Thailand Development Research Institute, TDRI), and leads to significant problems for all stakeholders. Many vocational students lack opportunities for good career because the poor quality of education compared to those with bachelor's degree. Graduates of vocational education have less career advancement and this results in the need to hire unskilled workers.

The education system has a higher cost but the return is lower. Graduated vocational students still have to attend university because their educational background cannot guarantee a good job.

Social values on education in Thai society seems to determine the fields of study, so most young people aim to continue their education in the general field. Being unable to increase manpower and labor, it can be concluded that the problem of the Thai vocational system is not a quantitative problem but a qualitative problem. This means the vocational education system produces skills that employers do not need, or the vocational system produces the skills that employers need but the graduates are not skilled enough.

Those mentioned problems bring the research issues, first, to systematically study the factors of organizational management, like, what factors influence or affect the sustainable operation of the organization, and at what level the results can be used as an information to support policy formulation, strategic planning, and management planning. Second, to develop teachers', personnel's and learners' potential. Third, how to allocate resources and the environment appropriately, efficiently, and to make the most of research findings, especially on factor issues of Leadership, Quality Management, Knowledge Management, and Social Responsibility which are important and affect Sustainable operation of the organization. The benefit of the conceptual framework can be applied as a guideline for the development of private vocational colleges in order to survive with quality and sustainability in the future

### **Integrative Literature Review for Theoretical and Conceptual Background of Each Factor**

The literature papers related to the studied factors are the independent factors including leadership, knowledge management, quality management, and corporate social responsibility, and the dependent factor which is sustainable organizational performance. They indicated the relationships between the independent factors and their influences to the dependent factor. They are all from the international databases published during the year 2015-2020. In addition, applying the integrative literature review method, the information about the studied factors in this paper will be analyzed, criticized and synthesized to extract important elements for each factor. Next, the results of the integrated literature review will be presented.

#### **Sustainable Organizational Performance**

According to the studied elements of Sustainable Organizational Performance, it can be concluded that the key elements are Innovative Sustainability, Social Sustainability, Environmental Sustainability, and Economic Sustainability. Thoroughly studied, Sustainable Organizational Performance can be explained that the Business Performance Success composed of Innovation Management Organization, Environment, Social and Economic change, to increase the efficiency of the Sustainable organizational performance (Liviú Moldovan, 2018; Taninrat Rattanapongpinyo, 2016)

#### **Leadership**

The studied element of Leadership can be concluded that the elements are Strategy & Planning Ability, Knowledge & Innovation Development Ability, Human Capital Ability, and Work Management Ability. It can be explained that working and learning to keep pace with the changes in order to be a survival organization with success. Current ideas help employees and organizations. One of the important factors that will help strengthen the organization of learning is Leadership (Lussier, 2009) Leaders with leadership can motivate employees in the organization to be more creative or to achieve a common goal (Warunya Jirangkul 2019; Duangkamol Chongcharoen & Muhammad Shahid Khan, 2020; Sanyasorn Swasthaisong & Pawarin Sawasthaisong, 2018).

### Knowledge Management

The studies of knowledge management capability refer to the ability to apply knowledge management and systems to the organization effectively. It can be concluded that there are four key elements of knowledge management capability; knowledge management and infrastructure, knowledge creation and acquisition, knowledge storage, knowledge sharing and knowledge application. When learning and knowledge transfer are supported, the organization can adapt the change and has an advantage in competition with other organizations. (Egena Ode & Rajenthyan Ayavoo, 2020; Saad Alaarj & Zainal Abidin-Mohamed, 2016; Fajar Ramadhani & Mahendrawathi ER, 2019; Chok Meetong & Saowanee Samantreeporn, 2018; Jeevan Jyoti & Asha Rani, 2017).

### Quality Management

The studied component of quality management can conclude that the core elements are human resource management, process management, customer management and strategic management. By studying quality management through these elements, it can be described that quality management that occurs at the organizational level arising from training and development employees is a strong driver. In addition, the award of performance appraisal is important. And business strategies affect the performance of employees. Corporate performance in both quantity and quality can increase corporate efficiency (Aysel Cetindere & Cengiz Duran & Makbule Seda Yetisen, 2015; Thanin Sivalai & Natthawut Roj Nirutikul, 2018; Muhammad Shafiq & Flevy Lasrado & Khalid Hafeez, 2019;).

### Corporate Social Responsibility

The studies of Corporate social responsibility capability refer to the ability to apply Corporate social responsibility to the organization effectively. The studied elements of corporate social responsibility capability includes four key elements of Customer Responsibility, Employee Responsibility, Environment Responsibility, and Community Responsibility (Chung, K.H., Yu, J. E., Choi, M. G., & Shin, J. I, 2015 ; Yu, Y., & Choi, Y. 2016 ; Shanmugam, K., Lakshmi, P., & Visalakshmi, S. 2015).

### The Links Between Key Factors to Confirm the Relationships

From the previous topic, it studied the theoretical and conceptual background of each key factor. Then, in this topic, it will study the relationships among those factors according to the expected conceptual framework. Besides, the findings from the reviewed research results sign the evidences of that they are the studied factors related to the holistic of the conceptual model. Likewise, they can be summarized and be confirmed the important relationships of each paired factors. Therefore, they can be shown in Table 1.

Table 1 The study of the relationships between various factors related to the conceptual model

Linking between Key Factors	Scholars in related research results
Leadership & Knowledge Management	Masa deh, R., Obeidat, B. Y., & Tarhini, A. (2016).
Leadership & Sustainable Organizational Performance	Egleston, D., Castelli, P. A., & Marx, T. G. (2017).Para-Gonzalez, L., Jimenez-Jimenez, D., & Martinez-Lorente, A. R. (2018) ,Wahab, S., Rahmat, A., Yusof, M. S., & Mohamed, B. (2016) ,Salehzadeh, R., Pool, J. K., Lashaki, J. K., Dolati, H., & Jamkhaneh, H. B. (2015) , Alrowwad, A. A., Obeidat, B. Y., Tarhini, A., & Aqqad, N. (2017). ..

Leadership & Quality Management	Teoman, S., & Ulengin, F. (2017). Barbosa, F. M., Gambi, L. D. N., & Gerolamo, M. C. (2017).
Leadership & Corporate Social Responsibility	Alonso-Almeida, M. del M., Perramon, J., & Bagur-Femenias, L. (2017); Alonso-Almeida, M. del M., Perramon, J., & Bagur-Femenias, L. (2017); Ullah, I., Hameed, R. M., & Kayani, N. Z. (2017); Saha, R., Cerchione, R., Singh, R., & Dahiya, R. (2020).
Knowledge Management & Sustainable Organizational Performance	Koohang, A., Paliszkievicz, J., & Goluchowski, J. (2017), Jyoti, J., & Rani, A. (2017). Abbas, J. (2019), Abbas, J., & Sagsan, M. (2019), Delshab, V., Pyun, D. Y., Kerwin, S., & Cegarra-Navarro, J.-G. (2020).
Knowledge Management & Corporate Social Responsibility	Khodadadi, M., & Feizi, M. (2015), Tuan, L. T. (2016), Shahzad, M., Ying, Q., Ur Rehman, S., Zafar, A., Ding, X., & Abbas, J. (2019).
Quality Management & Sustainable Organizational Performance	Mahmood, S., & Ahmed, A. (2015), Cetindere, A., Duran, C., & Yetisen, M. S. (2015), Pambreni, Y, Khatibi, A., Azam, S., & Tham, J. (2019),
Quality Management & Knowledge Management	Nasser Abdul Ghani Al-SAFFAR, & Abdallah Mishael Obeidat .( 2020 )
Corporate Social Responsibility & Quality Management	Abbas, J. (2019).
Corporate Social Responsibility & Sustainable Organizational Performance	Iwamoto, H., & Suzuki, H. (2019) ,Famiyeh, S. (2017), Hunra, A. I., Boubaker, S., Arunachalam, M., & Mehmood, A. (2020), Mehralian, G., Nazari, J. A., Zarei, L., & Rasekh, H. R. (2016).

### The Formulation Method for Developing the Conceptual Model

After the studies of both theoretical background of each key factor and the linkage between the paired factors for the holistic of the target conceptual model, this topic will explain the method of this study in sequence according to the steps of the integrative literature review. As well as, it conduces to the details of the key results of the study or research findings of particular scholars who have studied the related factors. Consequently, it analyzes, criticizes and synthesizes the important elements of each studied factor. Moreover, it includes the findings of the research results that study the linking of each pair of factors to confirm the relationships according to the conceptual model. Finally, the overall key findings will be integrated into the final results of this study, which is the conceptual model. Likewise, it presents the key components of each factor and the influenced direction of the whole model from the indication of each pair of factors. Therefore, it can be shown in figure 1 as the following.

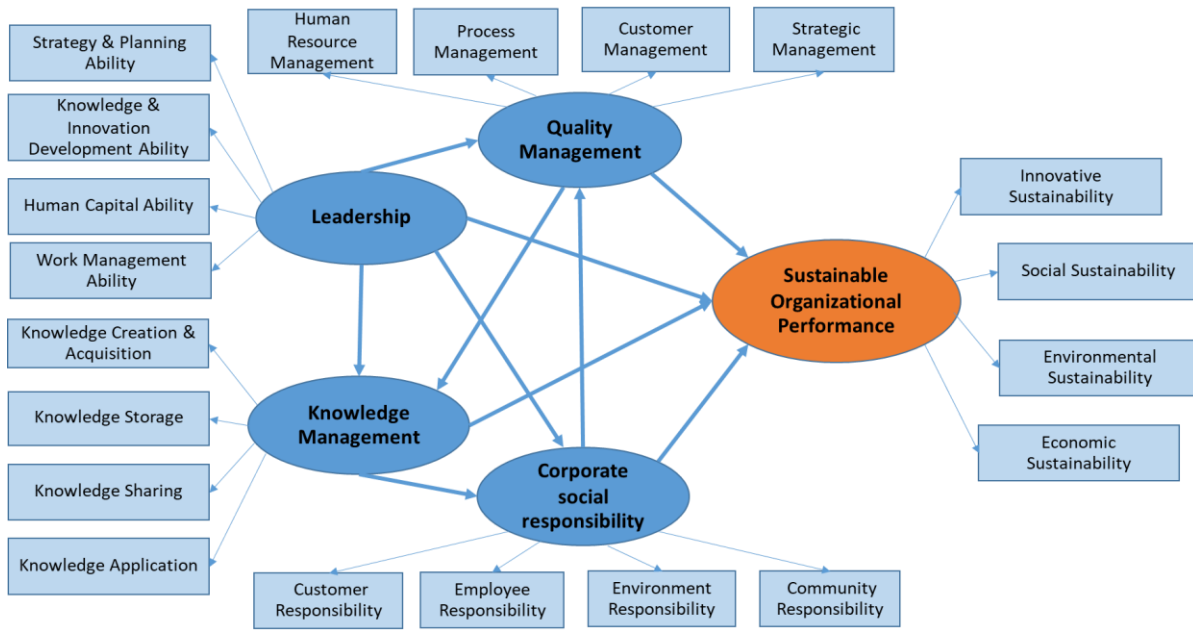


Figure 1 The Conceptual Model

## Contributions

The contributions of this study are the theoretical contribution, the policy contribution and the managerial contribution. Firstly, the theoretical contribution refers to be a database of academic knowledge for those who are interested in the issues related to Sustainable Organizational Performance, the Influences of Leadership, Knowledge Management, Quality Management and Corporate Social Responsibility. Then, the policy contribution means that it can be used as a guideline to improve the organization in accordance with the organizational development policy especially in education. Moreover, it will provide the information of Leadership to create change through effective management for the organization. Finally, the managerial contribution is that the results of the study will provide guidance of excellent operations for organization to apply the higher performance by taking into account the relevant factors including suitable The Influences of Leadership, Knowledge Management, Quality Management and Corporate Social Responsibility that respond to future situations and focus on the Sustainable Organizational Performance

## Conclusion and Recommendation

In summary, this paper looks at conceptual models, which are comprised of five main factors: The Influences of Leadership, Knowledge Management, Quality Management, Corporate Social Responsibility and Sustainable Organizational Performance. The model also identified all independent factors which these include of Leadership, Knowledge Management, Quality Management and Corporate Social Responsibility. It has a direct effect on the dependence factor, that is, organizational performance. In addition, the work of this study also includes aspects of theory, policy and management, and recommendations for future research are studies on the key issues of Thai education business or the context of private vocational colleges. Especially for the organization to achieve sustainable performance.

.In summary, this paper looks at conceptual models, which are comprised of five main factors: The Influences of Leadership, Knowledge Management, Quality Management, Corporate Social Responsibility and Sustainable Organizational Performance. The model also identified all

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## The Art of Prediction which is Relevant to The Law of Karma in Theravada Buddhism

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### Abstract

This article aims to analytically study in The Art of prediction which is relevant to The Law of Karma in Theravada Buddhism. The objectives of these study are 1. To study the prediction in Theravada Scripture which relevant to the law of karma. 2. To study the different of prediction between Thai Astrology and the prediction in Theravada Scripture 3. To study our Lord Buddha's suggestion in prediction. From the study, in the objective 1.) can be found that, the prediction in Theravada Scripture had been done by Lord Buddh with his special ability called vision through wisdom. In the objective 2.) found that the different knowledge that use for the prediction related to the Buddha is not by the theory but the realization by his own ability. Any predictions or estimations by the previous Buddha or the actual Gautama Buddha were happened by the power of Paramitas that the Buddha had been collecting for ages. For the objective 3.) can be found that the Buddha's explanation will be based on Buddhist principles of which he has to show the Law of Karma which consists of 3 bodily action (Kaya-kamma), 4 verbal action (Vaci-kamma) and 3 mental action (Mano-kamma). Buddha teaches us the Four Noble Truths (Ariya Sacca), which show the ways to truly diminish our sadness and unhappiness. Otherwise Buddha teaches us to understand one's behavior, karma, understand oneself and self-reliability which is the most useful and bring the best advantages outcome for every person.

**Key words:** Prediction, The law of Karma

### Introduction

The prediction is the part of Astrology subject which is related to time, connecting the past to the present to the future. All events and actions, either good or bad occur within time. By studying the courses of stars and using them as prime has been well-accepted in the global arena and has been studied over. An astrological philosopher, which states, "The past is the foundation of the present, and likewise, the present is the foundation of the future thus, the discovery within astrology is infinite.

In Buddhism, prediction is shown<sup>1</sup> in many different chapters of Tripitaka and Atthakata Scripture e.g. the prediction of 8 Brahmins after 5 days of Buddha's birth. In addition, there is also information on Buddha's prediction on his own dream before he entered his enlightenment<sup>2</sup> and the story of the prediction of sixteen dreams of King Pasentikosol<sup>3</sup>, which worried the king so much that he asked Purohit Brahmins to predict it, but

the outcome was not very pleased. They predicted that it is a sign of bad things, and suggested the king to do the exorcism sacrifice. The queen Mallika Dhevi heard the prediction and suggested the king to meet Buddha, before he did what had been told. After hearing the dreams, Buddha predicted that it was not harmful, neither to the king, the queen, nor the throne. But the bad influence could happen in far future if the ruler did not maintain himself according to ten virtues of the king. Resulted in chaos, because people would have no moral and live with selfishness, causing troubles to one another then both the city and people could be in danger as seen in the king's dream. The perspective of prediction in Theravada Buddhism scripture, there are many interesting points concerning prediction, which should be addressed and they are the Brahman religion and Brahmins as the important factors of the predictions and ritual performances influencing the lives of people from the level of the ruler, the king until the ordinary people. The Brahmins' knowledge from the Vedas, the world's oldest scripture, has mentioned of the birth of Buddhism by the enlightenment of the Buddha in the 4 noble truths, which is the real escape of the grief. Therefore, any prediction related to the Buddha is not by the theory but the realization by his own ability. Any predictions or estimations by the previous Buddha or the actual Gautama Buddha were happened by the power of Paramitas that the Buddha had been collecting for ages. The prediction by the Brahmins, however, is based on the theory from the Vedas. In conclusion, the Brahmins and the monks in Buddhism played such a different yet important role in society during the time of the Buddha. This is because the Buddha had set the disciplinary rules for monks of the prohibitions of the inappropriate actions and the permissions on necessary things that would not violate the way of being monks, which differentiate the way how the Brahmins practice the prediction, since the Buddha had realized that people would likely to rely on monks in both the academic wise and the living for the sake of their confidence and relief in living a stable daily life. Moreover, because India during the age of Buddha, people were still under the influence of Brahman religion and believed that everything happened by the power of deities or god. They believed that god is the person who creates goodness, stability, bless and disaster. So people tried to only please their god in order to be able to obtain good things in life. While the Buddha taught them to understand the fact about Karma, the actions, that you get what you give and that everything happens because it has its own cause, it would stay and end accordingly.

The prediction in Thai Astrology depend on the birth chart which composed of ten stars including "Ascendant or Lakana". Thai astrology is the knowledge of overall, which if a person has interest in this subject, he/she needs to have the basic knowledge of other subjects e.g. knowledge in Science, Geography, Mathematic, Hydrography etc. as basic foundation in understanding the universe in both Buddhism and Scientific perspective to be able to understand astrology with logic and in a reasonable sense, which can be reflected in the result of prediction. A person who studies astrology must be prudent and careful in analyzing and must responsible in their own word. Prediction based on situation, this is the reading of the nature of planet, angles, power influencing the likeliness of the situation of both negative and positive aspect. Mostly of Thai lay people had believed in making a merit, believed in Kusala and Akusala by the basic of Thai culture and tradition. Thai people in the present time had chosen the way of Astrology when they got the problems, by checking their horoscope with the fortune-teller or making another ritual which belief that they can pass through all difficult things and bad luck. Therefore if the fortune-teller has a good knowledge of astrology with a good understanding in eternal truth of life, then the advice will be more benefit to the people.

### **Objectives of the Study**

- 1) To study the prediction in Theravada Scripture which relevant to the law of karma.
- 2) To study the different of prediction between Thai Astrology and the prediction in Theravada Scripture.
- 3) To study our Lord Buddha's suggestion in prediction.

### **Benefits of the Study**

- 1) To understand the idea of prediction in Theravada Buddhism scripture.
- 2) To understand the principle of prediction in Thai astrology.
- 3) To understand the prediction in Theravada Buddhism and Thai astrology.

### **The prediction in Theravada Scripture which relevant to the law of karma:**

The definition of karma from Buddhism teaching is the action with intension<sup>4</sup>. Law of karma is the most significant law, directly for human concerned. This is because human is karma's creator. Human's vision and boundary give power in choosing action. Based on the law of karma, when human takes part in any activity, it is considered a factor of life's natural process. Yet, some might misunderstand that nature can be controlled or conquered by human. Buddhism, therefore, focuses on generating the idea of the importance of karma and the responsibility of action. Due to the fact that we own karma as a cause, as a race, as our reliability, as our belonging in life, so we cannot transfer it to anyone. This is, however, different between Buddhism and Hinduism, the religious belief that has so much influenced in Indian society. According to Buddhist teaching considers karma, type of karma and effects from karma as direct linkage to human beings. They are the ones who perform, react thus resulting in creating karma; and karma in return producing effects to lives, and become one's fate. Thus the most important thing of all is one's intention. Karma is equivalent to thinking and condition of mind (Sangkarā)<sup>5</sup>. It is the characteristics of mind. All in deeds or intention can guide the mind into actions either good or bad. Eventually relevant effect will be formed through physical acts by body, words that turn into different ways of conduct. Therefore it can be summed up that mind is equivalent to intention. Karma is equivalent to deeds, words and mind, which transform into various actions, speech and later transformed and become effects both in present time that continue throughout one's future. Upon reviewing past, one can sense that all causes that were created have transformed as effects both in constructive and destructive ways. That is why, rather supporting the belief in prediction or estimation, Buddha encourages us to obtain the accurate understanding of karma, in consistent with attention of the doer and its consequence. The prediction evidence found in Theravada Buddhism scripture clearly shows that the cause is the action of good karma such as Buddha's performance of 32 meritorious acts, resulted in obtaining Mahapurusha Lakshana (physical characteristics of the Buddha) and the enlightenment in becoming the Buddha. Mahapurusha Lakshana means the characteristic of the great man, the absolute gentleman. In obtaining the characteristic of Mahapurusha Lakshana is by performing 30 visions of good merits, There are generally 10 Paramitas, 10 Upaya Paramita, 10 Paramatta Paramita, meaning to regularly do good, having the general attention comprised of Dana, Sila,

Nekkhamma, Panya, Viriya, Khanti, Sacca, Addhitthana, Metta, Upekkha, complete and perfection in a long time.

After 5 days of our Lord Buddha's birth The first 7 Brahmins saw correctly the details of the Prince's characteristic shown completely about the 32 types of Mahapurusha Lakshana according to the prediction textbook of the description of the great man's characteristic then they showed 2 fingers as a sign indicated that the prediction could be interpreted into 2 perspectives that "If the Prince maintains the ordinary life, he would become the great king who could conquer all. But if he decides to become a monk, he could become the Gautama Buddha, the supreme enlightened one who could not be compared to others". However, the youngest **Brahmin Gothanya predicted in only one perspective showing one finger with confidence that "The Prince who was born with the great supreme characteristic would not decide to maintain his ordinary life. He would rather become a monk. He will understand lives and enter the path of the enlightenment until becoming the Gautama Buddha"**. The reason why Gothanya Brahmin predicted in one perspective with confidence was because he did not only see the characteristic of Mahapurusha Lakshana but he also consider the 80 special secondary characteristics<sup>6</sup> apart from 32 characteristics of Mahapurusha Lakshana, as one of the component in predicting, which the researcher would be presenting the detail concerning Mahapurusha Lakshana later on. According to Brahmin's textbook, there is information on the characteristic of the great man for generations as an indicator of the reason why the Buddha was born to this world. The word "The characteristic of the great man or Mahapurusha Lakshana" means a special characteristic of a great man. A person who can obtain this characteristic should have 2 ideals of

1) If a person stays as an ordinary people, he would become a great justice king, who rules with justice. He will be great on land surrounded by 4 oceans as his territory. He will receive victory and own the strong kingdom filled with 7 jewels, which are (1) Chakram (a throwing weapon in India) (2) Elephant (3) Horse (4) Jewel (5) Queen (6) Chariot (7) Wealth. He will have more than 1,000 sons who will be brave with the look of a real hero.

2) If a person becomes a monk, he will become the Gautama Buddha with no Kilesa of the world.

Finally, the Brahmin Gothanya's prediction was real Prince Sitthata became our Lord Buddha and teaching his lay people with the Four Noble Truth and The Law of Karma because the Four Noble Truths (Ariya Sacca), which show the ways to truly diminish our sadness and unhappiness.

### **1.1 The Art of prediction by Lord Buddha about Karma and the effect:**

1.1.2 Lord Buddha didn't give the answer to King Pasenthigosol after Queen Maliga Dhevi's death, for 7 days. The Queen used to had done wrong with her husband by telling a lie and she still remember clearly before her death that's made her mind in sadness with her big mistake, she could not recall any kusala that she had made to our Lord Buddha, so she went to the bad place ( hell) immediately. In the law of karma they call **Asanna Karma** means **deeds that are committed when one is near death** and is able to recall in the very last final moment of life. If he/she has not committed Karu karma then it will produce immediate effect to the person. Lord Buddha didn't give his word to The King about the bad place that the Queen stay for 7 days because he doesn't want The King had to be suffered and misunderstand about the great good merit that the

Queen had done through her life. After 7 days in hell, the effect of her good karma bring her back to heaven and then Lord Buddha gave the proper answer to The King.

1.1.3 Lord Buddha gave the prediction to Phra Anandha had become an Arahanta. Phra Anandha the Buddha attendant (Buddha Upatthaka), had got very sad and crying alone when he knew that Lord Buddha nearly Nibbana and he didn't success. Lord Buddha was consoled him that he will be an Arahanta on the first day of the first rehearsal (Sangiti – general convocation of the Sangha in order to settle questions of doctrine and to fix the text of the Scriptures.) Three months after Lord Buddha's Nibbana, the first rehearsal had been arranged in Rajgir city at Satabankuha Cave, last night before the first day of the first rehearsal Phra Anandha became Arahanta.

1.1.4 Lord Buddha and a man with Leprosy name Suppapuddha. In the past life Suppapuddha had born to be a rich man's son in Rajgir and made bad manner by splitting to Phra Pajeackbudha, after his death he had to be suffered in hell for a longtime, when he was born again he became a poor beggar with leprosy because of his bad karma that he made to Phra Pajeackbudha. When Lord Buddha saw him in Chetawan Vihara, with his perfect knowledge he knew that this man will attain the first stage of holiness(Sotapanna), after listening Lord Buddha's sermon whit his purify mind, he became Sotapanna at that time, but the result of bad karma had not finished yet, when he went from Chetawan Vihara he was attacked by the cow until he die. Lord Buddha gave his answer to all monks and lay people about Supapuddha that after his dead he will be in heaven because of good karma and purify mind in Sotapanna.

1.1.5. Phra Wangkhisa: A famous Brahmin who had learned about the special mantra called "Chiva srisa mantra" and all brahmin's doctrines, he can predict by knocked the skull of dead body and he knew that where the dead person born in heaven or hell, that person will be reborn as angel, human or animal. When Lord Buddha brought one dead skull's Arhanta to Phra Wangkhisa , he couldn't predict where the place of Phra Arhanta to be born again. He asked lord Budddha for the reason that he couldn't predict that skull, Lord Buddha said that he have to be a monk then he can learn this special mantra from him. After he took orders, Lord Buddha gave him the name "Phra Wangkhisa thera" and gave the sermon about Dhatu-manasikara (contemplation on the elements), he had passed through it and become "Arhanta" and known that all Phra Arhanta never born again they had Nibbana, that's the reason why he couldn't predict the skull's Arhanta.

1.1.6. Phra Dhevatata's Anantariya-kamma: Kuru karma means immediacy-deeds consist of 1.matricide 2.patricide 3.killing an Arhanta 4. Causing a Buddha to suffer a contusion or to bleed 5. Causing schism in the Order. Phra Dhevatata had done the great mistake (kuru karma) to Lord Buddha, one called Sangkaphet among Buddhist monks and the other that's very serious with intension to kill Lord Buddha at Kitchakuta Moutain by moved the rock to him but it wasn't success just only made him got a contusion on his feet. According to these actions, When Phra Dhevatata had brought to infront of Chetavan vihara he was buried by earth up to his chin then he had realized in the whole Dhamma of Lord Buddha and donate his chin's bone to worship Lord Buddha before he died. After he had been suffer in the deepest hell for along long time due to the kuru karma that he had done, Lord Buddha had predicted, Phra Dhevatata will become an individually Enlightened one or private Buddha (phra Paccekabuddha).

As the mention above, the prediction that address in Theravada Buddhism scripture are the perfect knowledge and it is the vison through wisdom by Lord Buddha only, he like to teach us to believe in Karma,

**Good deeds and bad deeds** areas mentioned in the Dharma bring feedback of effects both merit and sin. Good deeds bring no harm, but creating happiness while contributing no sadness to the mind. It also produces good life condition as they are stating in the Sammadhi Sutra which Sariputta said “good deeds or 10 principles of an honest person is to have an intention to deprive all bad deeds while maintaining the core of good deeds which resulting in greed deprivation; anger deprivation and delusion deprivation or ignorance. The 10 principles of an honest person consist of 3 bodily action(Kaya-kamma), 4verbal action(Vaci-kamma) and 3mental action(Mano-kamma). Karma is categorized in the Tripitaka into 4 kinds as follow<sup>7</sup>:

- 1) Black karma brought black effect
- 2) White karma brought white effect
- 3) Both black karma and white karma brought both black and white effect
- 4) Either black or white karma brought either black or white effect

**Karma derived effect according to seriousness of offense.**

**1) Karu karma** means heavy karma both the virtue and evil type.

**The virtue side (Kusala)**, they are 4 substantial meditation (the state of serenity attained by meditating) and 4 non-substantial meditation. (also state of serenity attained by meditating)

**The evil side (Akusala)**, they are the committing of 5 cardinal sins – the most serious offenses i.e. killing one’s father; killing one’s mother; killing an arhanta; injuring a Buddha and causing schism in the Order.

**2) Asanna Karma** means deeds that are committed when one is near death and is able to recall in the very last final moment of life. If he/she has not committed Karu karma then it will produce immediate effect to the person. For instance an old cow stands the gate of a stall, once the cowboy open the gate it would likely come out first, but because of having less strength then other livestock will proceed.

**3)Pahula Karma or Ajinna Karma** or habitual karma means karma that is often committed e.g. a person who always commits good deeds or bad deeds until it becomes his/her habit. In case someone who has neither Karu Karma nor Asanna Karma, then this type of karma will produce its effect relevantly.

**4) Kakatta Karma** means various deeds that are performed unintentionally or to be unaware of facts e.g. a person who wants to make fun of a friend who is very scare of ghost and that friend got a heart attack and die unexpectedly. In the aspect of law it would be judged as a case of committing crime by killing a person unintentionally. The offense is guilty of making the victim scare. Therefore the Karu Karma, Asanna Karma and Ajinna Karma have no effect to rule over, but then Kakatta Karma will produce its effect, which is said to be the slightest.

## **2. The different of prediction between Thai Astrology and the prediction in Theravada Scripture: Characteristic of Prediction in Theravada Buddhism**

Categorizing the point of study in order, which are the characteristic of prediction in the time before Buddha and in the time of Buddha, depending on the belief and knowledge of Brahmin in Vedic scripture. In Buddhism, speaking of the future situation or prediction derives from the collections of virtues of the previous Buddha as shown in Sutta Pitaka, Kuddaka Nikaya, **Buddhavamsa** (the Buddha’s hagiographical), Cariya Pitaka started from Dipankara Buddha until Gautama Buddha, altogether 24 Buddhas. It is the virtue practice

of the Buddha in a different time of the particular Buddha. The Gautama Buddha has got the prediction from each Buddha that he would become the Buddha of this era namely "Gautama". Therefore, prediction shown in Theravada Buddhism scripture, the predictor is the previous Buddha who predicted the enlightenment being Buddha with the perception (knowledge) of each Buddha<sup>8</sup>. The perception is the intuitive understanding or an insight, divided into:

- 1) The perception of past is the perception in realizing the past and its continued factors.
- 2) The perception of future is the perception in knowing the future and its result.
- 3) The perception of present is the perception of the present, its causes and factors.

In predicting with perception is the virtue of each Buddha. In the time of the Buddha, prediction was depended on the knowledge of Brahmins who studied the Vedic scripture, which were trusted by the king so when Brahmin predicts the important situation such as the birth of the Buddha from the dream of the Queen Sirimahamaya, ten thousands of the earth's elements were trembled causing 32 prognostications e.g. the big echo of sound, the light shedding everywhere [this is a good sign for all the living creatures] etc. All 64 Brahmins gave the prediction to the King Siri Suddhodhana and the Queen Sirimahamaya that they would welcome a son who is elegance and he would become the sole great man of the world. We can see that in giving the result of dream's prediction, the Brahmins applied their knowledge in predicting dream (prognostication) based on Brahman's scripture, which were widely used in the time before Buddha. The knowledge of astrology and prediction are passed on since the past. It is a subject connecting people's lives, via important religious rituals. Leaders or rulers must study in order to be able to control any unexpected situations since the study of astrology and astronomy is the study of the movement (orbit) of planets in different times, which indicates the situations that are likely or unlikely to happen.

Astrological belief has very much influence on Thai ways of living. We believe that astrology was practiced from/at the same time as the beginning of the history of Thailand. In the past, astrology was an advanced subject, preserved only for people in the upper class. It was a must study subject out of eighteen arts subjects, for people in the king's caste, and was considered as an absolute academic of art. The essence of astrology is a branch of liberal arts subject, mostly based on the knowledge of nature, studying the stars, geography, the statistic and the historical annals, which helps reminding people to be cautious and realize about the time and the moment of life and be prepared to face the two sides of the worldly conditions of satisfaction and gratification, both good and bad. However, people mostly misunderstand and think that fortune is rather superstition, than a factor of life's difficulties. Unless people could truly understand the mechanism or principle of astrology, it would have become a credulity led by misunderstanding.

The prediction in Thai Astrology is base on the rotating of the constellations which affected to the native's birth chart. The actions–reactions of stars within the universe that affect, respond can also deem as phenomenon and a kind of karma. Astrology is also connected to law of karma since all stars can be divided into 2 groups i.e. vice stars that produce bad effect or to be called **stars of bad luck**, which bring bad meaning to the fate's owner so we consider it as **Akusala side**. While the good luck stars bring good luck to the person or can be called **the good/lucky stars or the Kusala side**. The prediction of stars constellation to a person must be sensible, and consists of morale and ethics of good astrologist.



Buddha never asked anyone to support and believe in astrology or fortune telling as it cannot be neither the way of enlighten, nor the way to escape and diminish the sadness. Otherwise Buddha teaches us to understand one's behavior, karma, understand oneself and self-reliability which is the most useful and bring the best advantages outcome for those who can truly understand all. With his special ability, when he gave the prediction he will refer to the action or karma of that person which will effect to his/her life with his proper word, he had chosen to answer or not answer the question in his proper way.

### **3. Lord Buddha's suggestion in prediction:**

In Buddhism, Vinaya Pitaka Jullavakha Kutawattu Kandhaka: The data is about Buddha's prohibition to the monks, not to study nor teach ignorance. If any monk infringes, it could be considered as an offence to the rules. Moreover, the way of making a living with ignorance is also prohibited.

In Vinaya Pitaka Maha-vagga: monks are encouraged to study the synodic month<sup>9</sup>, the study of lunar months, since the waxing and the waning moon could be indicated from the moon's position in the sky, which also helps indicating the time. It is useful method for monks in calculating the date accurately, so they would know when they should travel to the temple to perform their duty in chanting the principal teaching.

In Vinaya Pitaka Jullavakha Tutiya bhakka Arunya-vagga: Monks who live in the forest should study all or some of the zodiac subject and they should be wise in directions<sup>10</sup> so that they could also obtain some knowledge of horoscope, calendar and directions in order to be able to answer people's questions, but not for the purpose of fortune telling or marking auspicious time. It is, however, remarkably noticed that any activities of fortune telling were not welcomed or encouraged by Buddha. Instead, for the Theravada Buddhism's teaching, practicing the Noble Eightfold Path, the true nature of phenomena is crucial as the real path to escape from grieves.

In Samaññaphala Sutra, the Buddha gave the explanation of 3 levels of percepts but said that it is the percept for monks in Vinaya Dharma, which related to prediction as:

For the big percept, the omit of earning a living with ignorant subjects such as predicting organs, predicting defects, predicting dreams, predicting characteristics, predicting rats biting cloths, performing bonfire ritual, lighting light for light waving ritual, adding husk in bonfire ritual, bonfire dance ritual, adding rice in bonfire ritual, adding butter in bonfire ritual, spurning of sacrifices of bonfire, giving blood as life sacrifice, subject of organs' inspection, subject of land inspection, subject in ruling, subject of charm, exorcism, subject of setting the shrine, subject of snake charmer, subject of poisons, subject of scorpions, subject of rats, subject of the bird's sound, subject of the crow's sound, subject of age defining, subject of arrows preventing, subject of animals' sound.

We can see that the Buddha does not support monks to get involve, believe, study or teach others in the above-mentioned subjects. The Buddha sees that these subjects are inappropriate for daily practice of monks and percepts' practicing ones. Moreover, the Buddha also has negative idea of the auspicious time, as shown in Sutta Pitaka Kuddhaka Nikaya Jataka in the meaning of "Advantage has passed the silly, who only waits for auspicious time. Advantage is auspicious to advantage. What could stars affect us?" The Buddha teaches that the advantages that should be done, is already the auspice of one. By waiting for only auspicious

time of zodiac, which depended on stars in giving light would make one lose the advantage of which one should be obtaining. Stars have no power in making the happening.

On the other hand, monks should not predict the characteristic of auspicious time as shown in Sutta Pitaka Kuddhaka Nikaya Suttanipata Tuvataka Sutta, which means "Bhikkus, who respect the Buddha should not earn a living with spell and textbook of dream prediction, predicting characteristics, auspicious time, predicting animals' sounds...<sup>11</sup>the Buddha gives importance to good behaviors more than auspicious time of zodiac. In behaving physically, verbally and mentally good is the assurance of one's auspice. One does not need to depend on stars as written as an evidence in Anguttara Nikaya Dighanipata Supupapanha Sutta, the Buddha said that:

All Bhikkus, if any creatures have behave well in consist of 3 bodily action(Kaya-kamma), 4verbal action(Vaci-kamma) and 3mental action(Mano-kamma),the next day would be the auspicious day of that creature, either day or night, they are all considered a good time. Body , verbal and mental acts or your wish will happen accordingly and will be considered as the auspicious time, auspicious moment, auspicious point, auspicious occasion and it will also be considered as the respect people who have strong virtue. Whoever acts the right action will be able to receive the advantages of life and will be religiously overwhelmed. Sickness could not be harmful and will be happy and fulfilled.

Buddha teaches about belief and decision that all beliefs must advocate prudence, as per the teaching appeared in the Wisdom of Kalama Sutra in 10 criteria as follow:

- 1) Ma Arnussavane Do not go upon what has been acquired by repeated hearing.
- 2) MaParumparai Nor upon traditions.
- 3) Ma Ittigirai Nor upon rumors.
- 4) Ma Pitoksamubhatanane Nor upon what was written in the scripture.
- 5) Ma Taggahetu Nor upon surmise.
- 6) Ma Nayahetu Nor upon an axiom.
- 7) Ma Agaraparivitakgane Nor upon specious reasoning.
- 8) Ma Tithinichanakantiya Nor upon bias towards a notion that has been pondered over.
- 9) Ma Paparoopataya Nor upon another's seeming ability.
- 10) Ma Samano Nokaruti Nor upon the consideration that this monk is our teacher<sup>12</sup>.

It is clear that Buddha teaches that one must apply very careful thoughts prior to accept any teaching as true. One must need and take into account whether it is sensible. Therefore do not incur belief as per details outlined in the foregoing 10 criteria.

Method of considering a theory knowledge, or teachings according to Theravada Buddhism is called "Yonisomanasikara" or "Critical Reflection" means 4 ways of reflections to be followed i.e.

- 1) Skillful way of reflection will lead to securing truth.
- 2) Continued thoroughness, systematic, and methodical reflection
- 3) Wise and critical reflection
- 4) Take to heart pondering, with insight reflection.

These 4 nobled-ways of critical reflections lead people to seek reason various knowledge in order to find out whether they really generate value and happiness. As human beings, we tend to have the nature of lacking confidence to anxiety, fear over circumstances; fear for uncertainty towards future; and doubtful predictions. Thus human beings try to minimize fear and anxiety while increasing strength and peace of mind so that they will have the courage to move on.

## Conclusion

According the objective No.1 found that the prediction in Theravada Scripture had been done by Lord Buddha and his special ability called vision through wisdom, every prediction had refer about the Law of Karma and the effect which is really true for every person. Everything never be immortal it's changed all the time by any causes. The objective No2. Found that the different knowledge that use for the prediction related to the Buddha is not by the theory but the realization by his own ability. Any predictions or estimations by the previous Buddha or the actual Gautama Buddha were happened by the power of Paramitas that the Buddha had been collecting for ages. The objective No.3 Lord Buddha's suggestion in prediction: the Buddha's explanation will be based on Buddhist principles of which he has to show the difference of belief in order to extend the vision e.g. for auspices in astrological context would be based on the result of the zodiacs but in Buddhist context, the Buddha instead said that "the person who does not live their life involving the auspicious time, meteors, dreams, good or bad is a person who breaks through the chain of passions of which is considered as animal's jewels. That person is likely to realize the stage of nirvana and would never reborn"

After researching and studying the Art of prediction which is relevant to The Law of Karma in Theravada Buddhism, this conforms to the Trilak Theory of Buddhist, the three characteristics of existence (*impermanence, incompleteness and non-self*). It teaches us to know that nothing is immortal and nothing can last forever both happiness and sadness, everything is in the wheel of change. This is the reason why Buddha teaches us the Four Noble Truths (Ariya Sacca), which show the ways to truly diminish our sadness and unhappiness. Buddha never asked anyone to support and believe in astrology or fortunetelling as it cannot be neither the way of enlighten, nor the way to escape and diminish the sadness. Otherwise Buddha teaches us to understand one's behavior, karma, understand oneself and self-reliability which is the most useful and bring the best advantages outcome for those who can truly understand all.

Researcher has shared this useful information received from this astrology learning, by researching from the right perspective with high integrity and morally right, which can bring out the three levels of advantages, which are present advantages, future advantages and highest advantages. This study supports life decision and life planning of human beings. For those who always conduct only good karma, they will surely receive only good things in life and their highest advantage is that they can truly understand the circle of life, which can lead them the final enlightenment. For those astrologists, if they maintain their goodness and moral to predict people as the founder of this theory, these astrologists can also be one of those people who can help any society they are living in by bringing Buddhist teaching combine with astrological theory to lead people's life and lift up human being's condition of mind, to be conscious while living their present life to conquer all obstacles and own lucks.

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## Prediction Model of ORAC Value in Mangosteen Pericarp Extract

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### Abstract

The objective of this research is to dilute the exact xanthenes concentration to measure three observations to study the linear relationship of two factors between xanthenes value and other observations value. To be able to use this relationship to create a line equation. This equation is used to predict the antioxidant value in xanthenes-based products in the future. Which the research results showed xanthenes at levels 4.25, 8.50, 12.72, 17.00 and 21.25 mg /100 grams. The ORAC was analyzed as  $29.47 \pm 0.50$ ,  $66.70 \pm 1.64$ ,  $70.70 \pm 2.90$ ,  $105.71 \pm 3.70$ , and  $130.94 \pm 3.50$   $\mu$ moles TE respectively, there were statistically significant differences ( $P < 0.05$ ). The measurement of % Radical Scavenging was  $3.07 \pm 1.33$ ,  $7.55 \pm 1.83$ ,  $12.73 \pm 2.96$ ,  $17.91 \pm 2.82$  and  $25.07 \pm 3.09$  respectively, there were a statistically significant difference ( $P < 0.05$ ). Measured turbidity values were  $56.87 \pm 4.46$ ,  $108.47 \pm 9.04$ ,  $149.30 \pm 11.90$ ,  $193.15 \pm 16.14$  and  $250.40 \pm 14.27$  NTU respectively. There were statistically significant differences ( $P < 0.05$ ). And can be used to do linear equations with high precision which can be observed from the R square value of 0.872-0.970.

**Keywords:** Model prediction in ORAC value, Turbidity of xanthone, Mangosteen extract, Use of turbidity in xanthone

### Introduction

*Garcinia mangostana* Linn. (mangosteen) is a popular fruit in Thailand. It is commonly cultivated in Thailand, Indonesia and Malaysia. Most of mangosteen is consumed as fresh fruits or exported fresh fruits to foreign market. It contains high nutritional values. In essence, it is a rich source of vitamins, minerals and fibers such as vitamin C, E, folate, calcium, potassium and magnesium (Limpisathian, 2008) Mangosteen rind or pericarp has been used in traditional Thai medicine for treating skin infections, wounds, and diarrhea for many years (Mahabusarakam et al., 1987). Among the fruit peels, mangosteen peel is an important source of natural antioxidants. The mangosteen peel contains various bioactive substances, i.e., phenolic acids, flavonoids, anthocyanin, polyphenol and xanthenes. The major anthocyanin in mangosteen was cyanidin-3-sophoroside (Du and Francis, 1977). Several researchers recognized phenolics and anthocyanin for their antioxidant properties (Robards et al., 1999; Karalaya et al., 2001; Rossi et al., 2003; Davalos et al., 2005; Balasundram, 2006).

Mangosteen contains a substance called xanthone, which is a flavonoid and polyphenon compound. It was found that xanthone extracted from the mangosteen rind, called alpha-mangostin, beta-mangostin and garcinone B can inhibit *Mycobacterium tuberculosis* (Suksamrarn et al., 2002). Alpha-mangostin is a major component which possess anti-inflammatory and antibacterial activities against methicillin-resistant *Staphylococcus aureus*, *S. epidermidis*, and *Propionibacterium acnes* which is the critical etiologic agent in acne

(Di-ngam, 2009; Sikhamchum, 2009). According to the report of Sakagami (2005), xanthone has antioxidant, anti-cancer and anti-bacterial properties, respectively. A recent study by Sukma et al (2011) also claimed that alpha-mangostin is anti-inflammatory, reduce inflammation in NG 108-15 cells. However, poor aqueous solubility of xanthenes limits its bioavailability and hence the full exploitation of its biological properties (Aisha, 2012 and Li Yoke Ho, 2017). Xanthone insoluble when it drops into the water, the sediment is clearly visible.

Because of mangosteen has high beneficiary for human, supplements factories are focusing on dietary supplements mangosteen juices. But processing method has an impact on phenolics anthocyanins and total antioxidant value. Heating has varied effect on several products depending on heating temperature and process conditions. But no report on effect of process conditions on total antioxidant as ORAC value. ORAC is not including antioxidant only anthocyanin and polyphenol but included strong antioxidant as xanthenes. These are influent to ORAC (oxygen radical absorbance capacity) value content. The ORAC value has recently been proposed as a quality index of total antioxidant in supplement juice. In Thailand, the rind extract is used in products such as herbal cosmetics and pharmaceutical. Recently, mangosteen rind extract is used in mangosteen juices or dietary supplements mangosteen juices. It has begun to be widespread around the world supplement.

The total antioxidant of mangosteen can also be measured using the DPPH method. In general, antioxidant assays are classified as single electron transfer and hydrogen atom transfer-based assays. Selection of methods for evaluating antioxidant property depends on the oxidation sources. Thus, many analytical methods are necessary to evaluate different antioxidant effects. As shown in Table 1, the antioxidant properties of mangosteen peel extract can be divided into four groups including free radical scavenging, chelating ability, reducing power and lipid oxidation inhibitory ability based on the antioxidant measurements. The antioxidant activity of mangosteen peel extract has been reported using the following methods: 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical. DPPH radical scavenging activity measures the antioxidant ability for donating hydrogen atom to capture the DPPH radical (DPPH•). As the DPPH• are quenched by antioxidant, the color of DPPH solution changes from a deep purple to a light yellow and the absorbance at 515 nm decreases. (Lim et al. 2007).

Turbidity can be defined as a decrease in the transparency of a solution due to the presence of suspended and some dissolved substances, which causes incident light to be scattered, reflected, and attenuated rather than transmitted in straight lines; the higher the intensity of the scattered or attenuated light, the higher the value of turbidity. Turbidity can be expressed in nephelometric turbidity units (NTU). Depending on the method used, the turbidity units as NTU can be defined as the intensity of light at a specified wavelength scattered or attenuated by suspended particles or absorbed at a method-specified angle, usually 90 degrees, from the path of the incident light compared to a synthetic chemically prepared standard (Andrew et al, 2002) Turbidity is caused by particles and colored material in water. It can be measured relative to water clarity, or directly with a turbidity instrument such as a turbidimeter or turbidity sensor. Turbidity sensors may also be referred to as submersible turbidimeters. Water clarity methods involve a disc or tube. They are often quick and inexpensive, but are only as accurate as the person using them 1. Turbidity meters use nephelometry (90 degree scattering) or other optical scatter-detection techniques for fast, accurate turbidity measurements on water samples. Turbidity sensors also use optical technology, but instead of using sample cells, they can be placed directly in the water source to measure turbidity. In addition, turbidity sensors can be used for continuous

turbidity measurements. However, when using a meter or a sensor, most turbidity data are not inter-comparable. Turbidity units such as NTU and FNU have “no intrinsic physical, chemical or biological significance”. Thus, differences in suspended sediment type (e.g. algae, clay or sand) and differences in instrument design will alter a turbidity reading. These instruments can be convenient and accurate tools as long as consistency is maintained.

## Methods

### Pure Xanthone extract preparation

The crude xanthone extract was prepared by drying the inner bark of the mangosteen completely. Coarse grinding with a coarse grinder. Then extracted with 95% ethanol for 14 days. Then filter out the liquid to evaporate ethanol by rotary machine. Until a strong xanthone is a substance that gives a high viscosity Continue to dry the contents in a tray oven until completely dry. When it dries well, it can be crushed with a strong crushing potion. Bake until the moisture does not decrease again to get 100% xanthone coarse extract. When the exact weight of the crude xanthone Used to prepare extracts at different concentrations. The samples were analyzed for ORAC, DPPH and turbidity as follows: Xanthone extract 4.25, 8.50, 12.75, 17.00 and 21.25 mg / 100 g respectively with ethanol.

### ORAC measurement

ORAC (Oxygen Radical Absorbance Capacity) value was used by Cao et al method which measures antioxidants scavenging activity against peroxy radical induced by fluorescein (FL) (3',6'- dihydroxy spiro[isobenzofuran-1[3H],9[9H]-xanthen]-3-one) as the fluorescent probe. The FL oxidized products induced by peroxy radical have been identified by LC/MS, and the reaction mechanism was determined to proceed as a classic hydrogen atom transfer (HAT) mechanism. Unlike other popular antioxidant activity methods, the improved ORACFL assay provides a direct measure of hydrophilic chain-breaking antioxidant capacity against peroxy radical (Ou et al, 2001). This study was analyzed at Food and Nutrition Laboratory, Institute of Nutrition, Mahidol University. ORAC values were calculated as described by Cao and Prior (1999) using a regression equation between the Trolox concentration and the net area under the fluorescence decay curve. The area under the curve was calculated as where  $f_0$  is the initial fluorescence reading at 0 min and  $f_i$  the fluorescence reading at time  $i$ . The net AUC was obtained by subtracting the AUC of the blank from that of the sample. All antiradical activity measurements were performed in triplicate, and results were expressed in  $\mu\text{MTE}/\text{kg dry mass (DM)}$  (Judith et al, 2016).

$$AUC = 0.5 + \left(\frac{f_1}{f_0}\right) + \left(\frac{f_2}{f_0}\right) + \left(\frac{f_3}{f_0}\right) + \dots + \left(\frac{f_i}{f_0}\right)$$

### DPPH Measurement

A part of xanthone solution was measured by DPPH assay. The method of analysis was performed according to the method of Brand Williams et al. (1995) with some modifications. DPPH stock solution was prepared dissolving 24 mg DPPH in 100 mL absolute methanol (100%), and stored at 8 °C until needed. The working solution was obtained by 10 folds dilution of the stock solution. Aliquots of 10  $\mu\text{L}$  of the xanthone solution extracts were mixed with 9.99 mL of the working solution. The absorption was measured at 515 nm

using a UV-Vis spectrophotometer model UV 1800 Shimadzu by immediately after 15 min of incubation at 25 °C. Report the value of absorbance by equation as below. The value of DPPH method will be report as EC50 % Radical Scavenging as equation below

$$\% \text{Radical Scavenging} = [ (AB - AA) / AB ] \times 100$$

### **Turbidity measurement**

Turbidity of xanthone solution was applied measurement by Turbidity meter Lovibrand model TB 210 IR. The sample were prepared for 5 levels of xanthone concentrate start with 4.25 milligram/100 gram because of the turbidity meter can be detected sediment in water solution at 5-1500 NTU. Turbidity measurements are reported in nephelometric turbidity units (NTU).

### **Statistical analysis**

Results are presented as mean values with their standard errors. Statistical analysis was carried out using single-factor one-way ANOVA. DMRT post hoc test was performed to determine the significant difference between the groups. Results were considered significantly different when  $p < 0.05$  was obtained. The correlation of data was testing the coefficient from SPSS program.

### **Prediction model**

Linear regression attempts to model the relationship between two variables by fitting a linear equation to observed data. One variable is considered to be an explanatory variable, and the other is considered to be a dependent variable. For example, a modeler might want to relate the weights of individuals to their heights using a linear regression model.

Before attempting to fit a linear model to observed data, a modeler should first determine whether or not there is a relationship between the variables of interest. This does not necessarily imply that one variable causes the other (for example, higher SAT scores do not cause higher college grades), but that there is some significant association between the two variables. A scatterplot can be a helpful tool in determining the strength of the relationship between two variables. If there appears to be no association between the proposed explanatory and dependent variables (i.e., the scatterplot does not indicate any increasing or decreasing trends), then fitting a linear regression model to the data probably will not provide a useful model. A valuable numerical measure of association between two variables is the correlation coefficient, which is a value between -1 and 1 indicating the strength of the association of the observed data for the two variables.

A linear regression line has an equation of the form  $Y = a + bX$ , where  $X$  is the explanatory variable and  $Y$  is the dependent variable. The slope of the line is  $b$ , and  $a$  is the intercept (the value of  $y$  when  $x = 0$ ).

## **Result**

The result of this research was shown in 2 parts. First, reported the detail on the observation value as ORAC, DPPH %Radical Scavenging and Turbidity and second, reported the correlation between 2 factors which responds to the ORAC value in linear regression to predict the ORAC value by prediction model.

### **The observed value responds to exact xanthone concentrate**

The exact xanthone extract concentrated was analyzed three observation values: ORAC, DPPH and Turbidity. The initial xanthone extract was started at 4.25 mg /100 g. This concentrates the turbidity meter can measure appropriately. The results showed that the ORAC value was measured at 29.47  $\mu$ moles TE at an



initial xanthone value of 4.25 mg / 100g. According to the amount, the concentration of xanthone extract increased. And it was up to 130 ORAC  $\mu$ moles TE when the xanthone extract was concentrated at 21.25 mg / 100g. And the ORAC values of the 5 levels were statistically different (P 0.05). When the DPPH was analyzed by absorbance at 515 NM, it was found that when xanthone extract was started at 4.25 mg / 100g, the absorbance was at the level of 4.76 and decreased steadily. As the amount of xanthonenes increases and when the maximum extract concentration of 21.25 mg / 100g, the absorbance decreased at the level of 3.67 and were statistically different (P 0.05). When calculating the % Radical scavenging, it was found that at the concentration of xanthone extract at 4.25 mg / 100g, the value of% radical scavenging was 3.07. And the value increased steadily as the amount of xanthone concentration increased. Xanthone extract concentrations at level 21.25 % radical scavenging values were higher at 25.07 and there was a statistically significant difference (P <0.05). And analyzed the turbidity, it was found that at the concentration of xanthone extract, 4.25 mg / 100g, the turbidity value was 56.87 NTU. When the xanthone extract concentration was increased to 8.50, 12.75, 17.00 and 21.25, the NTU value increased followed by 108.47, 149.30 193.15 and 250.40 respectively. The observation value was shown as the table 1.

Table 1 The observation value as ORAC, DPPH % Radical Scavenging and Turbidity.

Crude Xanthone (mg)	ORAC ( $\mu$ moles TE)	DPPH Absorbance 515 NM	%Radical Scavenging	Turbidity (NTU)
4.25	29.47 $\pm$ 0.50a	4.76 $\pm$ 0.10a	3.07 $\pm$ 1.33a	56.87 $\pm$ 4.46a
8.50	66.70 $\pm$ 1.64b	4.52 $\pm$ 0.90b	7.55 $\pm$ 1.83b	108.47 $\pm$ 9.04b
12.75	70.70 $\pm$ 2.90b	4.27 $\pm$ 0.16c	12.73 $\pm$ 2.96c	149.30 $\pm$ 11.90c
17.00	105.71 $\pm$ 3.70c	4.02 $\pm$ 0.14d	17.91 $\pm$ 2.82d	193.15 $\pm$ 16.14d
21.25	130.94 $\pm$ 3.50d	3.667 $\pm$ 0.15e	25.07 $\pm$ 3.09e	250.40 $\pm$ 14.27e

### Prediction model

From the results of the estimation of ORAC, DPPH and Turbidity value, when compare with xanthone, it was found that all values tended to increase significantly with the increase in xanthonenes value. Where all values have a variable linear relationship. Therefore, various values can be analyzed for correlation to create an equation to predict ORAC from other values with linear regression as shown in Figure 1.

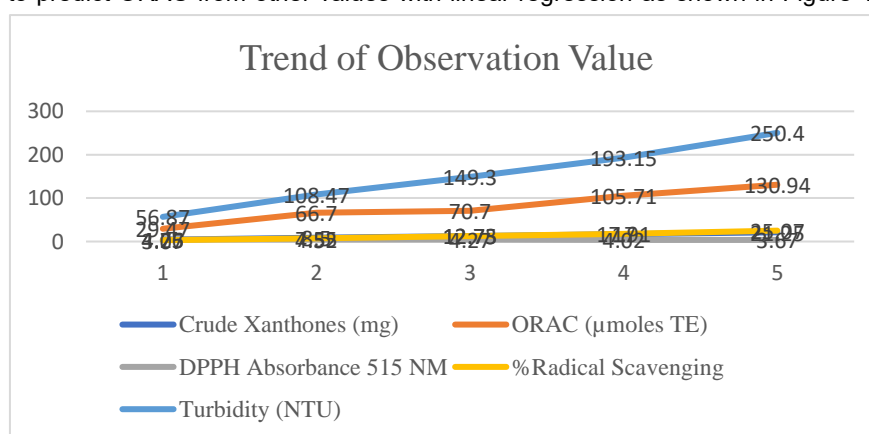


Figure 1 The trend of observable value relate to xanthone value

A linear regression line has an equation of the form  $Y = a + bX$ , where  $X$  is the explanatory variable and  $Y$  is the dependent variable. The slope of the line is  $b$ , and  $a$  is the intercept (the value of  $y$  when  $x = 0$ ).

The regression equation is written as  $Y = a + bX$

$Y$  is the value of the Dependent variable ( $Y$ ), what is being predicted or explained

$a$  or Alpha, a constant; equals the value of  $Y$  when the value of  $X=0$

$b$  or Beta, the coefficient of  $X$ ; the slope of the regression line; how much  $Y$  changes for each one-unit change in  $X$ .

$X$  is the value of the Independent variable ( $X$ ), what is predicting or explaining the value of  $Y$

The Equation of each model was calculated from coefficient of 2 factors were related in linear regression as table 2 the coefficient of xanthone and ORAC value.

Table 2 Coefficients of 2 factors correlation turbidity and ORAC

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	.565	5.141		.110	.914
Turbidity	.563	.033	.978	16.944	.000
a. Dependent Variable: ORAC		R=0.987	R Square =0.957	Adjusted R Square=.953	Std. Error of the Estimate=7.80577

Table 3 Linear equation of 2 factors correlation

Number	2 factors correlation	Equation	R Square
1	Xanthone* ORAC	$Y = 8.119 + 5.693X$	0.960
2	Xanthone*% Radical Scavenging	$Y = -3.043 + 1.279X$	0.900
3	Xanthone*% Turbidity	$Y = 10.113 + 11.10X$	0.968
4	Turbidity*ORAC	$Y = 0.565 + 0.563X$	0.957
5	Turbidity*% Radical Scavenging	$Y = -3.463 + 0.131X$	0.852
6	Turbidity*Xanthone	$Y = -1.138 + 0.980X$	0.970

### Linear equation of xanthoness and ORAC

From Table 3, it was found that the two factors with a linear relationship can be written as a linear equation. And have relatively high confidence with high R square value of 0.90 and above makes it reliable that this linear equation can predict each other precisely. And can be applied to measure the healthy mangosteen juice to determine the antioxidant value in the future.

### Summary

From the research results, the exact xanthoness were diluted to measure all 3 observations to study the linear relationship of the two factors between xanthoness and other observations to be able to use this correlation to construct a linear equation to predict the antioxidant value in xanthoness-based products. Which

the research results showed xanthenes at levels 4.25, 8.50, 12.72, 17.00 and 21.25 mg per 100 g were analyzed for ORAC values of 29.47, 66.70, 70.70, 105.71, and 130.94  $\mu$ moles TE respectively. Measured % radical scavenging were 3.07, 7.55, 12.73, 17.91 and 25.07 respectively. Measured turbidity values were 56.87, 108.47, 149.30, 193.15 and 250.40 NTU respectively. And can be used to do linear equations with high precision which can be observed from the R square value of 0.872-0.970.

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## Maintenance Efficiency Improvement of the Metal Stamping Machine

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### Abstract

The manufacturing industry is very competitive whether in factories or domestic organizations. Their goal is to achieve the highest profitability or the lowest unit price. In order to achieve this objective, required good planning therefore the manufacturing can be carried out efficiently without production breakdown or loss. As a result, the company has the reduction of its profits and produced in time as the customers' requirement. Metal stamping is important in the manufacturing industry. If the metal stamping machine is damaged suddenly or has a condition that unable to use. This will cause the productivity of a metal stamping machine to drop immediately. Moreover, it possibly further damage the other systems. Therefore, the preventive maintenance system of metal stamping machines for increasing production efficiency is important to work that should not be overlooked. At present, the maintenance of metal stamping machines is usually a quick repair without a prior plan. It means the fixing is conducted since the malfunction incurred. In principle, it requires the correct planning system such as preparing the workforce and tools for machine maintenance to be available at all times. In order to be able to prevent and fix problems that incurred in all forms effectively. Since the metal stamping machine in industrial plants must be operated continuously on a regular basis. The lack of an ongoing preventive maintenance plan can cause serious damage to the manufacturing industry.

This research studies the preventive maintenance system to increase production efficiency. It relies on four key factors in the production process: people, machines, raw materials, and capital. From the application plan for the preventive maintenance system. It was found that the mean after improvement had increased by 12.53% in production and decreased by 12.56% in failure as well as the increase of average time during the break down was 13,489. It showed the application of preventive maintenance has worked well to eliminate the problems caused by the loss of productivity in the industrial production plants for higher efficiency. This is also has reduced the production cost.

**Keywords:** Machine Performance / Maintenance

### Introduction

The business operators seek the great effectiveness of manufacturing their products. Metal stamping is important in the manufacturing industry. If the metal stamping machine is damaged suddenly or has a condition that unable to use. This will cause the productivity of a metal stamping machine to drop immediately. Moreover, it possibly further damage the other systems. Therefore, the preventive maintenance system of metal stamping machines for increasing production efficiency is important to work that should not be overlooked. At

present, the maintenance of metal stamping machines is usually a quick repair without a prior plan. It means the fixing is conducted since the malfunction incurred. In principle, it requires the correct planning system such as preparing the workforce and tools for machine maintenance to be available at all times. In order to be able to prevent and fix problems that incurred in all forms effectively. This study realized the importance of the aforementioned essence. Most of the controls are non-linear systems. The mathematical model cannot be performed easily. Therefore, fuzzy logic control is one option that can manage non-linear systems very well. The maintenance of metal stamping machines by using fuzzy logic control can be applied to prepare reports on the maintenance of metal stamping machines. For using in maintenance planning of metal stamping machines and support the management decisions, reduce the maintenance time of the metal stamping machine. Therefore, the metal stamping machine can work more efficiently.

### Research Objectives

1. The affect assessment and analysis of reason and problem arising from metal stamping machinery malfunctions.

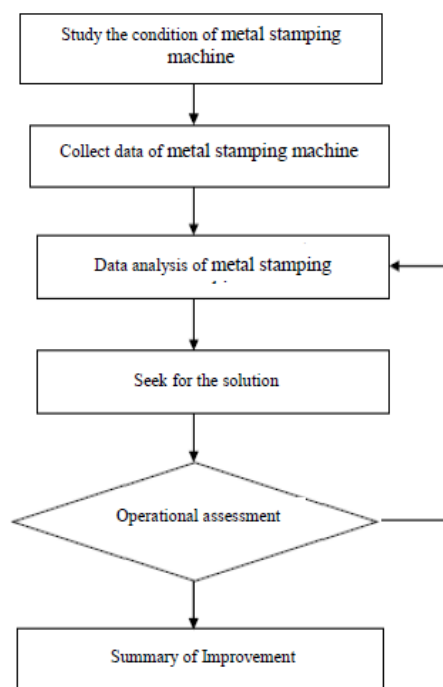


Figure 1 Conceptual framework for fixing the defect of Metal stamping machinery

2. Study the process of vehicle parts manufacturing. This study will use a car parts factory as a subject plant. This factory produces corrugated boxes from wood fibers and paper. There have production lines and machines management of factory layout which is called Product Layout by the production process. The production unit will be operated as the sequence of the production process (Product Layout). The production is started from steel sheets will be conveyed to each metal stamping machine for the production. Since the

workpiece is finished then it will be ready to ship by storing in the packaging and transport to the warehouse and await delivery to a customer.

3. Study the maintenance system of the factory, a case study of Machine maintenance system with the operating process as followed: starting from the engineering and maintenance department will make a machines list, machine maintenance methods. Preventive Maintenance plan (Annual PM) and propose for approval before implementing the PM. Since finished the PM, required the inspection. The inspection for workpiece completeness is including with recording the results and documentation of the PM timetable in accordance with the annual PM plan.

The machine has an annual PM plan but all the works will be done on Sunday and long public holidays. The technicians did not have an opportunity to work the same as the normal people who have holidays to be with their family. Moreover, the parts disbursement of the warehouse has a disadvantage once the parts have been delivered after purchasing. The store staff will call a technician to receive the items and store them. But when the parts are required to be reimbursed for use. The store staff cannot remember the appearance of the item request to the store or even where to keep it. In terms of the Machine cleaning system of the production department, machine maintenance for cleaning which the cleaning staffs will work on factory holiday on Sunday due to the machinery did not operate. The wages will be paid as overtime fees for those employees who come to wash the machine. The problem is Machine cleanser cannot clean the machines completely at all points due to unbalancing in work and workforce.

Table 1 Evaluation of the Severity on defect of Metal stamping machinery

Criteria	Appraisal value	Effect
Motor	1	No effect
Wedge	2	Little effect
Slide rail	3	Little effect
Magnetic contactor	4	Low impact
Flip Wedge	5	Medium impact
Bearing , Center Shaft	6	Major impact
Double pressed hand switch	7	Large impact
Drive belt	8	The impact is very heavy.
Rear drive shaft Bearing	9	Severe impact
Crankshaft wear bearings	10	Dangerous effects

### Research Scope

1. The study has conducted in factory as case study where is a vehicle parts manufacturing plant.
2. The study has conducted in the electrical maintenance department as the metric.
3. The study mainly focuses on the control system and disbursement of spare parts for machines.
4. To study and propose basic machine maintenance methods for production staff
5. To study and present, modify the PM schedules.

6. To measure the effectiveness of the system from reduction of machine loss hours as responsive variables.



Figure 1 The 500 tons forming machines used in the test.

## Expected benefits

### 1. preventive maintenance standards

- Maintenance standards are established to achieve the condition of the maintenance elements included cleaning standards, lubrication standard, customization and replacement standards, etc. Therefore, it must assign a technician who can perform the maintenance of parts or equipment, maintenance method, quantity required for each part/equipment, and appropriate maintenance intervals.

- Customization standard, parts replacement, and repairing by determining methods and the terms of the thematic practice, replacement of parts, and fixing. Sometimes, there requires disassembling the specialized equipment or parts. Due to some equipment requires special processing to assembly and prevent from damage. In some cases, maintenance times can be reduced through the correct use of tools and equipment as well as following safety regulations.

### 2. Measurement of improvement in PM (preventive maintenance) system

The measurement of the improvement in the preventive maintenance system. This study has determined the measurement methods as followed:

A. Measurement by using Mean Time Between Failure (MTBF), which MTBF can be determined by the following formula

$$MTBF = \frac{(Productive\ Time)}{\text{number of defect during failure period}}$$

This was measured by using the mean time between the machine failure. After fixing then calculate the value with higher MTBF means the improvement gives good results.

B. Measurement by percentage of machine downtime (% Machine Downtime)



$$\% \text{ Machine Downtime} = \frac{\text{Machine Downtime}}{\text{Operation Time}} \times 100$$

This measure by using the percentage of the Machine downtime, after fixing then calculate the value with lower % Machine Downtime means the improvement gives good results.

C. Production percentage means when we press the start button, the machine must be ready to use. There must be none of interruption or adjustment. If such events incurred, considered a waste of machine operation time. The total wasted time is the total machine Down Time. There also required the machine warm up and adjustment for a long time. The calculation showed the reduction of the said works.

$$\text{Production percentage} = \frac{\text{Total production time} - \text{breakdown time}}{\text{Total production time}} \times 100$$

### Research Method

- 1 Study and collect general information and operating systems of metal stamping machines in a case study.
2. Study and collect information on preventive maintenance and documentation of metal stamping machines
3. To analyze and improve the preventive maintenance system by planning the maintenance and organizing the machine documentation.
4. Summarize the maintenance results of metal stamping machines and find the efficiency of metal stamping production.

### Performance

Set up the prioritization for each part of the metal stamping machine. The analysis criteria have been adjusted by Siriran Silipiphat, who used the mean of 4 analytical factors for the suitability of the data. Each part has been prioritized to a metal stamping machine with the following details.

Factor 1: The amount of use of the parts with the following weight score.

- 1 score means rarely used of the part.
- 2 score means quite rarely used of the part
- 3 score means quite often used of the part
- 4 score means often used of the part

Factor 2. Price of a metal stamping machine with the following weight score

- 1 score means priced less than 3,000 baht.
- 2 score means priced between 3,001 - 5,000 baht.
- 3 score means priced between 5,001 - 10,000 baht.
- 4 score means more than 10,000 baht.

Factor 3. Effects on other parts when such parts wear out or damaged with the following weight score

- 1 score means does not affect other parts and the machine can continue production.
- 2 score means affect other pieces and the machine can continue production.

3 score means do not affect other parts but the machine cannot continue production.

4 score means affect other pieces and the machine cannot continue production.

Factor 4: Repair or replacement time, If the machine cannot be fixed, consider the replacement with the following weight score

1 score means repair or replacement period is less than 90 minutes

2 score means repair or replacement period is between 91 - 180 minutes.

3 score means repair or replacement period is between 181-270 minutes.

4 score means repair or replacement period is more than 270 minutes

From the prioritization by using the 4 analysis factors. The result from the 4 methods can classify the maintenance level into 3 levels as follows. The lowest average score is 1 and the highest average score is 3, therefore, the range  $\frac{4-1}{3} = 1$

Score level

Mean score 1.00 - 2.00 means the priority group c, requires few maintenance (less important).

Mean score 2.01 - 3.00 means the priority group b, requires moderate maintenance (moderate important).

Mean score 3.01 - 4.00 means the priority group a requires high maintenance (very important).

Table 2 Weighting of the importance of metal stamping parts at the downtime

Parts	Factors for the Analysis of defect in the Operation of Metal Stamping Machines				Mean	Importance
	1	2	3	4		
Motor	4	4	4	4	4	A
flip Wedge	4	4	4	3	3.75	A
Slide rail	3	1	1	2	1.75	C
Magnetic contactor	4	2	3	3	3	B
Rear driveshaft Bearing	2	2	4	4	3	B
Flip wedge-acceptor	4	1	4	4	3.25	A
Center shaft bearing	4	4	3	4	3.75	A
Double pressed hand switch	4	4	4	3	3.75	A
foot Pedal switch	4	1	1	3	2.25	B
Drive belt	4	3	3	4	3.5	A
Wind turbines	4	1	3	3	2.75	B
Crankshaft wear bearings	4	1	4	4	3.25	A

From weighting of the importance of the metal stamping parts once the machine has failure.

It was found that the significance means of group A was found in 7 parts: motor, flip wedge, flip wedge-acceptor, center shaft bearing, double hand press switch, drive belt, and crankshaft bearing. Therefore, they required further analysis.

The mean time between failure on each part of a metal stamping machine (Mean Time Between Failure (MTBF) was determined from the study of equipment failure in detail along with the study of the machine manual to find the average time between the failure of the equipment parts in detail. MTBF of group A must be used in the formulation of a preventive maintenance plan for metal stamping machines

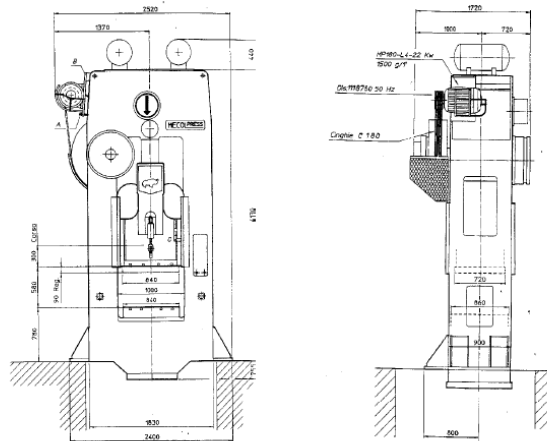


Figure 2 Italian hot stamping machines

Table 3 the percentages of defect and the MTBF of parts in 3 months.

Parts	Total production time (hrs.)	Time to stop production ( hrs.)	Actual production time ( hrs.)	MTBF	Number of crashes	percent	
						Production	Interruption
Motor	1,467	5	1462	143	3	99.04	0.94
flip Wedge	1,467	10	1457	287	2	98.11	1.89
flip wedge-acceptor	1,467	7	1460	234	2	97.77	2.30
center shaft bearing	1,467	30	1437	33	14	92.74	7.26
double hand press switch	1,467	20	1447	234	2	95.13	4.87
Drive belt	1,467	141	1453	212	2	95.40	4.60
Crankshaft wear bearings	1,467	65	1402	32	13	78.62	21.38
average	1,467	21.57	1445.43	167.86	5.43	93.83	6.18

Measurement results for the first three months prior to the adjustment, it was found that the total production was 1,467 hours, the number of failures was 44 times, the average production was 93.83%, the

average failure was 6.18%, and found that the crankshaft wears bearings have been maximum produced only of 78.62%, the lowest failure was 21.38 percent and the MTBF of metal stamping parts during the 3 months found that the parts with the highest downtime were the crankshaft wear bearings. This part has been selected for further preventive maintenance planning.

### Research results

The first results from using preventive maintenance. The results from the application of the preventive maintenance system in the bearings that had defect three months after the implementation of the PM system. It was found that the MTBF of the crankshaft wear bearings after the 3-month has the average improvement was 1,851 hours and 25 hours of downtime, instead of 1,467 working hours, 65 hours of downtime. It showed an improvement with effectiveness and the comparison of the performance between pre and post-maintenance of the metal stamping machines showed 12.56 % of the failure reduction while the production was increased at 12.53 % as shown in Table 4.

Table 4: The data of improvement results in metal stamping machines.

Information	Average value before adjustment	Average value after adjustment	Improvement
X1 (minutes)	29,354	37,024	7,670
X2 (minutes)	3,572	1,273	2,299
X3 (minutes)	24,880	35,700	10,820
X4 ( times)	15	3	12
MTBF	1,776	15,265	13,489
Percentage of Production	83.79	96.3 5	12.53
Percentage of Failure percentage	16.21	3.65	12.56

X1 = Total production time (minutes)

X2 = Down time (minutes)

X3 = Time the machine was run for production (min)

X4 = Number of failure (times)

MTBF = Mean time between failure

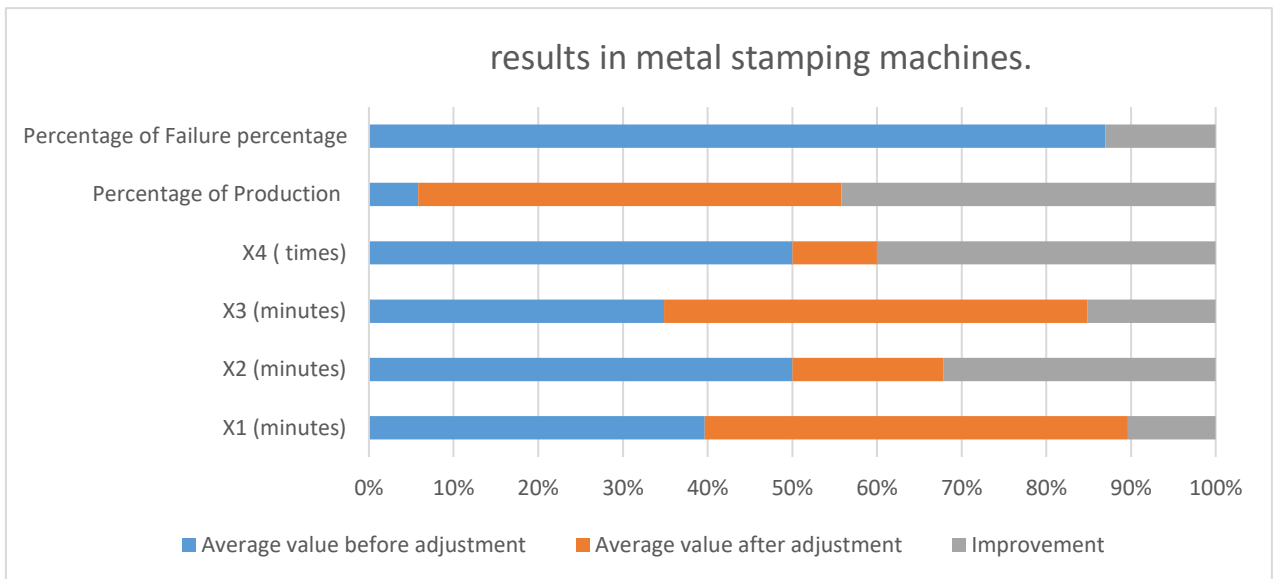


Figure 3 results in metal stamping machines

From planning the application of the preventive maintenance system. It was found that the mean after improvement had decreased as of 12.53%, production is increased as of 12.56% while the reduction in MTBF is 13,489. The result showed the effectiveness of the application of the PM system.

Table 5 Comparison of the MTBF in crankshaft wear bearings before and after adjustment in the crankshaft wear bearings of a metal stamping machine.

Topic	Before improvement	After renovation	Improvement results
MTBF	32	300	268
Production percentage	78.62	97.31	18.69
Failure percentage	21.38	2.69	18.69

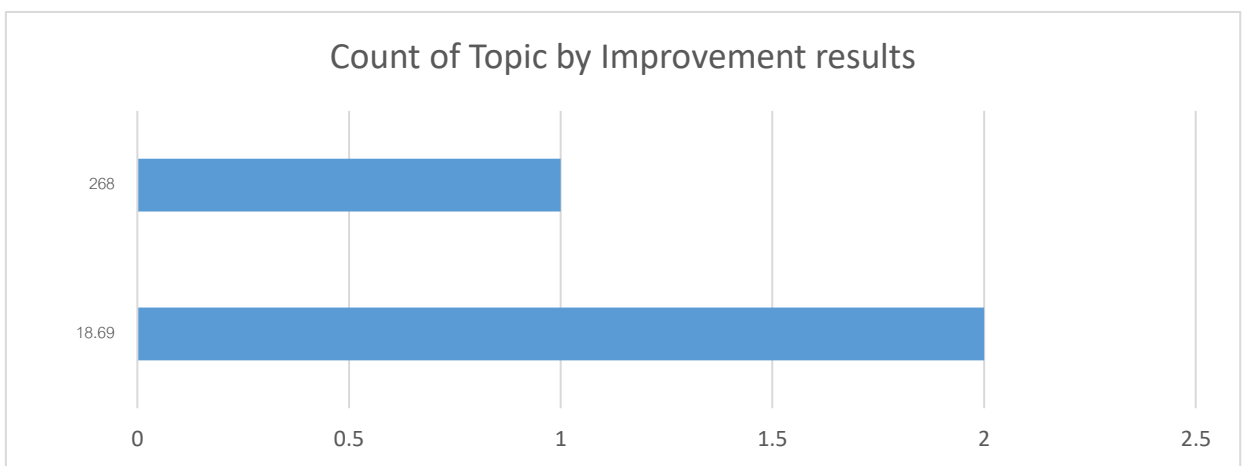


Figure 4 Count of Topic by Improvement results

The results from the performance and the improvement of metal stamping machines found MTBF of crankshaft wear bearings before adjustment was 78.62% and after the adjustment found the improvement in production time increased as of 81.31%. The failure of crankshaft wears bearings before adjustment was a 21.38% improvement in failure time, and decreased as of 18.69%. In terms of MTBF of crankshaft wear bearings of the metal stamping machine before adjustment was 32 hours and tended to be increased as of 268 hours.

## **Summary of implementation and suggestions**

### **Summary of implementation**

Summary of improvements in preventive maintenance of a mechanical metal stamping machine. This research proposed an application of a preventive maintenance system for metal stamping machines to increase production efficiency with the objective to increase the mean time between failures and reduce the percentage of failure time of the metal stamping machines while increasing the total productivity of the studied metal stamping machines. The study analyzed the current maintenance system. It was found that maintenance would be performed only when there was a malfunction without recording the failure cause analysis data for further preventive maintenance. In this study, the preventive maintenance system was developed, started from creating of the system to collect critical data of the failure during the downtime of metal stamping machine and analyzed the root cause of failure in the metal stamping machine. In the application of the preventive maintenance system, the following activities were as followed: the maintenance in the crankshaft wear bearings organized a document for operation control, prepared the maintenance plan, and established preventive maintenance practices.

From research operation by analyzing the failure of the metal stamping machine, set up the prioritization of issues during downtime, calculation of MTBF. It was found that the crankshaft wear bearing had the lowest MTBF or 32. After an improvement with preventive maintenance, it was found that the MTBF increased almost 10 times. It means the operations can be prevented while the total efficiency of the metal stamping machine was increased. The failure rate of the metal stamping machine was also decreased. This research proposes a preventive maintenance system to be applied in machine maintenance and implemented the PM system, Later, compared the results before and after the PM implementation. The result showed: MTBF increased on average as of 937.5 percent from the original value. The percentage of production has increased 18.69 percent of the original value. The failure percentage is decreased to 18.69 percent.

The results were measured by comparing results within 3 months before implementation of the PM system and 3 months after implementation of the PM system in a metal stamping machine. It was found that the Mean time between failures before improvement was 1,776 minutes after implementation of the preventive maintenance system was 15,265 minutes, representing a percentage of downtime before using the PM system was 16.21 percent and after PM system implementation, the percentage of downtime was increased as of 3.65%. The overall productivity of the metal stamping machine has been increased from 83.79% to 96.32.

### **Suggestion**

- There should be a detailed study of the costs incurred in order to compare the cost-effectiveness of the new system implementation.
- Should follow up the performance of employees in the new system closely whether employees act properly or not.

- Because the employees are still used to the former operation. Therefore, training should be provided for employees to understand the new system implementation.

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## Digital Platforms vs English Proficiency Development

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### Abstract

This paper develops documentary research for a digital platform for dealing with these trends and research challenges. We elicit research challenges by scrutinizing the literature on the digital platform, the key aspects of a digital platform, digital transformation, digitalization in education, and relevant research on how each digital platform is applied in learning and teaching English. Next, we draw upon the elicited research challenges combined with trends in the education domain to specify yet unanswered research questions for the digital platforms discourse. Next, we elicit conceptual, scoping, and methodological issues in the current literature and provide recommendations for digital platforms' scholars. The discussion section confronts the elicited challenges with trends in the digital platforms research to specify research questions for future research of the researcher's Ph.D.

**Keywords:** Digital platforms, English proficiency development, Thai students

### Introduction

"Thai English proficiency ranges from 89 to 100". How do you feel if you are Thais? How do I feel if I am an English teacher? On November 26, reporters reported on the English language's capacity index, revealed by Education First or EF, an international education company that specializes in language training, educational, travel, academic degree programs, and cultural exchange. It revealed that the Netherlands ranked at 1 while Thailand ranked at 89. According to the reporter, the English ranking is the following: 1. Netherlands, 2. Denmark, 3. Finland, 4. Sweden, 5. Norway, 6. Austria, 7. Portugal 8. Germany, 9. Belgium, 10. Singapore, 11. Luxembourg, 12. South Africa, while other Asian countries such as 27. Philippines, 30. Malaysia, 32. South Korea, 33. Hong Kong, 38. China, 45 Macau, 50. India, 55. Japan, 63. Bangladesh, 65. Vietnam, 74. Indonesia, 84. Cambodia, 89 Thailand, and 93. Myanmar, etc. It is clear that Thailand is in a very low ranking. (Matichon Online, 2563)

Moreover, the O-NET exam results from the National Institute of Educational Testing have been published for several years. Overall, the average score of English for Thai children at all levels, almost every time of the exam, has the lowest average score among the various subjects; however, the O-NET score of English language courses influences the selection for admission to a higher level, especially admitting to a university that scores here are taken into consideration. Therefore, there is a question to reflect on whether the teaching system in the English course is consistent with the modern students in the disruption era or not, does



the teaching align with the students' interests? However, nowadays it is found that the teaching and learning process of teachers cannot be effective for learners or may not be interesting and able to attract the learners enough so that they could not apply the knowledge or skills they had learned in school (or even part-time teaching institutes called tutoring schools) to be truly useful effect towards the future of Thailand. When Thai citizens get knowledge of the English language that is not appropriate in line with the globalized world, it can be seen that English is one of the most important skills of the era. Globalization-when the whole world is linked together in economic, social, political, technological, and cultural systems, etc. English is declared its official language in many countries. International organizations such as UNESCO, WHO, and multinational companies also use English to communicate in an organization. Even on the Internet, where the largest source of information is used mainly in English, the language used as the best medium of communication is English because it is a global language. Therefore, Thai people should pay more attention to English because language proficiency is no longer optional but necessary. English is an important skill to provide a gateway to a wider world and opportunities in many areas such as careers, business, or social status in the highly competitive era. If you can communicate in English very well, there will definitely be an advantage and more options.

Nowadays, there is a lot of research to show that today's technology or innovation affects students. For example, students today cannot live without Android and IOS mobile phones at all. These students will use their phones to access many digital platforms such as Facebook, Line, YouTube, Edmodo, Moodle Cloud, Schoology, Google Classroom, etc. Today's students represent the first generations to grow up with this new technology. They have spent their entire lives surrounded by and using computers, videogames, digital music players, video cams, cell phones, and all the other toys and tools of the digital age. Today's average college grads have spent less than 5,000 hours of their lives reading, but over 10,000 hours playing video games (not to mention 20,000 hours watching TV). Computer games, email, the Internet, cell phones and instant messaging are integral parts of their lives. (Marc Prensky, 2001, p.1)

The researcher is ; therefore, wondering if teachers can apply these technologies or innovations towards teaching and learning seriously, will they improve teaching and learning in English courses to be more effective or not? Therefore, I am also both teacher and researcher who would like to research the best way to improve English of my students. My aim is to prove whether each digital platform is suitable for English learning and teaching or not because I really would like to create smart classroom in the digital 4.0 era. After my great effort to increase the English proficiency of my students, I decided to do this documentary research that was the use of outside sources or documents to support my viewpoint or argument. Therefore, the purpose of this research was to explore, analyze, and synthesize the role of digital platforms in learning and teaching English before continuing doing my further research for my Ph.D.

### **Objective of the Study**

To explore, analyze, and synthesize the role of digital platforms in learning and teaching English before continuing doing my further research for my Ph.D.

## **Methodology**

This is the documentary research commonly used method of collecting information from the secondary data. The literature is relevant and consistent with the research objectives, including published research, academic articles, textbooks, teaching materials, the Internet, and newspapers that present related data regarding the topic.

The researcher selected the data from the secondary documents, according to the Scott Guidelines (1990; 2006), which have criteria for selecting relevant documents as follows: 1) Authenticity is a document that comes from a reliable source. Be accurate, complete, consistent with the context of the circumstances that occurred during the period of publication. 2) Credibility is a document that is free from errors and distortions. 3) There is representativeness which is a document that can show details instead of the same type of document. The description can represent a sample population and 4) Meaning: It is a document that can be easily understood, consistent with the objectives and significance of the research (Mogalakwe, 2006).

## **Research Findings, Discussion, and Suggestion**

### **Digital Platform**

Going digital is the only way to keep up with the rapid pace of the modern world. Therefore, we should understand the definitions of a digital platform. I chose the interesting definitions to be studied and discussed as follows:

Stephen Watts (2020) has worked at the intersection of IT and marketing for BMC Software since 2012. Stephen contributes to a variety of publications including CIO.com, Search Engine Journal, ITSM. Tools, IT Chronicles, DZone, and CompTIA. He said that in business enterprise terms, a digital platform can be thought of as the total of a place for exchanges of information, goods, or services to occur between producers and consumers as well as the community that interacts with said platform. It's imperative to understand that the community itself is an essential piece of the digital platform and that without that community, the digital platform has very little inherent value. He gave examples of successful digital platforms as follows:

- Social media platforms like Facebook, Twitter, Instagram, and LinkedIn
- Knowledge platforms like StackOverflow, Quora, and Yahoo! Answers
- Media sharing platforms like YouTube, Spotify, and Vimeo
- Service-oriented platforms like Uber, Airbnb, and GrubHub

Mohammad Nabil Almunawar et al. (2020) said that a digital platform is systems and interfaces that form a commercial network or market facilitating business-to-business (B2B), business-to-customer (B2C), or even customer-to-customer (C2C) transactions.

Ajani Yusuf Ayodeji et al. (2020) said that a digital platform is any electronic tool for communication includes desktop, mobile, social, and email software this covers websites and Social Media - Twitter, Amazon, Wattpad, etc.

Roseline O. Ogundokun et al. (2020) said that a digital platform is an established device erected on present-day cloud technology that makes the evolution of software or programs easy. It is, nevertheless, not a product in itself. The services, applications, and solutions on the platform are the products that you are the customer will interact with and pay for.

Alif Azizi Abdullah. (2020) said that a digital platform referred to as a two-sided market that involves an environment of a supplier and consumer groups that engages in transactions and exchanges.

Muhammad Anshari et al. (2020) said that a digital platform is a digital space that provides facilities for users to collaborate, interact, or transact digitally. Digital marketplace and digital platform are used interchangeably.

Dr. Watanyoo Suksangiam, a Ph.D. in Information Systems and Technology said that a digital platform refers to an infrastructure or a collection of goods, services, tools, and digital information to be used to create new products or services in the business. We call it vertical integration. It integrates upstream to downstream such as tablet computers. We can take the CPU and memory to assemble and build a portable computer where both the CPU and the memory are products by being bringing it into a new product is a portable computer. In terms of horizontal integration, it means that the product or service can be adapted to new markets, such as the transition from a laptop to a mobile phone. In the digital world, the digital platform will be used for both integrations. Even if the platform can be transformed into new products and services or easily adapt to new markets then competitors will have a competitive advantage.

The Information Technology and Innovation Foundation (ITIF) (2018) summarized that digital platforms are online businesses that facilitate commercial interactions between at least two different groups—with one typically being suppliers and the other consumers. Airbnb, Amazon, BlaBlaCar, Deliveroo, Facebook, Google, TaskRabbit, Uber, and Xing are all platforms, but they have different business models, and they interact with end-users and other businesses in different ways. Consequently, each platform has created different rules to optimize these interactions. Some important distinctions are the degree to which a platform relies on advertising revenue versus fees, its rules for managing suppliers and content, and its relationship with consumers.

The Information Technology and Innovation Foundation (ITIF) (2018) also added that digital platforms will also grow as they harness more data. Data enables platforms to better match users on different sides of a market, reducing transaction costs. Data also allows platforms to deliver personalized services to users, spot trends, and optimize services

Marc Pilkington (2017) said that a digital platform refers to the software or hardware of a website allowing for the interaction of its users.

Joe Kennedy (2015), a senior fellow at the Information Technology and Innovation Foundation wrote the topic, "Don't regulate Internet platforms, embrace them" that internet platforms such as Google, Facebook, and Spotify are creating an awkward quandary for regulators. They have grown rapidly and gained significant market share and yet they have an uncanny habit of creating terrific value for consumers and other players across the economy.

In conclusion, as a teacher, I think a digital platform can be thought of as a place for exchanges of information between the teacher and student as well as the community that interacts with said platform. If my students are interested in a digital platform like Google, Facebook, YouTube, etc. and I try to stay in that world of my students, it will be useful to encourage them to improve the method of learning English. Their English proficiency may develop better. This cognitive process of language acquisition varies in each person and that is why new teaching strategies must be applied in order to cover all the different ways of processing the

information obtained. Also, for this digital age of knowledge we have “digital natives”, named because they were born in the age of technology. (Marc Prensky, 2001, 1)

### **The Key Aspects of a Digital Platform**

Stephen Watts (2020) summarized the key aspects of a digital platform as the following:

- Ease of use and immediate appeal for users
- Trustworthiness and security (clear terms and conditions are necessary as well as privacy protection and assurances for intellectual property and data ownership)
- Connectivity through the use of APIs that allow 3rd parties to extend the ecosystem of the platform and its capabilities
- Facilitation of exchanges between users (producers and consumers)
- Providing value to the community and as a function of the size of the community (the bigger the community, the more value the platform can provide to all parties involved)
- Ability to scale without causing performance degradation

Maximilian Schreieck (2019), his research is “Governing Value Creation in Digital Platform Ecosystems.” He said that digital platforms have become ubiquitous. Digital platforms represent a promising strategy in the digital age. It is crucial to understand how things can create value with a digital platform. Platform owners apply platform governance to co-create and capture value.

Therefore, the key aspects of a digital platform above make me be interested in using them to improve the English proficiency of my students.

### **Digital Transformation**

Stephen Watts (2020) said that digital transformation is the use of new, fast, and frequently changing digital technology to solve problems.”

Ipatov Oleg et al. (2020) said that the digital transformation of higher education is understood as the transformation (change) of its entire model, namely the strategy, processes, organizational structure for the most effective use of the possibilities of the digital economy. The researcher also said that digitalization refers to the transformation (change) of an array of data into digital form so that they are more consistent with new tools and technologies of the digital economy and the subsequent exchange of this data through electronic communication channels. Digitalization is designed to perform routine tasks without the direct participation of the user, as well as for orientation in the modern world, since one of its characteristics is the systematization and ordering of data.

In my viewpoint as a teacher, digital transformation is to implement digital in education, learning and teaching to reach more learners, to activate more learners to be thirsty for knowledge and are doing their best to learn, to reduce paperless process, to focus on active and flexible teaching, and not to stick with the traditional way of learning and teaching.

### **Digitalization in Education**

Currently, modern researchers are increasingly turning to the topic of digitalization in education.

Ipatov Oleg et al. (2020) summarized that digitalization has several benefits. Thus, digitalization helps to resolve issues related to the accuracy of data provision. The information should be provided by the user from

the original source. For example, a digitized document is available to both the teacher and the student. There is no need to repeat the same information many times, while there is a possibility of its distortion.

Hüseyin Kazan, (2020) said that digitalization can have an impact on educational activities, both through complex technical knowledge, and through the possibly changing behaviour of learners. Already at the first stage of digitalization of the educational process, in many cases the need for physical presence for those users who have access to the Internet disappears. Digital accessibility bridges physical distance. The transition to digitalization in higher education must be carried out quite consciously and consistently, the introduction of strategic and tactical approaches is required.

Maria Odinkaya et al. (2019) reported that some researchers point out that digital learning is designed to complement traditional learning and facilitate the acquisition of digital competencies necessary to thrive in the digital age.

My point of view, I agree with some researchers that Maria Odinkaya reported. I think a digital platform is beneficial if we apply it in learning and teaching because it reaches more learners, activates more learners to be thirsty for knowledge because they are familiar with it. Also, it reduces the paperless process and focuses on active and flexible teaching. After this- documentary research, I will design more research to check whether my belief is correct or not.

#### **Relevant Research about Digital Platform Application in Learning and Teaching English**

Ru-Chu Shih (2011), the research topic is "Can Web 2.0 Technology Assist College Students in Learning English Writing? Integrating Facebook and Peer Assessment with Blended Learning." The findings suggested that incorporating peer assessment using Facebook in learning English writing can be interesting and effective for college-level English writing classes. Students can improve their English writing skills and knowledge not only from the in-class instruction but also from cooperative learning. Facebook can significantly enhance students' interest and motivation.

Gwo-Jen Hwang et al. (2011), their research topic is "Development of a Ubiquitous Learning Platform Based on a Real-Time Help-Seeking Mechanism." In this study, it proposed a context-aware ubiquitous learning platform (CULP) which uses low-cost cell phones with embedded cameras and Internet service to support ubiquitous learning. CULP is able to provide instant support for learners in the ubiquitous learning activity; that is, learners can receive help from the right people via the hints given by the learning system when they encounter problems during their learning activities. The experimental results of a Personal Computer-Assembling course show that, with the assistance of the new learning platform, both the learning efficiency and the learning achievement of the students were significantly improved.

Judine Ladbrook (2014), the research topic is "An Interactive Digital Platform for Preservice Secondary English Teachers' Reading: First Iteration Findings." The results showed that using an interactive digital platform with social networking characteristics for writing and reading book summaries augmented knowledge of titles, increased motivation for reading, developed a repository of titles for use in the first year of teaching, and demonstrated how a digital platform might be successfully used in schools.

Selami Aydin (2014), the research topic is "The Use of Blogs in Learning English as a Foreign Language." The results showed that blogging as a language learning strategy makes significant contributions to enhancing learners' cultural knowledge and cultural awareness about the target society. In addition, the use

of blogs enhances learners' cultural interactions, competencies and exchanges. Second, blogging plays an important role in developing learners' interactions and communications in the target language. Third, blogs are effective tools for developing speaking, reading and writing skills. However, with respect to speaking skills, while blogs are effective for developing skills related to conceptualization, brainstorming, articulation, monitoring, evaluating, self-presentation and information exchange, they have no effect on fluency, accuracy, language complexity, or pronunciation. Furthermore, the research indicates that the use of blogs enhances reading processes, results in positive perceptions of reading, encourages classroom discussions, and develops literacy and critical thinking skills. However, the use of blogs has little effect on learners' reading test results. Blogging positively affects learners' writing performance, their ability to monitor writing, their attitudes towards and perceptions of writing, and their interactions and participation in writing. More specifically, blogs are effective for developing rhetorical strategies, improving grammar skills, designing paragraphs and essays, revising written works, giving and receiving feedback and participating in peer review activities. The use of blogs also facilitates academic writing and enhances the sharing and exchanging of knowledge, provides a learning space for learners' to interact, allows for reflection on learning, develops autonomous learning, and improves self-expression. The use of blogs has also been found to considerably enhance learners' motivation, to affect positively students' perceptions of learning, and to result in positive attitudes towards learning. However, one study found that students have both negative and positive views regarding blogging. Finally, blogs have been found to enhance autonomous learning and knowledge and information sharing while also serving as a learning space for ELF learners.

Chunfu Charlie LIN et al. (2015), their research topic is "Learning English Writing via A Web Digital Platform: A Case of Taiwanese Aboriginal Nursing Students' Participation and Learning Outcomes." The results showed that the participants' perceptions and learning outcome to be significantly related to the chosen instructional pedagogy. Students responded favorably to statements such as "I think I can be more satisfied with this course arrangement and the designated teaching method", "I think learning by using a social network, web digital platform enables me to be an active learner" & "I think my attitude toward learning the given subject is more serious on a social networking, web digital platform. However, they either agreed or strongly disagreed with statements such as "I think the online English writing instruction can fully replace the conventional face-to-face instruction", and that "I think my interaction with the instructor and other students is greater in a social networking, web digital platform."

Ayten Kayacan and Salim Razi (2017), their research topic is "Digital Self-Review and Anonymous Peer Feedback in Turkish High School EFL Writing." The findings revealed that both self and peer feedback contribute positively to the revision of papers by student authors as they scored significantly better in the revised versions. Their writing scores indicated improvement in five major components: organization, content, grammar, vocabulary, and format. The participants also reported improvements related to content, grammar and format and indicated a positive attitude towards digital self and peer feedback. Since both digital self and peer feedback were found to be beneficial, EFL teachers should be encouraged to implement them in their writing classes.

Cao Da-Wei et al. (2018), their research topic is "Research and Application of Multimedia Digital Platform in the Teaching of College Physical Education Course." The results showed that multimedia digital

platform provides a new direction for the development of physical education in colleges and universities. It also promotes the development of physical education and the spread of sports skills.

Frøydis Vasset et al. (2019), their research topic is "Professional Learning through a Digital Platform." The aim of the study was to explore student experiences with interprofessional learning (IPL) mediated through a digital platform with the aid of a facilitator who participated in the virtual meetings to ensure focus and equality in dialogue. In this study, the students were familiar with virtual communication and found it to be a good tool in IPL. The results show that students gained insight into their own professions and the professions of the other participants, as well as into the importance of interprofessional collaboration. This initiative, however, is just the start of collaborative practice readiness, and the students found that they needed more experience with IPL.

Hung-chun Wang and Cheryl Wei-yu Chen (2019), their research topic is "Learning English from YouTubers: English L2 Learners' Self-Regulated Language Learning on YouTube." The results showed that the most highlighted purposes for learning English on YouTube were to explore more learning resources, to seek the attraction of learning English, and to explore cultural knowledge. After viewing the videos on YouTube, the students were more likely to press like and share the videos with their friends. Moreover, learning English on YouTube was considered to be more flexible, more interesting, and more interactive than formal learning in the classroom; nevertheless, this informal learning approach was also deemed less effective for students who wanted to improve their English or prepare for English exams.

Ipatov Oleg et al. (2020), their research topic is "The Impact of the Digital Transformation Process of the Russian University." The results showed that the digital knowledge and skills, and abilities that the university is developing need to be improved. Acceptance of the hypothesis and conclusions of the theoretical part shows the relevance when using the concept of key factors that facilitate the process of digital transformation in the educational system of Russia. The results of the qualitative research in this paper showed that students tend to be very concerned with the changes they face. It is required to strengthen the digital basis of the methodological support of Russian education, to develop competitive e-courses, to increase the competence of teachers in the new era.

Salvatore Tripodi et al. (2020), their research topic is "Digital technologies for an Improved Management of Respiratory Allergic Diseases: 10 Years of Clinical Studies Using an Online Platform for Patients and Physicians." The studies and clinical practice based on the use of AllergyMonitor have proven the reliability and positive impact of a digital platform including an electronic diary (eDiary) on the diagnostic precision of SAR in poly-sensitized patients as well as patient adherence to both, drug therapy and allergen immunotherapy.

Norman Patrick Harvey Arce and Ana Maria Cuadros Valdivia (2020), the topic of their research is "Adapting Competitiveness and Gamification to a Digital Platform for Foreign Language Learning." It was found that 81.03% of students are more inclined to use gamified digital tools, and also 82.76% of students feel more motivated to learn a second language using this methodology.

Samantha G. Daley (2020) et al. (2020), their research topic is "Behavioral Engagement among Adolescents with Reading Difficulties: The Role of Active Involvement in a Universally Designed Digital Literacy Platform." It showed that students who started the year with lower reading comprehension skills were likely to benefit more from higher reading-related behaviors and more use of text-to-speech than those starting with relatively higher comprehension skills.

In conclusion, most research discussed above makes the researcher see the power of the digital platform in education and be thirsty for doing more research about it.

## **Conclusion**

The diffusion and importance of digital platforms operating as multi-sided values are rapidly increasing, for example, exchanging of information, goods, or services to occur between producers and consumers, facilitating social networks, supporting media sharing platforms, supporting service-oriented platforms, creating knowledge platforms, etc. Unquestionably, digital platforms are going to be an intrinsic part of many research. Digital platforms form uniquely new sociotechnical artifacts that force scholars to engage in conceptual and methodological innovation.

This paper seeks to identify and synthesize a series of possible contributing strands of research to advancing our understanding of digital platforms. We elicit research challenges by scrutinizing the literature on the digital platform, the key aspects of a digital platform, digital transformation, digitalization in education, and relevant research on how each digital platform is applied in learning and teaching English.

Our analysis explores and outlines several main benefits of a digital platform that matches with the good components in helping in education or learning and teaching English in the digital 4.0 era. as the following. Provides facilities for users.

- Create new products or services.
- Match users on different sides of a market.
- Reduce transaction costs.
- Ease of use and immediate appeal for users.
- Facilitate exchanges between users.
- Provide value to the community (the bigger the community, the more value the platform can provide to all parties involved).
- Be able to scale without causing performance degradation.
- Use new, fast, and frequently changing digital technology to solve problems.

Moreover, modern researchers are increasingly turning to the topic of how to use a digital platform in education or learning and teaching. After scrutinizing the literature on digital platform research, we found positive trends and lots of benefits of the digital platform.

Therefore, it is clear that the digital platform in education or learning and teaching provides an opportunity for researchers to recreate its relevance for other fields like increasing English proficiency. While the aim of this paper has been to raise awareness and stimulate discussion, it is our hope that it also will contribute to some initial conceptual clarity facilitating the further work- my Ph.D. dissertation, on populating the concept of the digital platform with meaning, precision, and depth. Finally, initiate an innovation created by the digital platform to enhance the English proficiency development of Thai students.

## **Limitations and Further research**

This article is documentary research by studying related literature that shows the elementary elements of each concept to test the validity of these elements in the context of society. It can further develop into



research like quantitative research to confirm the factors found by the method of confirmation factor analysis and as a qualitative research framework to establish the grounded theory to complete the study process and then initiate the innovation for education.

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## **New Normal Learn Simulation Using a State Transition Model**

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### **Abstract**

This presentation, the purpose is to illustrate using a State Transition Model for characterizing New Normal Learn Simulation to advance the theoretical and practical skills of fifty-nine students from the Department of Information Technology, Faculty of Science and Technology, in second 3-month of year 2020. The procedures of the simulation were as follows. Firstly, a teacher explained principles, secondly, students considered learn type then organized and were divided into three teams by themselves, thirdly, students characterized the simulation of case "New Normal Learn Simulation" for each started learn type, and finally, students took exam and discussed the interaction design in virtual classroom while teacher was their consultant. The equipment consisted of a simulation teaching step, informational documents, work sheets, and a selfassessment of interaction state transition model; characterizing simulation. The results showed that after the post examination, students work as a team, increased their theoretical knowledge, improved understanding in the characterizing simulation to use on the process of interaction design; and also had a satisfactory result in the strategy of developing a diverse learning process respectively.

**Keywords:** New normal learn type, The process of design, State transition model; HCI

### **Introduction**

In COVID-19 and/or Post-COVID-19, the development of the New Normal has its implication on education. During just the first few months of the pandemic, many classes turned to be on Zoom, Google Class, etc. In response to the COVID-19 pandemic outbreak in Bangkok, Bangkok are closed until further notice. My university remains operationing and learning by taking place thorough virtual classroom learning and/or online learning. However, all type of learning focuses on human and computer interaction.

Human and Computer Interaction (HCI), which concern about human and computer interaction composition, task analysis and dialogues diagram, the process of design, interaction design and usability, event simulation, and prototyping.

Especially, the process of design focuses on the process, state status, input and output from each state of interaction.

So, Using simulation in HCI on the process of design has mostly concentrated on characterizing simulation to use.

In this research, the researcher has adopted the State Transition Model to characterize simulation of human and computer interaction; the behavior of case "New Normal Learn Simulation".

### **Objectives**

- 1) To characterize simulation by using state transition model

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- 2) To increase the student's theoretical knowledge
- 3) To improve the student's understanding and achievement in characterizing simulation by using interaction state transition model skills
- 4) To characterize simulation for using in HCI (Human and Computer Interaction) of new normal learning, which reflects the level of the strategy of Developing a diverse learning process.
- 5) To integrate the learner knowledge to the process of design

### Target group

The target group is the students of the IT Department, Science and Technology Faculty, Thailand, which has 59 undergraduate students in third semester of academic year 2020 .

### Literature review

#### The process of design

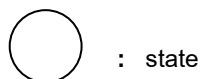
- (1) gathering requirements ; what is there and what is wanted
- (2) analysis ; for ordering and understanding
- (3) design ; for what to do and how to decide
- (4) iteration and prototyping ; for getting it right and for finding what is really needed!
- (5) implementation and deployment ; for developing / making it and getting it out there

#### The state transition model

:- the creation of a formal executable description of the user interaction with the system, based on augmented state transition diagrams.

(Al Wasserman - Software Engineering, IEEE Transactions on, 1985)

:- Symbol usage such as



→ : input or output condition

### HCI (Human and Computer Interaction)

: the approach and framework for system development ; HCI, include requirement gathering, analysis, design, and implement.

#### Step to Draw a state transition model

- Step1 - Define States
- Step2 - Describe States
- Step3 - Draw Transition
- Step4 - Define Transition Triggers
- Step5 - Define Guard Condition

### New Normal Learn Type

- (1) Classroom learning; include normal classroom learn and/or virtual classroom learn

- (2) Online learning, which can learn anytime and/or learn anywhere
- (3) Self learning, according to learner background, experience, consideration, and make decision.

**Instrument**

- 1) The simulation characterizing teaching step
- 2) The informational documents and work sheets
- 3) The 3 various learn type-started simulation of self-assessment interaction state transition model (3 examples detailed as figure 1: Classroom-started interaction state transition model for New Normal Learn, figure 2: Online-started interaction state transition model for New Normal Learn and figure 3: Self-started interaction state transition model for New Normal Learn).

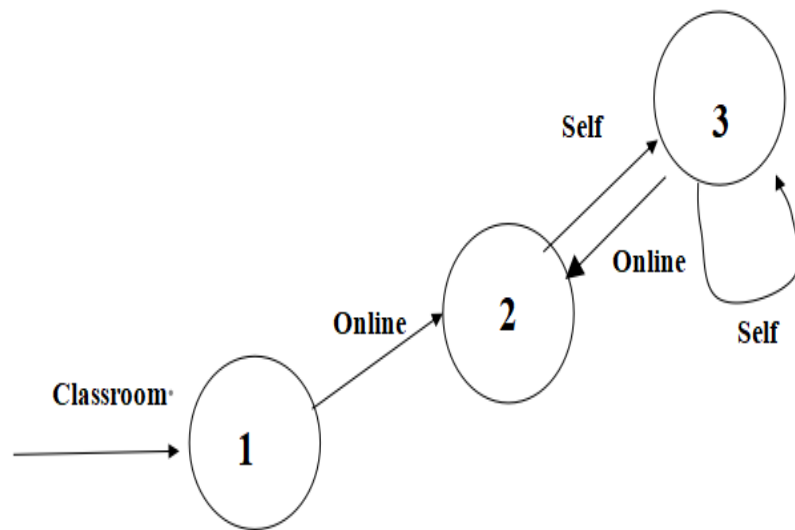


Figure 1: Classroom-started interaction state transition model for New Normal Learn

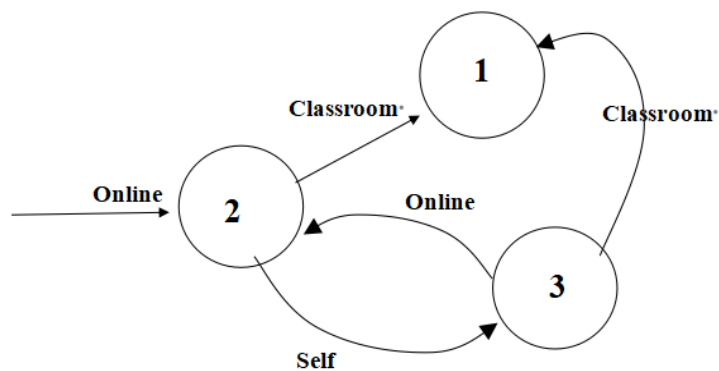


Figure 2: Online-started interaction state transition model for New Normal Learn

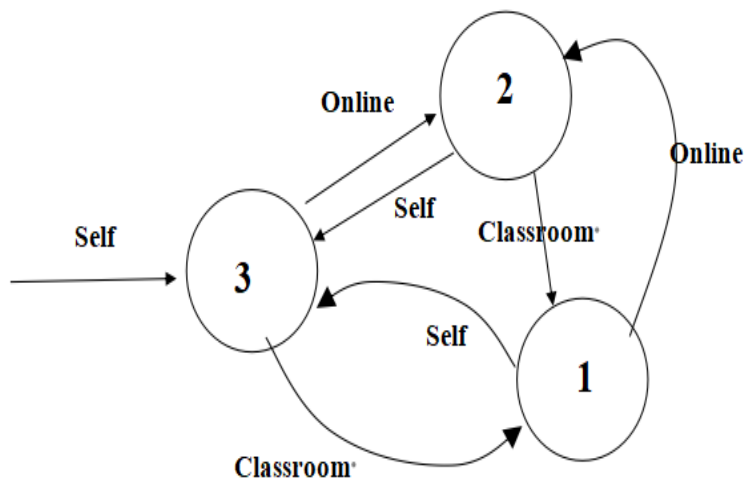


Figure 3: Self-started interaction state transition model for New Normal Learn

### Characterizing Simulation Procedures

- 1) The teacher explains principles about the characterizing of simulation
- 2) The students consider and organize the 3 teams by themselves
- 3) The students, each team use state transition model to simulate their Human and Computer Interaction according started learn type (New Normal Learn)
- 4) Each team considers and discuss each started place of the “New Normal Learn Simulation” in virtual classroom via Zoom ; while teacher is their consultant.
- 5) Evaluate result by questionnaire

### Case Study

In this section, we discuss several case studies and map them to our previously-discussed state transition model ; Each case studies have different started learn type. We consider the following 3 learn type-started “New Normal Learn Simulation” :

- 1) Classroom-started Interaction state transition model for New Normal Learn
- 2) Online-started Interaction state transition model for New Normal Learn
- 3) Self-started Interaction state transition model for New Normal Learn

### Conclusion

- 1) To summarize, Students have considered a state transition model to describe the behavior of case “New Normal Learn Simulation”.
- 2) Students also showed how this model helps to describe “New Normal Learn Simulation” by focusing on 3 various learn type-started Simulation.

3) Future work includes further creation a prototype system, and evaluate the prototype through validation.

4) Students have a better understanding in New Normal Learn simulation, how to characterizing interaction simulation on state transition model, which evaluate by questionnaire ;correct answer for first times and second times is 38 and 48 respectively(64% and 82%) .

5) Students can work in a team and have a virtual child-center skill

6) The students can have a hand-on experience, instead of only learning the Theory.

7) The students can practice different variety skills on HCI simulation characterizing.

8) The teaching course should consists of the simulation.

9) The students have a satisfactory result in the level of standards in line with the strategy of Developing a diverse learning process.

10) Students have class GPA more than 3.00

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**A Study Case of System Analysis and Design for Development of  
Sterile Medical Device Management Information System with  
RFID and Supply Chain Concept for Hospital CSSD  
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**Abstract**

The purposes of this research are to analysis, design, and approve the analysis and design on sterile medical device management information system for hospital CSSD with RFID and supply chain concept. The sample group of this research consists of the experts on information technology system, 10 professionals on sterile medical device management, and other 5 experts. The sample group is selected by purposive sampling. The research instruments are the manual for system analysis and design, structured interview, questionnaire, the approval form for analysis and design on information system by the experts. The research instrument had passed for finding on the value of consistency in a range from 0.50-1.00. The statistics used for data analysis are mean and SD. The research findings indicated that the result from analysis and design on information system by means of analysis and design with Use Case Diagram Class Diagram, E-R Diagram, and design for coordinating with users, is at high level. The result is approved for use by the experts. In conclusion, the system analysis and design can be applied for developing on sterile medical device management information system for hospital CSSD with RFID and supply chain concept in the next phase.

**Keywords:** Analysis and design on information system, Sterile medical device management, Information system, RFID, Supply chain concept

**Introduction**

During the past 30 years, the medical technology industry has developed an amazing number of life saving and life enhancing products. These products and therapies have helped millions of patients to live longer, better quality lives. With continuing innovation and the rapid advancement of technologies, medical devices are currently one of the fastest growing industries (Sterile Barrier Association, 2020)

Each year, Thailand has many patients receiving services from the public health facilities. According to statistical data collected by the National Statistical Office, it reveals that the total number of patients receiving services from the public health facilities is 12,445,264 in year 2012 and the total number of the injured and disabled by accidents is 946,435 in year 2020 (Accident Information Center, 2020). With a large number of patients, the needs for sterile medical devices used for the treatment has been significantly increased. Therefore, it is necessary to have an adequate supply of devices, especially for the reusable items of sterile medical devices (Reused items). In general, all sterile medical devices must be sterilized to kill the germs which may lead to or cause other infectious diseases before use (Bamrasnaradura Infectious Diseases Institute, 2017).



And, the preparation of sterile medical devices is normally performed by Central Sterile Services Department (CSSD), the main unit which collects the used medical devices to be brought into sterilization process before being distributed to other departments in the hospital for further examination and treatment of patients.

The central sterile services department (CSSD), also called sterile processing department (SPD), sterile processing, central supply department (CSD), or central supply, is an integrated place in hospitals and other health care facilities that performs sterilization and other actions on medical devices, equipment and consumables; for subsequent use by health workers in the operating theatre of the hospital and also for other aseptic procedures, e.g. catheterization, wound stitching and bandaging in a medical, surgical, maternity or paediatric ward. The operations of a sterile services department usually consist of the cleaning, disinfection, and sterilization of reusable medical equipment. Reusable medical equipment, or RME, can consist of any medical equipment from stainless steel surgical instrumentation, to IV pumps and crash carts. RME is separated into three classes: non-critical, semi-critical, and critical, with each class requiring a minimum level of reprocessing.

A sterile medical device is a device that must be free from live bacteria or other microorganisms and their spores. Sterile medical device requirements are defined by national or regional standards and regulations, which detail the sterility requirements. Sterilization of a medical device may include exposure to ethylene oxide, gamma irradiation, steam, dry heat, or chemical sterilization under defined conditions, and any necessary post-treatment required for the removal of by-products (Center for Devices and Radiological, 2020). The sterile medical device management information system for hospital CSSD will assist the hospital in management on the sterile medical devices with the following concepts. The first concept is that the need for sterile medical devices used for the treatment on the patients must be properly managed and inspected from the preparing process, especially for the Reused items. Moreover, it finds from the study that the sterile medical devices have not been used until the expiration date, and many devices which were requested for being used in an emergency have not been used either, and those are the main cause for economic losses in each year. The second concept relates to monitoring on sterilization process. From the fact that hospital CSSD is the unit, which is responsible for collecting the sterile medical devices to be sterilized before use with the patients, if the sterilization process does not perform correctly, it may cause illness and further complications with patients.

From the above, the researcher conducted a research project phase 1 for analysis and design on sterile medical device management information system with RFID and supply chain concept so as to provide solutions for the problems occurred from the old system, to develop the information system with RFID and supply chain concept, and to be used as the tools in monitoring and inspecting on the processes to meet with the international standards. Besides, it aims at assuring the quality of sterilization process used for sterile medical devices and linking the database of hospital CCSD to connect nationwide for creating a big database of sterile medical device in analysis and management in the future.

## **Objectives**

1. To analyze and design the sterile medical device management information system for hospital CSSD with RFID and supply chain concept.

2. To approve the analysis and design of sterile medical device management information system for hospital CSSD with RFID and supply chain concept.

**Methodology**

This study is classified as the Research and Development and conducted by the following methodology.

1. Population and Sample Group are the experts on information technology system, 10 professionals on sterile medical device management, and other 5 experts. The sample group was selected by purposive sampling.

2. Research Instrument consists of the manual for system analysis and design, structured interview, questionnaire for the experts on information technology system, the approval form for analysis and design on information system by the experts. The research instrument had passed for finding on the value of consistency in a range from 0.50-1.00. and finding on the value of confidence (Reliability) for the manual on system analysis and design at 0.95.

3. Research methodology

This study had been conducted according to the principle of Rapid Prototype Base Methodology, which was used for being the process for developing the information system. For the first phase, the analysis and design are conducted with analysis and design by Use Case Diagram Class Diagram and E-R Diagram workflow which have the following methodology.

3.1 Stage of Studying and Formulating Problems - The researcher studied on the problems from the old working processes, and the need for system from the relevant persons by conducting the interviews with 15 hospital CCSDs in the small-sized hospitals, the medium-size hospitals, and the big hospitals. The first stage is summarized in the below Fish Bone Diagram which points out the major and minor problems. As provided in Figure 1.

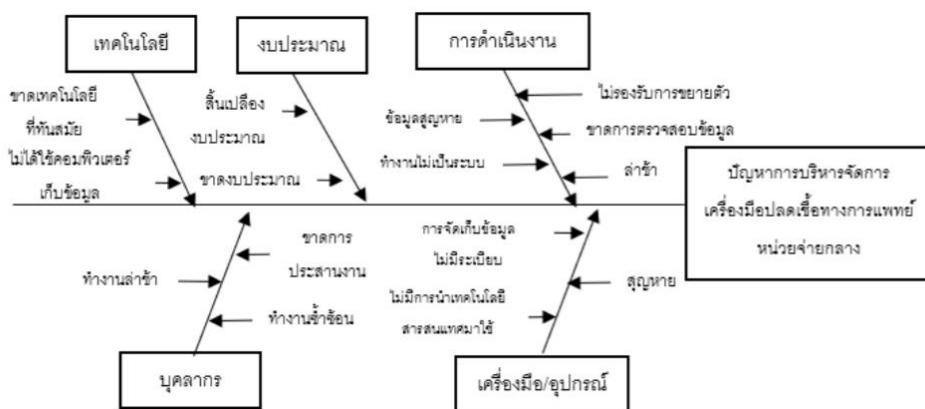


Figure 1 Fish Bone Diagram pointing out the major and minor problems of system

3.2 Stage of System Analysis is the stage where the researcher brings the problems in the first stage to be analyzed and find the possibilities from the developed system and system working processes. In addition, the data will be analyzed to define the conceptual framework for developing the system together with

the supply chain concept consisting of need management, capacity and resource management, customer relation management, service process management, service performance management, including the information system management. In this regard, RFID is used as an innovation to help those managements on the information system. After that, the data will be presented to 5 experts on information technology for consideration.

3.3 Stage of System Design is the stage where the researcher brings the analyzed data from the Stage of System Analysis to be summarized and used for design with RFID and supply chain concept, such as, design for working processes, design for data system, design for interactions with users. Then, the data will be presented to 5 experts on information technology for consideration.

3.4 Stage of Inspection for Appropriateness and Accuracy is the stage where the investigators, 5 experts on information technology, and other 5 experts from hospital CSSD inspect the relation, linkage, and accuracy of system which is created from analysis and design under supply chain concept and modify the system for the draft of system analysis and design.

3.5 Stage of Approval on Analysis and Design is the stage where the draft of system analysis and design is presented to 5 experts to consider for actual use. At the final stage, the researcher concludes the approval result with mean and Standard Deviation (SD).

4. Data Analysis - The statistics used for data analysis are mean and Standard Deviation (S.D.). The analysis is conducted by questionnaire with rating scale, having 5 levels. The scores are from 1 to 5. The lowest score is 1, which implies to strongly disagree. The highest score is 5, which implies to strongly agree. The total scores are used for finding average at each level. The criteria for interpreting the average can be read in 5 levels as follows. The approval for system analysis and design requires reaching 50 percentage in each item.

Average score at 4.51-5.00 means Strongly	Average score at 3.51-4.50 means High
Average score at 2.51-3.50 means Moderate	Average score at 1.52-2.50 means Little
Average score at 1.00-1.50 means Least	

## Research Findings

The result from analysis and design on sterile medical device management information system for hospital CSSD with RFID and supply chain concept is the information system, developed from document system to an information system in Electronic Form. The information system enables the users to work conveniently, reduce unnecessary working processes, save time and resources, as well as help to collect and use the information efficiently with RFID which is applied for the management on medical devices, and the supply chain concept that helps in management. From the system analysis and design, it not only creates the procedures for management on the system, but also the relation of each part in the system which are shown in UML diagram that points out the working processes of developed system in Figure 2 - 5 and displays the information via the screen with the concept of responsive web design, a concept that the size of program can be modified on the website to show the result and screen resolutions on different devices. As provided in Figure 6.

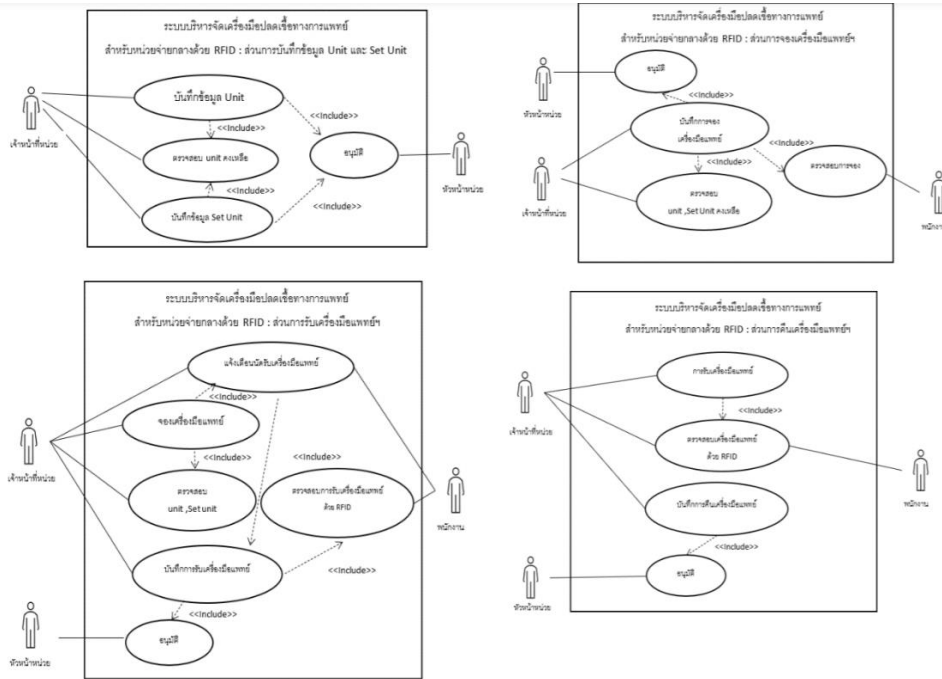


Figure 2 Use Case Diagram of system

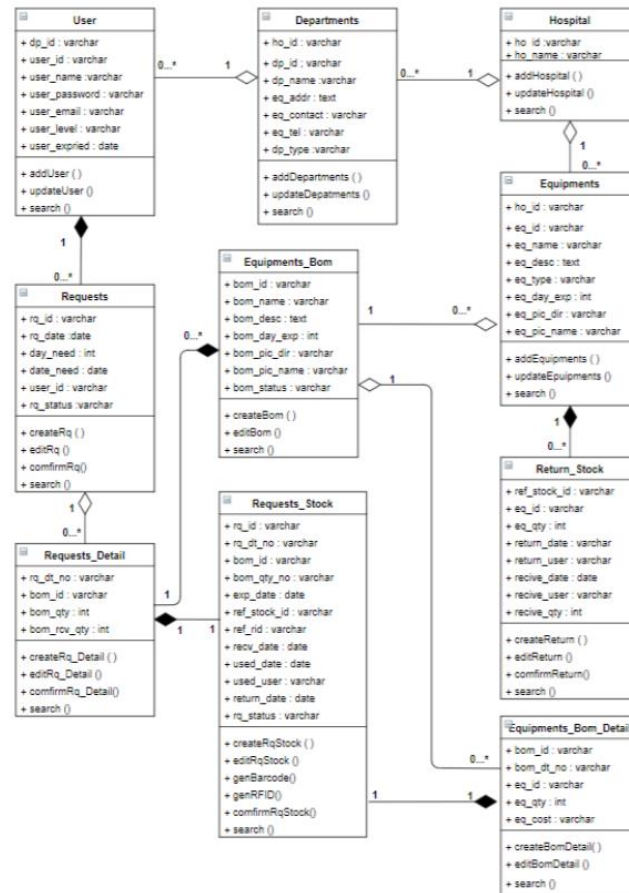


Figure 3 Case Diagram of system

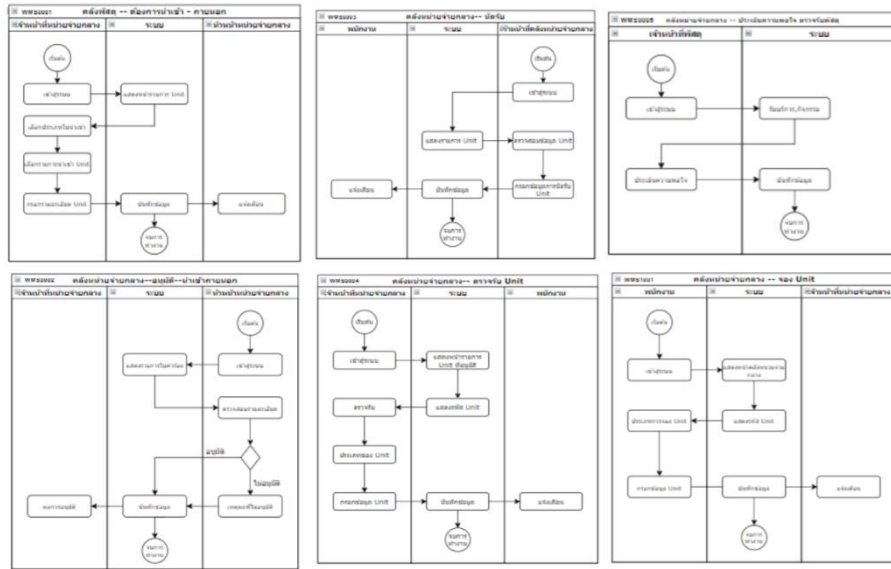


Figure 4 The workflow of system

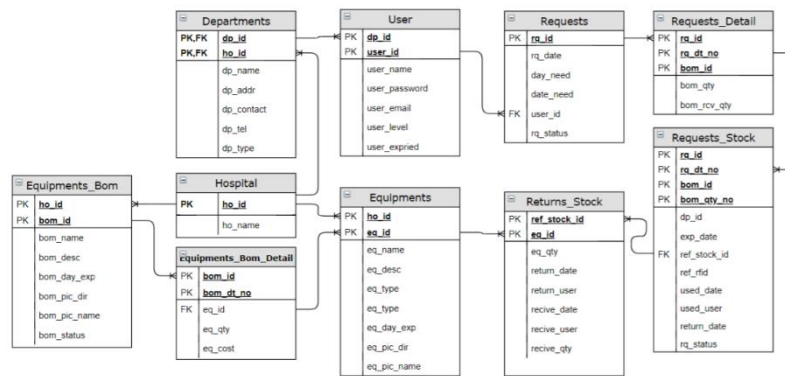


Figure 5 ER-Diagram of system

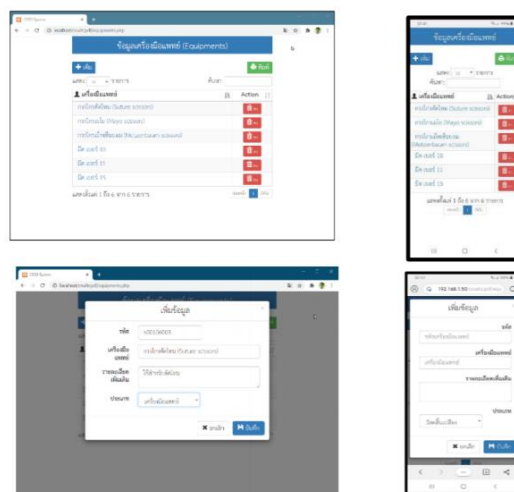


Figure 6 Example of system interface

The result of questionnaire on analysis and design on sterile medical device management information system for hospital CSSD with RFID and supply chain concept from 10 experts as shown in the Table 1.

Table 1 The result of questionnaire on analysis and design on sterile medical device management information system for hospital CSSD with RFID and supply chain concept from the experts

List	$\bar{x}$	S.D.	Result
<b>1. Understanding on the System</b>			
1.1 Acknowledge and understand the problems from old system	4.40	0.52	High
1.2 Can classify and provide solutions for old system	4.20	0.42	High
1.3 Classify the needs from old system	4.10	0.57	High
1.4 Interpret the needs from old system	4.30	0.48	High
1.5 Have procedures and methods in the system to resolve the problems from old system	4.50	0.53	High
1.6 Can apply the information technology to resolve the problems from old system	4.20	0.42	High
<b>Average for understanding on the System</b>	<b>4.32</b>	<b>0.47</b>	<b>High</b>
<b>2. System Analysis</b>			
2.1 Procedures in the system in accordance with the system for solutions	4.50	0.53	High
2.2 Can explain the procedures with proper and clarity	4.40	0.52	High
2.3 Procedures in accordance with the scope in supply chain concept	4.10	0.32	High
2.4 Symbols for the procedures meet the international standards	4.20	0.42	High
2.5 Symbols used in an appropriate and correctly way	4.30	0.48	High
2.6 The analyzed and designed system can be compatible with RFID	4.10	0.32	High
<b>Average for System Analysis</b>	<b>4.27</b>	<b>0.45</b>	<b>High</b>
<b>3. Design on Database</b>			
3.1 The scope of collated data is in line with system	4.50	0.53	High
3.2 Symbols for ER- Diagram meet the international standards	4.00	0.00	High
3.3 Symbols for ER- Diagram are appropriate and accurate	4.30	0.82	High
3.4 The design of database related to the analyzed data of system	4.00	0.00	High
3.5 The relation of database in accordance with the scope of work	4.20	0.42	High
3.6 The Data Dictionary is appropriate and accurate	4.30	0.48	High
3.7 Database is suitable for development	4.50	0.71	High
<b>Average for Design on Database</b>	<b>4.26</b>	<b>0.53</b>	<b>High</b>
<b>4. Design for Input and Report</b>			
4.1 Symbols for design on the screen can signify well	4.20	0.63	High
4.2 Design the screen in accordance with the data in database	4.00	0.00	High
4.3 Design the screen to be suitable for use and in accordance with RFID	3.90	0.32	High
4.4 Design the screen to have a function for inspection on mistakes	4.40	0.70	High

List	$\bar{x}$	S.D.	Result
4.5 Design the report in accordance with the data in database	4.20	0.42	High
4.6 Design the report to be suitable for use	4.30	0.48	High
4.7 Design the input and report to be proper for operations	4.10	0.32	High
<b>Average for Design for Input and Report</b>	<b>4.16</b>	<b>0.47</b>	<b>High</b>
<b>5. Supply Chain Concept</b>			
5.1 Management on the needs	4.30	0.48	High
5.2 Management on manufacturing capacity and resources	4.10	0.32	High
5.3 Administration on customer services	4.10	0.32	High
5.4 Administration on service processes	4.00	0.94	High
5.5 Management on the efficiency of administration	3.80	0.63	High
5.6 Management on the data and information system	4.40	0.84	High
<b>Average for Supply Chain Concept</b>	<b>4.12</b>	<b>0.64</b>	<b>High</b>
<b>Average for all aspects</b>	<b>4.28</b>	<b>0.52</b>	<b>High</b>

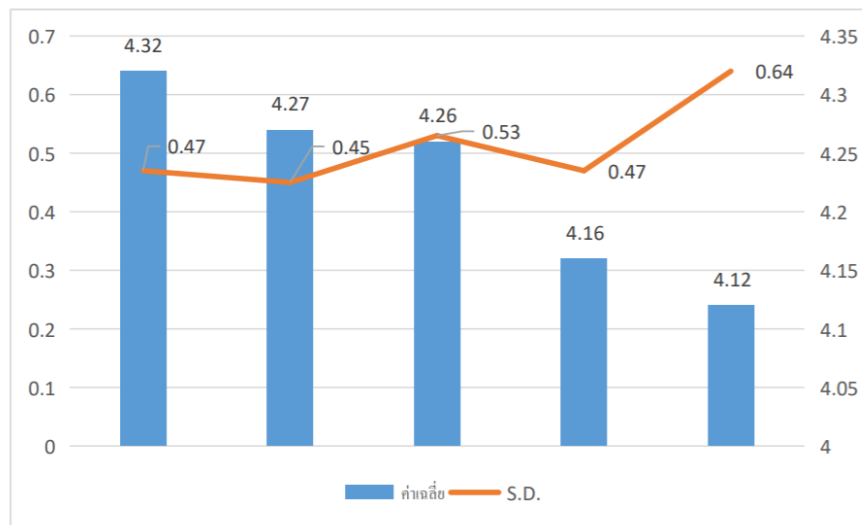


Figure 7 Diagram summarizing the experts' opinions towards the analysis and design of information system

From the Table No.1, the opinions of experts on the sterile medical device management information system for hospital CSSD with RFID and supply chain concept, are rated at High level. ( $\bar{x} = 4.28$  S.D. = 0.52). When considering on each item, it finds that the Understanding on the System is rated at High level. ( $\bar{x} = 4.32$  S.D. = 0.47). The System Analysis is rated at High level ( $\bar{x} = 4.27$  S.D. = 0.45). The Design on Database is rated at High level ( $\bar{x} = 4.26$  S.D. = 0.53). The Design for Input and Report is at rated High level ( $\bar{x} = 4.16$  S.D. = 0.47). And, the Supply Chain Concept is rated at High level ( $\bar{x} = 4.12$  S.D. = 0.64).

The approval result of analysis and design on the sterile medical device management information system for hospital CSSD with RFID and supply chain concept from 5 experts.

Table 2 The approval result of analysis and design on the sterile medical device management information system for hospital CSSD with RFID and supply chain concept from 5 experts

List	Approval Result	
	Percentage	Interpreted
1. System analysis		
1.1 Procedures in the system in accordance with the system for solutions	100	Approve
1.2 Can explain the procedures with proper and clarity	80	Approve
1.3 Procedures in accordance with the scope in supply chain concept	100	Approve
1.4 Symbols for procedures meet with the international standards	100	Approve
1.5 Symbols used in an appropriate and correctly way	100	Approve
1.6 The analyzed and designed system can be compatible with RFID	100	Approve
2. Design on Database		
2.1 The scope of collated data is in line with system	100	Approve
2.2 Symbols for ER- Diagram meet with international standards	100	Approve
2.3 Symbols for ER- Diagram are appropriate and accurate	80	Approve
2.4 The design of database related to the analyzed data of system	100	Approve
2.5 The relation of database in accordance with the scope of work	80	Approve
2.6 The Data Dictionary is appropriate and accurate	100	Approve
2.7 Database suitable for development	100	Approve
3. Design for input and report		
3.1 Symbols for design on the screen can signify well	100	Approve
3.2 Design the screen in accordance with the data in database	100	Approve
3.3 Design the screen to be suitable for use and in accordance with RFID	100	Approve
3.4 Design the screen to have a function for inspection on mistakes	80	Approve
3.5 Design the report in accordance with the data in database	100	Approve
3.6 Design the report to be suitable for use	80	Approve
3.7 Design the input and report to be proper for operations	100	Approve
4. Supply Chain Concept		
4.1 Management on the needs	80	Approve
4.2 Management on manufacturing capacity and resources	100	Approve
4.3 Administration on customer services	80	Approve
4.4 Administration on service processes	100	Approve
4.5 Management on the efficiency of administration	80	Approve
4.6 Management on the data and information system	100	Approve
<b>Total</b>	<b>93.85</b>	<b>Approve</b>



From the Table No.2, the 5 experts have the opinions to approve the analysis and design on information system at 93.85 percentage showing that the conducted analysis and design on information system are appropriate for developing the information system on the sterile medical device management information system for hospital CSSD with RFID and supply chain concept in the next phase.

## **Conclusion**

In conclusion, the analysis and design of sterile medical device management information system for central supply units in hospitals with RFID technology and supply chain concept. By presenting the system analysis and design with use case diagram, class diagram, ER-Diagram and user interface design principles. It is found that the opinions of experts is at high level and pass the certification for suitability and usage from an experts. It can be conclude that the analysis and design of the prepared system can be used to develop an information system and management of medical sterile device for the CSSD in hospitals with RFID technology and the concept of the supply chain in the next research phase.

## **Discussion**

Based on the research results, the development of sterile medical device management system for the hospital CSSD with RFID technology and the supply chain concept. The study case are analyze and design the system from the existing system and study the needs of users in small, medium and large hospital. Therefore, it can be knowing the need clearly, can solve the problems that arise in the current system from the collected data and knowing the pros and cons which Klomshen et al. (2019) has developed an information system for reporting the health of inpatient medical record summaries. It was found that advantages and disadvantages of the system were analyzed, affecting the development of information systems. Also, Kongsinthu (2018) has analyzed and designed a system for curriculum administration according to the qualification standard framework, it was found that a careful study of the user's system requirements had an effect on the efficiency of the information system. In this research, has present the data for analysis and system design using use case diagram, class diagram, flow chart, ER diagram and user interface design. Before starting the system implementation in the development of information systems by experts thus, the concepts and draft of the development of the information system are appropriate and feasibility for the system development.

The analyzed and designed information system is a prototype which has been approved by the experts to be used as guideline for linking the data in the information system and the procedures in the information system of Electronic Form. When the information system passes to the developing stage, the developer must carefully consider before use and may need to modify the details and relationship to be in accordance with the changeable contexts by users.

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## The Development and Evaluation of 2D Animation “Amazing Thai Alphabet”

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### Abstract

The objective of this study was 1) to design and develop 2D animation 2) to evaluate the efficiency of 2D animation 3) to evaluate the satisfaction of 2D animation titled “Amazing Thai Alphabet”. This research's population used 100 students from High school of Bansomdejchaopraya University Demonstration School and the sample group was 30 students by specific selection. This research used tools which consisted of 1) 2D animation titled “Amazing Thai Alphabet” 2) Structural interview forms for experts to analyze the topic of content 3) Structural interview forms for experts to analyze the topic of story and character design 4) 2D animation efficiency form and 5) 2D animation satisfaction assessment form. The statistics used in this research are the mean and the standard deviation. The result of the research are 1) 2D animation titled “Amazing Thai Alphabet” which has 1920 x 1080 pixel for its resolution and the length is 05.15 minute, 2) the efficiency of 2D animation that was evaluated from experts and students are high level and 3) the result of satisfaction score are high level.

**Keywords:** 2D Animation, Thai vocabulary, Thai alphabet, Satisfaction evaluation, Edutainment

### Introduction

One thing that made human being distinguished from other animals is language. Language can be used for communication and declared the meaning of everything. Human language can explain not only the physical objects but also expressing thought and recognizing the past, present and future. In daily life, we mostly use language for communication by voice and visual. Every human language uses a set of alphabets to represent the meaning of things and these alphabets are become a tool for communication such as writing and reading. From the hypothesis of Benjamin Lee Whorf, Languages can has a significant effect to human thought and sometime involve with the behavior of human. (Whorf, 1956). So, Language and communication can be the fundamental key of success in social development including the part of education, politics and economics. Thai language is one of the identities of Thai's culture which used as a main language. So, it is important to educate Thai people to have a good attitude and use Thai language correctly. The mistake that usually found in the context of writing is spelling. When putting the wrong position of alphabet or choosing wrong vowel, it will cause the different meaning in translation. From these reason, it needs to understand and practice spelling Thai vocabularies since primary school to high school. As mentioned by Mazuryk and Gervaultz, Human's perception includes five senses; each of them have a different amount of receiving data; 75 percent from seeing by eyes, 13% from touching by skin, 6% from smelling by nose, 3% from hearing by ears, and last 3% is tasting from tongue (Mark, 2016). So, the best way of student learning is by seeing. While listening and doing is also help students and give the result of learning more efficiency (Nudchanad, 2012). As seeing is most used to receive

the information, so reading and writing are very important. However many students can not spell word correctly, they easily use wrong alphabet, vowel, orthography or even tone mark which will lead to miscommunication. Some lecturers found that students will not much pay attention to learning Thai language because some boring teaching styles such as narration or explaining from teacher book only enough to motivate the student to study if compare with a set of learning activities (Arisara, 2019). From this reason, teachers have to develop tools for helping student's learning such as vocabulary spelling practice tools for primary school (Tipsuda, 1998) or other techniques; exercise sheets, games, poets and songs which can entertain students to be enjoying while studying.

Cartoon Animation and game are in the category of entertain media that can make the all age of audience, especially children, enjoy while watching. Nowadays, animation and game used as an education tools called "edutainment". As Isam mentioned in his research, all students were enjoyed and very enthusiastic when a learning material was playing and all of them want to see video more when the video was stopped (Md. Baharul, 2014). From the concept of edutainment and using animation in the classroom show it is importance in educational process because animation can hold a great promise to the instructional process (Okon, 2008) and a good storytelling will keep the audience concentrate to the story of animation. According to the previous mentioned about five sensation of perception, the more number of senses involve the more effectiveness of learning will be (Frank, 2006). Animation can activate the senses of sight and hearing but its effective also up to these factors; story or plot, character and design, color, and sound which can make the concentration and enjoyments to audience.

From the above reason, the researcher conducted the development of 2D animation "Amazing Thai Alphabet" for students in high school and had evaluated its satisfaction and efficiency.

### **Objective**

1. To design and develop 2D animation about spelling Thai vocabulary correctly;
2. To evaluate the efficiency of 2D animation;
3. To evaluate the satisfaction of 2D animation.

### **Method**

This research used an experimental method. Population is 100 students and the sample group is 30 students by specific selection from Bansomdejchaopraya Rajabhat University Demonstration School. The research instruments are 2D animation "Amazing Thai Alphabet";

Structural interview for experts in animation story in the form of 5 rates questionnaire which has IOC between 0.67-1.00;

Structural interview for experts in design part which has IOC between 0.67-1.00;

Effectiveness evaluation form which has IOC between 0.67-1.00;

Satisfaction evaluation form which has IOC between 0.67-1.00.

Data collection in this research was divided into two parts; Primary data gained from books, papers and other medias. Secondary data was collected by interviewing professional who teach and make animation film. The data analysis use descriptive statistics which are average and standard derivation.

## Result

The result of this research can be separated into 3 parts as following;

1. Pre-production, this process composed of character design, scene design, storyboard, and animatic. The process including reviewing from expert as the result; the storytelling part, 70 percent of experts recommend to shorten the animation length. 30 percent said the timing for story is already good. The content to the animation part, 60 percent of expert recommend to use 2D animation both character and scene, 30 percent of experts said it should be 2D character and scene can be done in 3D. Other 10 percent of experts prefer 3D animation both character and scene. For other opinion, the expert suggested to adapt from only animation into game so that the student can be a real player.

In the design evaluation from 5 rates questionnaire that answered by the experts had separated into 4 segments as below;

1.1 Genre, the summary of questionnaire found Fantasy genre would be the best for the audience target that is teenager, the average score is 4.57. The next genre is comedy which gain average score 4.29.

1.2 Theme, the summary of questionnaire found the story about friendship in the school has the highest score due to it is suitable for the target group, which the average score is 4.57 and the next story is about family relation which get the average score 4.29.

From the above genre and theme, the storyboard was produce in figure 1.

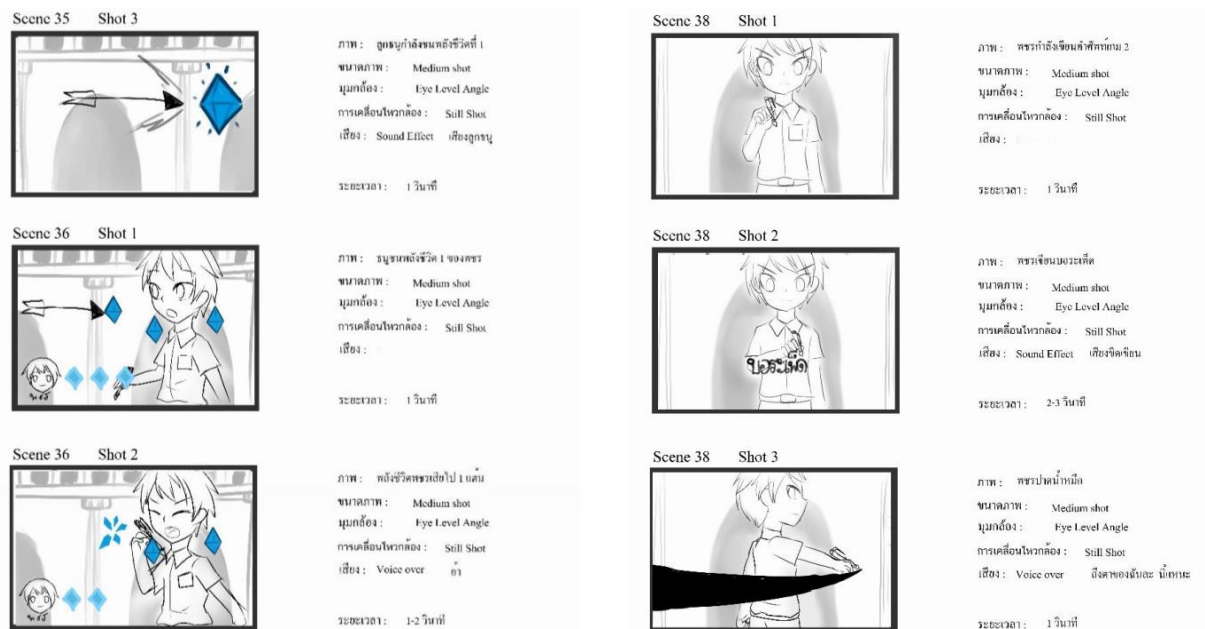


Figure 1 The sequences of storyboard are sketched into the frame. One frame is represented as a shot which composed to the scene of animation. Each shot will has a description about the name of shot, camera type, camera angle, voice and timing.

After finish storyboarding, the animatic will be the next step. The pre-production designer will bring all shots to order in the sequencing and editing software such as Adobe Premier and insert voice or narration into the timeline. This animatic is importance for revise the story of the animation. It is better to fix the story, delete or add some new sketch shots into the timeline rather than the production process begin. If the animatic is good enough that means the success of animation will be true.

1.3 Character, the summary of questionnaire by experts found the style for character design should be Manga with the proportion of head to body is 1:4 which gained average score at 4.50. This will make the character look like teenager and will appeal to the audience who are in the teenage. The next style still be a manga but the proportion is 1:3 which got the average score at 3.88. The figure 2 shows the result of character design.



Figure 2 The set of characters which are manga style. Manga is the characteristic of Japan comic and it is very famous to Thai audience. The proportion of character are 1:4 which compare between the character head height and body.

1.4 Scene, the summary of questionnaire found the style of scene is the best to use flat 2D rendering style better than 3D scene and the average score as following 4.57 and 4.29



Figure 3 The example of scene rendering, the class room, which done in flat style. Even it is 2D animation but the scene was planned to use perspective for depth feeling.

2. Production, this process started from drawing frame by frame from the sketching guide of storyboard into digital format which done in Adobe Animate and the size of frame is 1920 x 1080 pixels. After the frame outline was done, the line up and painting process will be the next step. A set of frames that were painted will be called shot and the sequence of shots will be ordered to send to post-production process. Animator is the people who has a task of making the movement of character and there is other job position who paints scene background called background painter. But in this research both the character animation and scene painting were done by the researcher. This production process consumed the highest amount of time. When the scene coloring was done and the character movement is finished, there will be a composition time. It is more convenience to separate the layer between characters and background. This composite may be done on Adobe after Effect and render to a sequence or scene. The example of compose shot is shown in the figure 4.



Figure 4 The composition of character and scene were done by Adobe After Effect. This software can make some effect such as glowing, motion blur, or scaling object. The scene or sequence will be exported and sent to the last process, post-production.

3. Post – Production, this process will collect the sequence shots to order and render into a movie by the editing software which is Adobe Premiere. The voice and sound are also added in this step. For this research the movie are 2D animation named “Amazing Thai Alphabet” which has 05.15 minute length.





Figure 5 Some final sequence of 2D animation named “Amazing Thai Alphabet”.

The experiment of this research separated into two parts; first is expert efficient evaluation and the second is satisfaction evaluation. First part was given the score by 8 experts and the result as the following table;

Table 1 The efficient evaluation by 8 experts.

Title	Average	S.D.
Creativity of theme	4.7	0.4
Story sequence	4.7	0.4
Emotion and mood	4.6	0.5
Character design	4.7	0.4
Movement of Animation	4.8	0.3
Scene design and composition	4.2	0.4
Scene detail	4.3	0.5
Camera angle	4.3	0.5
Light and shade	4.5	0.5
Editing	3.7	0.5
Sound and voice	4.3	0.7
Summary	4.2	0.6

From the efficient evaluation in the table 1, the highest score are 4.8 in the movement of Animation and the following high score are 4.7 for theme creativity, story sequence and character design. The weakness of this animation is 3.7 in editing which has a problem about the sharpness of image when the shot is zoom in.

Table 2 The satisfaction evaluation by sample group of 30 students.

Title	Average	S.D.
The impression of story	4.7	0.4
Character design	4.6	0.4
The way of giving knowledge of Vocabulary	4.5	0.5
Scene design	3.7	0.5
Movement of Animation	4.6	0.4
Sound and voice	4.0	0.8
Summary	4.3	0.5



From the satisfaction evaluation in the table 2, the highest score is 4.7 which is the impression of story because the sample audience like the way of the animation present how fun of the story to use vocabulary spelling as a magic. The lowest score are scene design, 3.7, because the sample audiences want to see more identity of scene design or more exciting style.

### **Conclusion and analysis**

The result of this research is 1920 x 1080 pixel 2D animation which titled "Amazing Thai Alphabet" in the length 05.15 minute.

For the efficiency of this animation found the average score are high (4.2) and the strength of this animation is movement which received the highest average score (4.8), this result consistent to the research of Bouldin (Bouldin, 2004) who studied about the lively movement and fully of imaginative character in the animation will be significant to the popularity of that animation.

For satisfaction of sample group found the average score are high (4.3). The highest score are the impression of the story. The sample students were enjoy while watching the animation and want to watch more. This result of satisfaction of storytelling is consistent to the research of the intertextuality of narrative in comics, television dramas and novels (Umapornx, 2008) that a narrative convention of storytelling should have this following step; 1) Beginning of story 2) Conflict started 3) Crisis or climax of the story 4) Crisis resolving and 5) Ending.

About the character design of this research which gain the satisfaction score at 4.6, the consistent concept is mentioned in the research of communication of lines to indicates the goodness and badness of selected cartoon characters (Sirichai and Lattasit, 2017). A good character design is not only to have a beautiful style but also need to meet the characteristic of audience's age. Shape of characters such as flat or around character is also effect to the psychological of audience.

### **Suggestions**

This animation in the research is too short to have more vocabulary for student's learning. So, it should be develop as a series of animation rather than short animation for continuous learning of students.

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## **Adverse Childhood Experiences and Alcohol Consumption Among Vocational Students in Bangkok, Thailand**

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### **Abstract**

Adverse childhood experiences (ACEs) and alcohol consumption have been recognized globally as key public health issues. Adolescent alcohol consumption is a very serious issue in the world, and Thai adolescent alcohol consumption is no exception. The number of Thai youth who drink continues to rise steadily. This study investigated how the ACEs influence alcohol consumption among vocational students in Bangkok. This retrospective, cross-sectional, web-based study used data from the 2019 round of the Bangkok Behavioral Surveillance Survey (BBSS). Descriptive statistics were computed, followed by simple and multiple logistic regression analysis to determine the strength of association between ACEs and alcohol consumption, controlling for socio-demographic factors. The final adjusted sample size was 720. The number of students reporting alcohol consumption was significantly higher among those who lived in a household with a member who had been incarcerated (AOR=2.062 95%CI 1.200, 3.542) p value=0.01, and those who had experienced cyberbullying in the past 12 months (AOR=1.832, 95%CI 1.058, 3.172) p value=0.05. More research is needed to evaluate the effectiveness of strategies and programs in reducing intergenerational transmission of ACEs. Specifically, it would be important to know what the social cost savings are of such programs, as that could be an important part of advocacy with policymakers to increase support for and access to such strategies and programs.

**Keywords:** Adverse childhood experiences, Alcohol consumption, Vocational students

### **Introduction**

Excess alcohol consumption has become a common part of life for many people. This is a major problem, especially in the case of youth, as reckless alcohol consumption can have severe negative effects on their health (Mukamal et al., 2003; Ruitenberg et al., 2002). When persons start consuming excess levels of alcohol at a relatively young age, they are that much more likely to become alcoholics in adulthood (Prescott & Kendler, 1999). Many studies suggest that students' drinking patterns are influenced by many factors, and there has been considerable research on the effect of youth alcohol consumption on health and happiness (Thakker, 1998). A number of studies confirm that drinking alcohol is widespread and common among older students. For example, in one study, 42% of first-year college students had experienced a period of heavy drinking in the several months before the survey (Wechsler et al., 2002), and about two-thirds of American undergraduate students (age 18 to 24 years) reported drinking alcohol in the month before the study (Johnston et al., 2003). Although the terms "young people," "students," or "teenagers" refer to different social groups in different countries, it is clear that alcohol consumption is an important aspect of the lives of youth. No less

important is the fact that drinking patterns during one's youth set the stage for its continuation or even escalation in adulthood for a substantial proportion of those individuals (Jennison, 2004).

Alcohol consumption has been found, by previous studies, to be strongly associated with child abuse, neglect, and other adverse childhood experiences (ACEs), resulting in physical, social, and psychological consequences that can cause addictive risk behaviors in adulthood. In 2014, the US Centers for Disease Control (CDC) reported that approximately 702,000 children were confirmed by child protective services to be victims of ACEs. Adverse effects from this trauma may include, but are not limited to, improper brain development, impaired cognition, anxiety, blindness, smoking, alcoholism, and drug abuse (CDC, 2016). One study looked at how ACEs impacted self-reported alcohol-related problems (Strine et al., 2012). Adults with a higher ACEs score also had higher risk of alcoholism (Anda et al., 2002). ACEs may lead to unhealthy alcohol consumption behaviors, such as binge drinking and Alcohol Use Disorder (AUD). The most recent study to-date of ACEs and alcohol misuse investigated the relationship between ACEs, gender differences, and substance misuse among adults. The variables of interest included self-reported binge drinking and heavy drinking to assess alcohol consumption. Nearly all ACEs individually, and a combined ACEs score of greater than four, resulted in greater odds for binge and heavy drinking (Crouch et al., 2018).

This study was conducted to assess whether there is an association between prevalence of ACEs among a sample of adolescents and excess alcohol consumption. Data were obtained from the 2019 round of the Bangkok Behavioral Surveillance Survey (BBSS). Most studies which have found an association between alcohol abuse and ACEs focused on child abuse, neglect, household dysfunction, and bullying. This study is among the first to focus on childhood experience of abuse, neglect, bullying, and household dysfunction and excess alcohol consumption using a sample of Year 2 vocational students in Bangkok.

## **Methods and Materials**

The BBSS is conducted every two years, and the questionnaire was adapted from the Youth Risk Behavior Surveillance Survey (YRBS) from the US CDC. In the latest round (2019), the BBSS was conducted in 18 government vocational schools in Bangkok with total enrollment of 6,969 students. Data were collected using a web-based, self-administered questionnaire, filled out by a random sample of 720 students in the computer lab of their school. The research protocol for this study was approved by the committee for Research Ethics (Social Science), Faculty of Social Science and Humanities of Mahidol University, Thailand. Certified approval number is 2020/028.1910 and MU-SSIRB number is 2020/240 (B2).

### **Independent Variables**

ACEs were hypothesized to predict alcohol consumption behavior. Thus, a history of ACEs of household dysfunction, neglect, abuse, and bullying, was defined as the independent variable. Questions on ACE variables were adapted from the 11-item questionnaire of the CDC's ACE Module. Abuse was specific to the ACE variables within the BBSS questionnaire which consisted of experiencing physical/verbal/sexual abuse, emotional, or physical neglect before the age of 18, and physical/cyberbullying within the past 12 months. Household dysfunction was specific to the ACE variables within the BBSS questionnaire as well, which consist of growing up in a household with a member who has/had been incarcerated, an adult member who abused substances, a member who was mentally ill, or a household in which there is intimate partner violence.

Questions on types of bullying and bullying victimization were adapted from the YRBS. Experience of physical bullying on school property within last 12 months was assessed with the following question: "*In the past 12 months, have you ever been injured or threatened by your friends at school?*" (bullied on school property), and it was coded as 1=Yes and 2=No. If 'Yes,' respondents were asked to specify the times as follows: 1=Never, 2=1-2 times per year, 3=3-6 times per year, 4>= 6 times per year. Being a victim of cyberbullying during past 12 months was assessed with the question: "*In the past 12 months, have you ever been electronically bullied via text messaging, Facebook, Instagram, or other social media?*" (cyber bullying), and was coded as above.

### **Alcohol consumption**

In this study, the primary outcomes of interest are binge drinking and heavy drinking. According to the Substance Abuse and Mental Health Services Administration (SAMHSA), a respondent who had five or more drinks (for men) or four or more drinks (for women) on at least one occasion in the past 30 days is defined as a binge drinker. SAMHSA defines heavy drinking as five or more drinks for a man or four or more drinks for a woman on the same occasion on at least five days in the past 30 days. For binge drinking, respondents were asked the following: "Considering all types of alcoholic beverages, how many times during the past 30 days did you have five or more drinks (for male students) or four or more drinks (for female students) on a single occasion?" A response of at least one or more days was considered binge drinking. A response of 'None' was considered non-binge drinker. (Those who did not respond to this item were excluded from the analysis.) Heavy drinking is a subset of the binge drinking variable. Heavy drinking was defined as binge drinking at least five days during the past 30 days. Individuals who engaged in binge drinking four or fewer days in the past thirty days were not considered heavy drinkers. Students were asked about alcohol use with the question: "In the past 12 months, how often did you drink alcohol?" Response was classified as follows: 'Once a month or less;' 'More than once a month;' 'never drank alcohol in lifetime;' 'Drank, but not in the past 12 months;' and 'Had a sip of alcohol to see what it's like.' Participants were also asked about binge drinking with the question: "How many times in the past 30 days have you had five or more drinks of alcohol on the same occasion?" Respondents were also asked about the effect of alcohol consumption with the question: "How many times in the past 30 days has drinking alcohol made you drunk? (That is, you had so much to drink that you could not do what you wanted to do, or you threw up)." These items were coded as 'once,' 'more than once,' or 'never.'

Data analysis was conducted by using IBM Statistical Package for Social Science (SPSS) version 21. Descriptive statistics were used to measure the prevalence of ACEs, experience of physical and cyberbullying, and alcohol consumption among the sample of students. The association between ACEs, bullying victimization, and alcohol consumption was measured by multinomial logistic regression analysis. Statistical significance was set at p-value <0.05.

### **Results**

Slight more respondents were female (47.1%) than male (41.5%), while 11.1% specified their gender as 'other.' The majority of the sample came from a family with lower family income (61.3%), lower socio-economic status (45.4%), was currently living in Bangkok (77.4%), and had a close friend who used alcohol (69.0%), (Table 1).

Table 1: General Characteristics of Respondents (n=720)

<b>Socio-economic characteristics</b>	<b>n</b>	<b>%</b>		<b>n</b>	<b>%</b>
<b>Gender</b>			<b>Current Residence</b>		
Male	299	41.5	Own house/apartment/condo	461	64.0
Female	398	47.1	Rent	247	34.3
Other	82	11.4	Other	12	1.7
<b>Father's education</b>			<b>Currently Staying with</b>		
Primary school	151	21.0	Mother and/or father	553	76.8
Secondary school	260	36.1	Relatives	121	16.8
Vocational school	190	26.4	Lover/partner	13	1.8
Bachelor's degree	102	14.2	Alone	10	1.4
Higher than bachelor's degree	17	2.4	Other	23	3.2
<b>Mother's education</b>			<b>Living in Bangkok</b>		
Primary school	178	24.7	Yes	557	77.4
Secondary school	271	37.6	No	163	22.6
Vocational school	127	17.6	<b>Close friends use alcohol</b>		
Bachelor's degree	126	17.5	Yes	497	69.0
Higher than bachelor's degree	18	2.5	No	223	31.0
<b>Average family income (baht/month)</b>			<b>School strictness about drug use</b>		
Low ( $\leq 20,000$ )	438	61.3	Not strict	27	3.8
Middle (20,001 - 39,999)	140	19.6	Least strict	37	5.1
High ( $\geq 40,000$ )	136	19.0	Less strict	46	6.4
Median (SD) = 20,000 (Q1=10,000, Q3 =30,000) Min			Moderately strict	245	34.0
= 1,000, Max = 500,000					
<b>Socio-economic status (score)</b>			Very strict	222	30.8
Low (2-5)	324	45.4	Most strict	143	19.9
Middle (6-11)	219	30.7			
High (12-30)	171	23.9			
Mean (SD) = 7.79 (5.66), Min = 2 , Max = 30					

One-third of the sample experienced household dysfunction before the age of 18 (35.6%). By sub-groups of ACEs, slightly over one in ten had experienced one form of abuse or another, 16.1% reported emotional neglect, 8.9% had experienced physical neglect, 18.8% had witnessed violence among family members, and 9.3% had been a victim of violence by someone else in the household. Nearly one in ten respondents (9.7%) had been a victim of cyberbullying, and 6.8% experienced physical bullying. Over half the

sample (59.2%) reported having had at least 1 drink of any kind of alcohol in their entire life. Of those who had ever had an alcoholic beverage, two in five reported having had at least 1 drink of any kind of alcohol during the last 30 days (42.3%) and, of these, more than half drank heavily (58.3%) (Table 2)

Table 2: Distribution of Self-reported History of Adverse Childhood Experiences (n=720)

Individual ACE	Number	Percentage	95%CI
<b>Abuse</b>			
Emotional abuse	96	13.3	11.2,16.4
Physical abuse	76	10.6	8.6,13.4
Sexual abuse	79	11.0	9.0,13.8
<b>Neglect</b>			
Emotional neglect	116	16.1	13.9,19.5
Physical neglect	64	8.9	7.1,11.5
<b>Violence</b>			
<b>Household violence</b>			
In family members	135	18.8	13.9,19.5
By family members	67	9.3	7.5,11.9
<b>Family Dysfunction</b>			
Parental separation or divorce	161	22.4	19.9,26.2
Household drug use	144	20.0	17.6,23.7
Household mental health problem	72	10.0	8.1,12.7
Incarcerated household member	109	15.1	12.9,18.4
<b>Bullying Victimization</b>			
Physical bullying victimization	49	6.8	5.4,7.9
Cyberbullying victimization	70	9.7	8.3,10.5
<b>Cumulative ACEs scores</b>			
No history of ACEs (0)	394	54.7	52.4,59.8
Few ACEs (1-2)	163	22.6	20.1,26.5
Some ACEs (3-4)	70	9.7	7.8,12.4
Many ACEs ( $\geq 5$ )	93	12.9	10.5,15.6
<b>Alcohol consumption</b>			
In your entire life, you have had at least 1 alcoholic beverage (n=702)	426	59.2	55.5 62.8
During the last 30 days, you have had at least 1 alcoholic beverage (n=426)	180	42.3	37.5,47.1
During the past 30 days, you drank heavily (number of drinks reported in women 4c and 5c) in one sitting (n=180)	105	58.3	50.8,65.6

Results for the multinomial logistic regression analysis of the relationship between ACEs, alcohol consumption, and socio-demographic factors are shown in Table 3.

Table 3: Prediction of Alcohol Consumption by Individual and Cumulative ACEs

<u>ACEs</u>	Non-drinking	30-day history of drinking (AOR)	(95% CI)
Emotional abuse (Ref=no)	1	1.223	0.650, 2.301
Physical abuse (Ref=no)	1	1.492	0.741, 3.005
Sexual abuse (Ref=no)	1	1.246	0.479, 1.546
Emotional neglect (Ref=no)	1	1.162	0.647, 2.089
Physical neglect (Ref=no)	1	1.255	0.604, 2.611
Parental separation (Ref=no)	1	1.200	0.704, 2.048
Child violence (Ref=no)	1	1.017	0.468, 2.210
Intimate partner violence (Ref=no)	1	1.695	0.882, 3.259
Household drug use (Ref=no)	1	1.295	0.751, 2.233
Household mental health problem (Ref=no)	1	1.325	0.651, 2.695
Incarcerated member of household (Ref=no)	1	2.062**	1.200, 3.542
ACEs score >=4 (Ref=0-3)	1	1.407	0.571, 3.465
Physical bullying victimization (Ref=no)	1	1.150	0.592, 2.233
Cyberbullying victimization (Ref=no)	1	1.832*	1.058, 3.172
Male (Ref = Female)	1	1.110	0.774, 1.593
<b>SES (Ref= Low SES)</b>			
Moderate	1	1.035	0.680, 1.577
high	1	1.168	0.748, 1.823
Close friend is a drinker (Ref=no)	1	7.134***	4.013, 12.684
<b>School strictness (Ref= High)</b>			
Moderate	1	3.460**	1.307, 9.162
Low	1	3.526**	1.342, 9.262

**Remark** AOR=adjusted odds ratio, CI=confidence interval,

N=720. \* p value < 0.05, \*\* p value < 0.01, \*\*\* p value < 0.001

There was no significant association between sex (i.e., gender) and alcohol consumption. The amount of self-reported alcohol consumed was significantly higher for students who lived in a household in which a member was incarcerated compared with those who did not (AOR: 2.062 95%CI 1.200, 3.542) p value=0.01. The amount of self-reported alcohol consumption was also significantly higher for students who had been cyberbullied in the past 12 months compared to those who were not (AOR: 1.832, 95%CI 1.058, 3.172) p



value=0.05. Students who had a close friend(s) who drank alcohol, also had a risk of alcohol consumption. Students who had a close friend who drank were 69.0% more likely to report consuming alcohol compared to those with no close friend(s) who drank (AOR: 7.134, 95% CI: 4.013 –12.684,  $P < 0.001$ ). Perception of greater strictness of school regulations about drugs increased the likelihood of self-reported alcohol consumption (AOR: 3.526, 95% CI: 1.342 – 9.262,  $P < 0.01$ ) and moderate school strictness (AOR: 3.460, 95% CI: 1.307 – 9.162,  $P < 0.01$ ) compared to those who perceived less school strictness.

## Discussion

Adolescents who are involved in bullying have been reported as having an increased risk of many negative health behaviors, including alcohol use (Hertz et al. 2015; Kelly et al. 2015; Moore et al. 2017; Peleg-Oren et al. 2012; Priesman et al. 2017) and binge drinking (Kelly et al. 2015; Moore et al. 2017; Priesman et al. 2017). This study of Bangkok vocational school students found that self-reported alcohol consumption was significantly higher for those who had been cyberbullied. Evidence regarding the relationship between being a bullying victim and alcohol use is mixed. In a meta-analysis that examined bullying victimization, a significant association between bullying victimization and alcohol use was found (Moore et al. 2017). However, studies that have differentiated among bullying, victimization, and bully-victims have not consistently identified victims of bullying to be at increased risk. Cross-sectionally, Sangalang et al. identified bullies and bully-victims to be at increased risk for alcohol use (Sangalang et al. 2016). Longitudinally, Kelly et al. identified only bully-victims as being at an increased risk of future alcohol use (Kelly et al. 2015). Some studies only examined bullying victimization, and differentiated between traditional forms of bullying and cyberbullying (Hertz et al. 2015; Priesman et al. 2017). These studies found that only those affected by cyberbullying, and not traditional bullying, were at increased risk of binge drinking (Hertz et al. 2015; Priesman et al. 2017). Finally, one study examined both bullying categorizations and found that, when considering traditional bullying (i.e., physical or verbal), only bullies and bully-victims were identified to be at increased risk for alcohol use. When considering cyberbullying, bullies, victims, and bully-victims were all at increased risk of alcohol use (Peleg-Oren et al. 2012). In that study, there was evidence of an association between bullying and alcohol consumption: Being a bully or bully-victim at baseline was associated with increased odds of initiating future alcohol consumption.

In this study, no significant difference in self-reported alcohol consumption was found between those students with a history of 0-3 ACEs compared to those with >3 ACEs. Many of the early studies of ACEs did not investigate cumulative number of type of adverse experience, but specifically focused on the impact of physical and sexual abuse during childhood. Findings from those studies identified childhood abuse as a risk factor for alcohol consumption. An association has been determined between the risk of alcoholism and depression in adults who suffered from ACEs, and adults with a higher ACEs score possessed a higher risk of adult alcoholism. (Anda et al., 2002). This greater likelihood of substance use disorders places victims at greater risk for adverse health conditions from excess drinking (Nichols & Harlow, 2004). The specific etiological factors linking early childhood experiences and subsequent substance use remains to be determined, but there have been several studies that have found associations between higher ACEs scores and subsequent substance use in later adulthood (Nichols & Harlow, 2004). While previous studies that focused specifically on one risk factor (such as physical or sexual abuse) found links to substance use, the Adverse Childhood Experiences Study provided further insight into the impact of cumulative childhood stressors on adults (Felitti et al., 1998).

The original ACEs study found that the risk for alcohol use increased 7.2-fold for persons with four or more ACEs. Felitti and colleagues (1998) also found a link between alcoholism and the number of childhood adversities. In the ACEs Study, subjects who had experienced four or more types of ACEs were more likely to consider themselves alcoholics, use illegal drugs, and/or inject drugs.

In addition to the ACEs Study, several researchers have found associations between early traumatic experiences and alcohol use in adulthood. The present study found that the amount of self-reported alcohol consumption was significantly higher for students who lived in a household with a member who was incarcerated. That finding is not consistent with a previous study conducted in 2018 which found that household dysfunction was not significantly associated with binge drinking or any drinking (Loudermilk et al., 2018). Research in treated and untreated populations consistently shows that ACEs predict alcohol dependence (Pilowsky et al., 2006). While these overall findings support evidence that ACEs are associated with alcohol use problems, there have been differences found among adult men and women. Bensley and colleagues (2000) found that experiencing both sexual and physical abuse during childhood was associated with heavy drinking among women, whereas experiencing childhood physical abuse alone increased the risk of heavy drinking among men. Koss and colleagues (2003) found that risk of alcohol dependence was greater among men who reported parental alcoholism, physical abuse, physical neglect, or combinations of physical and sexual abuse, while all types of childhood adversities increased risk of alcohol dependence in women. A recent analysis of data from the National Epidemiologic Survey on Alcohol and Related Conditions examined the impact that parental divorce, death of a biological parent, living with foster parents, and living in an institution have on the risk of developing alcohol dependence (Pilowsky et al., 2009). After controlling for potential cofounders, the researchers found that individuals who experienced two or more of these ACEs were 1.37 times more likely to develop alcohol dependence than individuals who experienced only one type of ACE (Pilowsky et al., 2009).

Retrospective reporting of ACEs by the sample of vocational school students in this study may be affected by recall bias or current emotional state. However, retrospective reporting is an accepted method in population studies. In Thai society, the reporting of ACEs may have been affected by cultural norms – particularly the fear of shame, the fear of “losing face” to oneself and one’s family.

Reporting parental neglect or abuse may also be seen as a violation of filial piety. In the current study, every effort was made to minimize this bias by ensuring that all participants filled out the questionnaire by themselves, in a confidential setting, without any adult or teacher present.

Further, the questions on ACEs were at the end of the questionnaire to avoid withdrawal from survey. However, a significant number of respondents did not complete the questionnaire (n = 45), which was the result of both respondent refusal and a small group who did not understand the instructions which resulted in inadvertent non-administration of the questionnaire in the initial phase of the survey (n =12). It is possible that those who refused to complete this questionnaire could have experienced more severe abuse, which in turn could have resulted in the low prevalence of sexual abuse reported by this sample. The severity or duration of abuse was not measured in the current study. More severe or longer-lasting episodes of abuse may be associated with different magnitudes of later-life outcomes.

Reverse causation, i.e., the mental disorder leading to ACEs such as abuse, interpersonal violence, parental separation, etc., caused by parental frustration or distress due to the child’s condition is also possible

and was not explored in the current study. Strengths of the study include the use of a structured instrument to assess ACEs, and stringent quality control measures to promote collection of high-quality data.

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# Key Factors Influencing Customers' Purchase Intention of Residential Condominium in Bangkok

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## Abstract

The study focuses on factors influencing customers' purchase intention of residential condominium in Bangkok. Because of the popularity of condominiums in Thailand, the expansion of investment in this sector has continuously increased year after year and the condominium market has become very competitive. Customers have different reasons to purchase condominium with different marketing decision to purchase. The main variable is the purchasing of the customers' intention in residential condominium in Bangkok, and the independent variables which include property age, property size, metropolitan area, neighborhood, price, finance return, developer reputation. A total of 282 questionnaires survey were distributed to consumers who plan to purchase or have already purchased condo in Bangkok. A two-part-questionnaire was developed in order to collect data. Part one was about demographic information, part two was about independent variables decision factors. Statistics analysis utilized in this study included cronbach  $\alpha$  coefficient reliability analysis, validity test, descriptive statistics and confirmatory factor analysis.

**Keywords:** Bangkok market, Condominium, Purchase intention, Factors

## Introduction

In particular, this chapter presented an analysis of key factors influencing the purchasing of residential condominiums by customers in Bangkok. It covers the basic situation of Thai economic development and development of Thai real estate industry, with a special focus on the condominium market in Bangkok, Thailand.

### 1.1 Research rationale

#### 1.1.1 Thai economic growth

So far, Thailand's total foreign trade ranks second in Southeast Asia, and first is Singapore. The economy of Thailand is dependent on exports, which accounts for more than two-thirds of the country's GDP. Thailand itself is a newly industrialized country, the 8th largest economy of Asia. (Porphant Ouyyanont, 2017). Thailand is one of the countries with the lowest unemployment rate in the world, published in the first quarter of 2014 as 1 per cent. This is attributable to a large proportion of the population working in subsistence farming or other insecure employment.

China has replaced the United States as the largest export market in Thailand, while the latter still retains its second-largest supplier role (after Japan). In 2016, The military government has launched the newest economic plan, Call "Thailand 4.0" for improve Thai economic. This was largely the result of government allowing foreign specialists to import to help bring Thailand forward 4.0. According to the Colliers Radar (2017), Thailand is strategically located in the heart of Asia, serving investors as a dynamic gateway to a fast-growing economic market.

Local economic conditions are a major factor which affects real estate market (Glenn R Mueller, 1993). The support of the government's 4.0 policy would enhance Thailand's economic development potential to be huge in the future.

### **1.1.2 Real estate situation in Thailand**

The economic situation of Thailand began to recover from 2001 to 2010. The condominium market in Bangkok expect 15 years of growth with only a brief slowdown during the global financial crisis of 2008 (CBRE, 2018). In 2019, the Thai real estate industry is in the stage of recovery and development while attract more customers to this market.

The real estate includes house, townhouse, condominium and land. In addition, The development strategy of Thailand was firmly market-oriented and open to trade and investment flows from elsewhere. Foreigners can legally hold Thai condominium with permanent property rights and enjoy the same rights as Thai (Global Property Guide, 2019).

That leads to an increased number of foreign customer purchase intention on condominiums in Thailand. Foreigners can also invest at least THB40 million (US\$1.3 million) in a Board of Investment approved project. They will then be allowed to purchase up to 1 Rai (1,600 square meters) of land (Lalaine C, 2019). Thus, Thai real estate condominium market become more popular.

In 1988, there were only 2,600 units of condominium in downtown Bangkok. In 2019, there are 140,000 units in the downtown Bangkok and around 630,000 in the entire city (CBRE, 2018). On the other hand, condominium price will continue to rise for newly launched condominiums located in the best downtown locations. In 1988, the price of condominiums was around THB 20,000 - 25,000 per square meter. Marketing is witnessing many developers starting condominium projects asking for prices above THB 300,000 per square meter and the new standard appears to be THB 250,000 per square meter (CBRE, 2019). Because of the condominium market success, this market has received attention from many developers.

There are more than 100's of the best developers in Thailand. The key players of property developers in Thailand (Sohlbery, 2017) are as follows:

1. Pruksa Real Estate. It was founded in 1993 by Thongma Vijiitpongpan, and is headquartered in Bangkok, Pruksa Real Estate Public Company Limited and one of Thailand's largest property developers. Pruksa reported the highest annual sales of 47 billion THB in 2016 (around 1.5 billion USD). The business works globally including Thailand and India.

2. Central Pattana Public Company Limited is one of the largest property developers in Thailand. The parent company, Central Group, founded their real estate wing in 1980. The company owns and maintains 10 luxury shopping centers (Central Department Stores), five office buildings and two residential condominiums in operation for more than 25 years. Central Pattana is also CPN Retail Growth Property Fund real estate president.

3. Noble Development Public Company Limited is a publicly listed property development company incorporated in Bangkok, Thailand. In June 1997, the company listed its shares on Thailand's stock exchange (trade quote: NOBLE). The company's core businesses are the construction of residential projects. Noble was founded in 1991 by Mr. Kitti Thanakitamnuay, a visionary group of Thai businessmen.. In 2019, Noble company

had 20 projects consisting of 10 detached housing projects and 9 condominium projects, including 2 retail ventures (cumulative 5,600 residential units to be developed).

4. Sansiri Public Company Limited is a veteran of Thailand's real estate development industry, with a 35- year history that goes back to its establishment in 1984. It is one of Thailand's most successful and biggest real estate developers.

5. Land and Houses is another large real estate developer in Thailand that was ranked third in terms of annual revenue (THB 27 billion) in 2016. Ironically, it is the second fastest-growing business. Land and Houses was established in 1983 as a Bangkok-based property development company. In the single detached house group, it is also one of the most respected developers.

6. Ananda Development Founded in 1999, Ananda Development Public Limited Company is a leading real estate developer in Thailand. Its headquarters is in Bang Phli. According to the 2016 company financial report, Thailand's top ten developers have annual revenues of more than 12 billion baht.

7. Supalai is headquartered in Bangkok and was established in 1989. It has established subsidiaries in multiple regions and is one of the best apartment developers in Thailand. Supalai has performed well and is one of the largest real estate developers in terms of annual revenue (over 20 billion baht). In addition to building residential projects, Supalai is also known for Supalai Pasak Resort and Supalai Resort and Spa.

8. Quality Houses Public Limited Founded in 1983, Standard Houses has sales worth billions of baht. They develop mainly residential projects, resorts, office buildings, and hotels. They possess Quality House Internationals Co. at present. Ltd., a Hotel Industry company.

9. Everland Public Limited Company was founded in 1994 and is an international property developer based in Bangkok. Besides their high-quality residential projects, they are also known for having resorts designed and run.

Table 1.1 Key players of property developers in Thailand

No.	Company	Projects	Property Type	Starting Prices (THB )	Areas
1	Pruksa(found in 1993)	The Tree The Gallery's Nexts Town Passorn	Condominium Single home Townhouse Single-home	THB 2 M (townhouse) THB 4 M (single-house)	Bangkok India Maldives
2	Central Pattana Plc(found in 1980)	CentralWorld CentralFestival CentralPlaza Property types	Shopping centers	n/a	Bangkok Shah Alam Selangor Malaysia
3	Noble (found in 1991)	Nue noble Noble revolve Noble BE 19 Noble Ploenchit	Condominium housing	THB 3.4 M (condominium)	Bangkok

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No.	Company	Projects	Property Type	Starting Prices (THB )	Areas
4	Sansiri (found in 1984)	The Line (Phra Kanong) The Base (On nut) Oka HAUS KHUN	Condominium Single-houses Townhouses	THB 4 M (condominium) THB 6 M (single -house) THB 2 M (townhouse)	Bangkok Kensington London
5	Land and Houses (found in 1983)	Villaggi in Rangsit Indy Land Mark in Ramindra Ladawan The Bangkok in Thonglor and Sathorn	Condominium Single-houses Townhouses	THB 3 M (condominium) THB 5 M (single -house) THB 2 M (townhouse)	Bangkok
6	Ananda (found in 1999)	Ideo Mobi Series AIRI Series Arden Series	Condominium Single-houses Townhouses	THB 5 M (condominium) THB 2 M (townhouse)	Bangkok
7	Supalai (found in 1989)	Park Ville Moda Royal River Bella	Condominium Single-houses Townhouses Resorts	THB 4 M (condominium) THB 2 M (townhouse)	Pattaya Pakkret Bangkok
8	Quality Houses (found in 1983)	Q House Avenue Casa Grand Casa Presto Casa Seaside	serviced apartments offices townhouses	THB 6-7 M (single-house)	Bangkok
9	Everland (found in 1994)	The Politan Aqua The Politan Breeze The Politan Rive My Villa	Condominium Single-houses Resorts	THB 1.3 M (condominium) THB 4 M (single-house)	Bangkok

Among property developers in Thailand, Sansiri is the only fully integrated property developer in Thailand that provides additional sales and after-sales facilities for its customers. Sansiri is also Thailand's only



fully integrated property developer, providing comprehensive services that go far beyond those of traditional developers(Sansiri, 2018 ) .

Sansiri company with over 33 years of experience and hundreds of projects in Thailand, including two hotels and a residential house in Kensington, London. Sansiri company strive to continuously improve the quality of life of our residents through constructing meticulously designed, well-made homes (Sansiri, 2016). Therefore, the current study focused on factors that impact on purchase condominium intention of Sansiri company.

Bangkok, the capital of Thailand, hosts 32 million tourists a year(Amazing Thailand,2016), and the booming tourism industry is driving Bangkok's economy and Thai real estate market. Due to its proximity, rapid tourism development and beautiful environment, economic growth up, Thailand has become a new target for overseas customers. In recent years, Thai real estate has been increasingly sought, especially for purchase condominium in Bangkok.

### **1.1.3 Customer decision making on property**

Investment refer to expend money with the expectation of achieving a profit or material result by putting it into financial schemes, shares, or property, or by using it to develop a commercial venture. Customers expect to obtain financial return through purchasing condominium in Bangkok.

Portfolio of investors are prone to include cash, bonds, common stocks, mortgages, mortgage-backed securities, real estate equity, venture capital, and international stock (Worzala & Bajtelsmit, 1997). As real estate in Thailand attract customer, buying a condominium in Thailand seems to be another country's most popular real estate transaction.

Decision-making process for investment includes: 1.) Setting strategy; 2.) Establishing return/risk objective; 3.) Searching for investment opportunities; 4.) Forecasting expected returns; 5.) Evaluating forecast; 6.) Assessing and adjusting for risk; 7.) Decision-making; 8.) Implementing accepted proposals; 9.) Auditing operating performance (Farragher & California, 2008). Investors tend to consider property age, property size, region, metropolitan area, neighborhood Factors, and lease term (Worzala & Bajtelsmit, 1997) as part of their forecasting and evaluation. In terms of financially, investors are likely to payback period, return on investment, and income multiplier (Farragher & California, 2008).

Most of prior research focused on property investment in general and applied the financial approach. This study also includes resource-based view that influence on investor decision which can referred to as purchase intention. According to Grant (1991), firm resource that enhance competitiveness include firm asset characteristics, firm reputation, service capabilities, and cost advantage.

Companies with a high reputation build competitive advantages and are more likely to influence customer behavior and attitudes. The main aim of this study is to examine the credibility of Volkswagen after the pollution scandal from the viewpoint of Turkish customers and also to clarify the effect of Volkswagen's reputation on customer intentions. The results show that corporate reputation has a positive impact on both customer intentions and performance Ibrahim and Emel (2018).

The main aim of this study was to identify the factors responsible for Polish property buyers' choice of residential location, including single-family houses and apartments. The data were processed statistically to reveal that price is the most important factor behind the residential location choice. Other factors identified by the respondents included the sense of security and a quiet neighborhood. High scenic value was regarded as

a moderately important factor, although its significance was recognized by the majority of the respondents. Sabina, Maria, Anna and Radosiaw (2015)

### **1.2 Research Objectives**

To explore factors that influence customer purchase intention of the condominium in Bangkok.

10. To examine the relationships between the factors and purchase intention.

11. To gain insight into consumers' perception toward purchasing the condominium and in order to develop the business.

### **1.3 Hypotheses**

Hypothesis 1: Asset characteristics (i.e., property age, property size, metropolitan area, neighborhood and price) have positive influence purchase intention of condominium.

Hypothesis 2: Developer reputation has positive influence purchase intention of condominium.

### **1.4 Scope of Research**

1. This study focused on the factors that impact on investor purchase intention which include asset characteristics (i.e., property age, property size, metropolitan area, neighborhood and price) and developer reputation.

2. This study target toward investor who interested to purchase condo from Sansiri company in Bangkok, Thailand.

3. This study was collected the data through online survey using the Google form in September 2019.

### **1.5 Research Contributions**

1. This study provides empirical evidence of factors that impact on investor purchase intention.

2. This study provides guidance for better understanding customer perception toward purchasing condominium in order to formulate an effective strategic decision on product development and marketing strategies.

3. This study have extended resource-based view concept to explain the role of condominium characteristics to gain competitive advantage while contribute to attribution theory to explain the impact of developer reputation on purchase intention.

### **1.6 Definitions**

#### **Real Estate**

Real estate is the property, land, buildings, air rights above the land and underground rights below the land. There are four types of real estate: 1.) Residential Real Estate; 2.) Commercial Real Estate; 3.) Industrial Real Estate; 4.) Land.

#### **Condominium**

Condominium refers to a building where the residential units are owned by individuals and where all the co-owners collectively own common areas and facilities. Units are usually furnished, with apartment-like amenities. In a condominium, the building management manages the common areas of the property and its units are the responsibility of the individual owners.

#### **Asset characteristics**

Asset characteristics refers to property age, property size, metropolitan area, neighborhood and price.

### **Property age**

Sometimes the real age of a structure is called historical age or chronological age. It is the number of years that have occurred since completion of building construction.

### **Property size**

Property size refers to the final unit floor area to be built. It is measured from the middle of the unit's walls which are not held jointly. The exterior structure of a condominium is the condominium's joint ownership, with the parallel walls between the units belonging to the individual unit's floor area for 50 percent private ownership.

### **Metropolitan area**

Metropolitan area refers to the economic, cultural, and often historic, political, and geographical center of a city, and is often synonymous with its central business district (CBD).

### **Nationhood**

The area of a town surrounding someone's house, or the people living in that area.

### **Price**

The amount a customer pays for condominium. The price include taxes, fund and other fees.

### **Developer Reputation**

Developer reputation refers to socially transmitted meta-belief and evaluation that results from the attitudes other actors have about some socially desirable behavior. A company's reputation should be viewed as an asset and prestige that gives the company a competitive advantage because the business will be seen as reliable, honest, trustworthy and accountable for staff, clients, shareholders and financial markets.

### **Purchase Intention**

The willingness of a customer to buy a condominium.

## **Literature Review**

### **2.1 Theories and Concepts**

This chapter discussed Resource-based view concept on how resources of property company which include property age, property size, metropolitan area, neighborhood and price reflecting the cost lead company to have advantage over competitor, thus influence on investor decision. This chapter also discuss the attribution theory that explain how firm reputation impact on investor decision. The current chapter employ purchase intention to explain investor decision making process.

#### **2.1.1 Resource-based view (RBV)**

There was a resurgence of interest in the role of the company's capital as the basis for firm strategy. At the business strategy level, Explorations of the relationship between capital, competition and profitability include the study of competitive imitation, the appropriateness of innovation returns, the role of imperfect information in creating differences in profitability between competing firms (Grant,1980).

Five-stage for strategy formulation includes: 1.) analyzing the firm's resource-base; 2.) appraising the firm's capabilities; 3.) analyzing the profit-earning potential of firm's resources and capabilities; 4.) selecting a

strategy; 5.) extending and upgrading the firm's pool of resources and capabilities (Robert M. Grant, 2001 ) as shown in figure 2.1.

Resource Based View (RBV) analyzes and interprets the organizations ' resources to understand how organizations gain sustainable competitive advantage. The RBV focuses on the firm's idea of hard to replicate qualities as sources of superior performance and competitive advantage (Barney, 1986; Hamel and Prahalad, 1996).

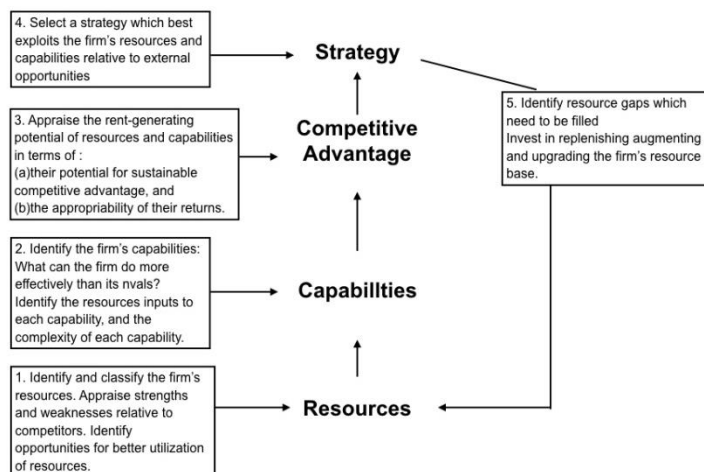


Figure 2.1 A Resource-Based Approach to Strategy Analysis:A Practical Framework

Consistently, Hunt (2000) proposed resource advantage theory (R-A Theory). In 1994, Robert Morgan and Hunt reviewed some latest developments related to "resource-based" approach in the strategic leadership literature. Many strategy theorists suggested in this literature that the strategy was misguided by embracing "sector" as the main focus of the growth of strategy. These new theorists argued that executives should concentrate on creating and acquiring. R-A theory is an evolutionary, unbalanced, competitive process theory in which innovation and organizational learning are endogenous, companies and consumers have imperfect information, and where entrepreneurship, ships, institutions, and public policy influence financial efficiency. Hunt (2000) proposed 9 premises which are

"P1. Demand is heterogeneous across industries, heterogeneous within industries, and dynamic.

P2. Consumer information is imperfect and costly. (Here, R-A theory uses "consumers" in its broadest sense, which includes business and other buyers.)

P3. Human motivation is constrained self-interest seeking.

P4. The firm's objective is superior financial performance.

P5. The firm's information is imperfect and costly.

P6. The firm's resources are financial, physical, legal, human, organizational, informational, and relational.

P7. Resource characteristics are heterogeneous and imperfectly mobile.

P8. The role of management is to recognize, understand, create, select, implement, and modify strategies.

P9. Competitive dynamics are disequilibrium-provoking, with innovation endogenous”. (Hunt, 2011, p.73)

Figure 2.2 Explain how company evaluate its competitiveness. For instance, cell 3A explain the results from the company, relative to its competitors, in segment A, having a resource assortment that allows it to generate an offering that (1) is viewed to be of superior importance by customers in that segment and (2) is generated at reduced cost than competitors.

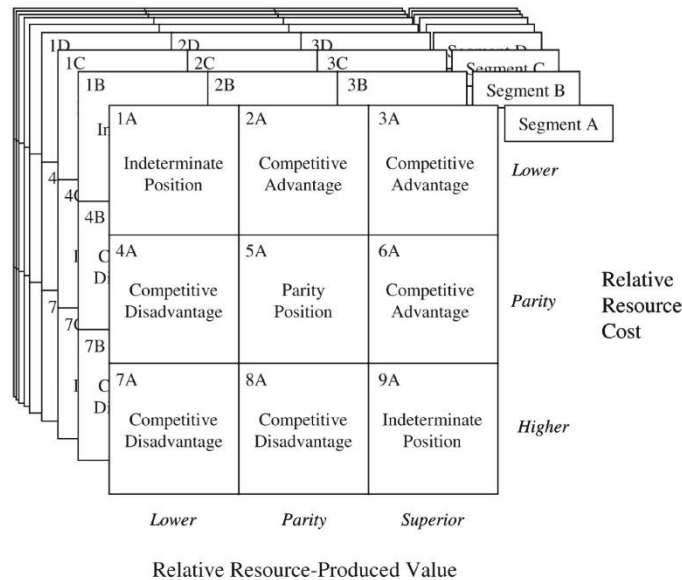


Figure 2.2 Relative Resource-Produced Value

RBV says not all client capital will be strategic tools and thus sources of competitive advantage. Competitive advantage only exists when there is a situation of heterogeneity of resources (different resources between firms) and immobility of resources (the inability of competing firms to acquire resources from other firms). If the resource is not ideally elastic (i.e., the resource is not free to move between companies, or if a resourceless business faces a considerable cost burden in creating, acquiring or using it that a company does not already use it), then the resource would possibly be a source of sustained competitive advantage. If a resource is imitated or substituted then any benefits gained may be short-lived. In short, the more mobile a resource is, the less enduring will be the value derived from that resource. In this current era of fast changing globalized world, if an organization is able to change swiftly and be more alert to changes in the competitive market, then they are more likely to gain and sustain competitive advantage (Jazz, 2005).

Competing companies offering a similar range of products and services may distinguish themselves from their rivals and enjoy some competitive advantage by leveraging their valuable resources and capabilities that are superior, limited and inimitable (Roberts and Dowling, 2002).

In property business, the firm’s resources are financial, physical such as property age, property size, metropolitan area, neighborhood, legal, human, organizational, informational, and relational. Property companies attempt to innovate their offer on condominium, develop firm’s resource characteristic, and customize the offer to customers. Therefore, a company’s corporate image could provide some competitive edge that could ensure a company’s growth and potential survival in a highly competitive environment (Zainudin Hj Awang, 2009).

### 2.1.2 Theory of Buyer Behavior

Various factors impact on investor behavior. Howard & Sheth (1969) proposed a theory of buyer behavior model. The elements of a buyer's brand-choice decision are (1) a set of motives, (2) several alternative courses of action, and (3) decision mediators by which the motives are matched with the alternatives. The motifs are unique to a class of product and represent the buyer's underlying needs. The alternatives are the different brands, which have the ability to satisfy the desires of the consumer.

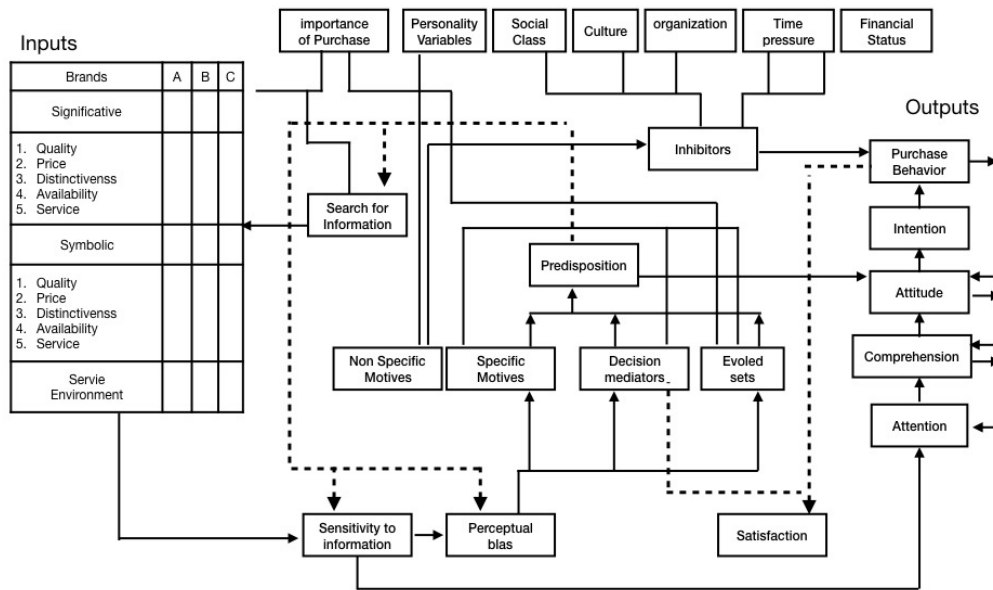


Figure 2.3 Theory of buyer behavior.

The central rectangular box isolates the different internal variables and processes that, taken together, reveal the buyer's condition. The inserts into the rectangular box are advertisement and social stimuli. The outcomes are a number of responses that the buyer is likely to react to, depending on the relationship between the stimulus and his internal state. (Howard & Sheth, 1969).

Besides the inputs and outputs, the rectangular box contains a collection of seven influences which affect the variables. Such variables appear at the top of the diagram, and they are classified as "exogenous." Its purpose is to provide an adjustment to the interpersonal differences mentioned above (Howard & Sheth, 1969).

The variables inside the rectangular box are conceptual constructs that serve the position of endogenous variables in the sense that changes are clarified in them, but they are something less than endogenous variables in that they are not clearly described and can not be observed. Their values are extracted from the relationships between the variables involved in the production (Howard & Sheth, 1969).

At any point in time, various stimuli from its environment influence the conceptual constructs which represent the internal state of the buyer. This setting is either categorized as commercial or as social. The commercial environment consists of various companies ' marketing activities, by which they seek to interact with the customer. From the buyer's view point, these communications essentially come via either the brand objects themselves or some linguistic or pictorial representation of brand attributes. When brand elements such

as price, quality, service, distinguishability or availability are communicated through brand objects (means), the stimuli are described and classified as meaningful stimuli (Howard & Sheth, 1969).

The third stimulus input variable is the information provided for a purchase decision by the social environment of the consumer. Word-of-mouth contact is the most obvious example (Howard & Sheth, 1969).

The inputs from the three main categories of stimuli into the buyer's mental state are interpreted and stored through their interaction with a set of conceptual constructs: The buyer will respond to these stimuli immediately or later (Howard & Sheth, 1969).

### 2.1.3 Attribution Theory

The theory of attribution deals with how people use the information to pursue causal explanations for events. It looks at what information is collected and how it is incorporated into a causal decision (Fiske & Taylor, 1991). The information may include firm reputation and other property information. Attribution analysis looked at the causal inferences of customers for a number of outcomes-inferences about the consumer's own actions, the success or failure of a product, and the approval of a product by a communicator (cf. Zaltman and Wallendorf 1983).

Attribution is a psychological construct that refers to the cognitive processes through which an person infers the cause of the conduct of an actor (Calder, 1977). Attribution determines whether a behavior is ascribed to inner, private or external causes. The customer is a social actor in the purchase and use of products whose conduct is mainly open to others' observation (Calder, 1977).

Figure 2.4 presents attribution paradigm. Relationship (1) explains how an observer infers private disposition from the conduct of a consumer. One is the precision of the understanding of the attributions participants make of their conduct by the consumer. It can be referred to this as the attribution sensitivity of the consumer. The other element of the complete paradigm is how the attribution sensitivity of the consumer impacts his own subsequent behavior. Relationship (2) explains the relationship between the attributions of the subject and the sensitivity of the actor to these attributions, may require the observer's overt pressure or the actor's mere presumption of an attribution. Relationship (3) explains the relationship between the attribution sensitivity of the actor and his subsequent behavior, necessarily includes the question of how this sensitivity is psychologically represented and how it impacts other behavioral determinants such as attitudes.

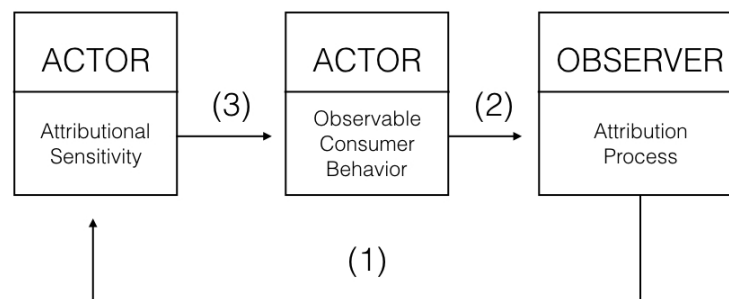


Figure 2.4 An attribution paradigm for the study of interpersonal influence

Nguyen and Leblanc's (2001) study found that consumers are more inclined to buy the products or services from companies they perceived as having a favorable reputation amongst their competitors.

An investor needs to double-check the reputation of the developer before investing in projects that assure regular return. One should also check the quality and status of past projects of the developer, before investing in property (Jayashree Kurup,2008).

#### 2.1.4 Purchase intention Concept

Fishbein and Ajzen (1975) asserted that person intention is a function of attitudinal (i.e., attitude toward performing the behavior) and normative (i.e., subjective norm). They further confirmed that attitude, belief, and intention are different concepts. Intention is comprised of four elements; behavior, targets, situation, and time. Behavior refers to the action that intent to perform. Target is the object toward which the conduct is directed. The condition applies to the circumstance in which the behavior is to be carried out. Time refers to when action is to be terminated. Spear and Singh (2004) defined buying intentions as a deliberate decision for the consumer to make an effort to buy a brand.

The processes intervening between stimulus and response variables. Figure 2.5 shows that intention are determined by two intervening variables, attitude toward the behavior and subjective norm. Attitude toward the behavior is a function of beliefs about the behavior's consequences and evaluations of those consequences. One must examine the effects of stimulus conditions on the beliefs and evaluations.

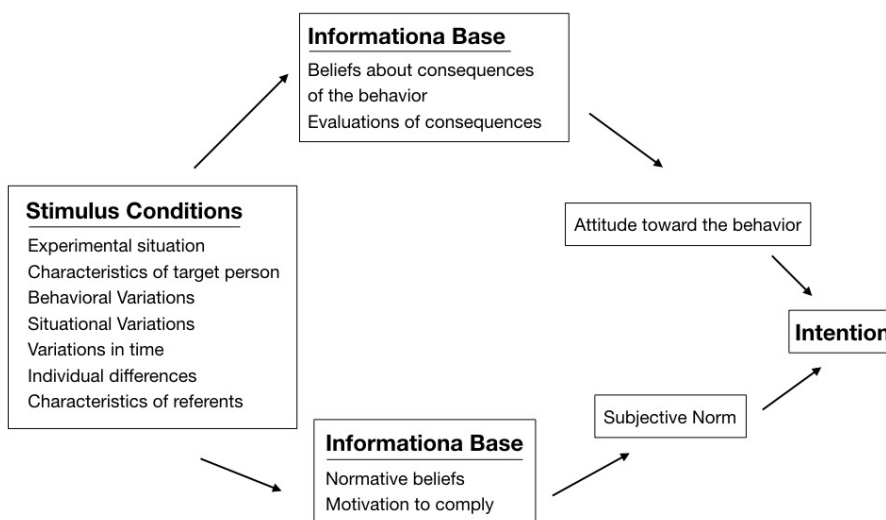


Figure 2.5 Schematic representation of effects of stimulus variables on intentions

Marketing executives often measure and use purchase intentions as an input for choices on fresh and existing products and services. Buying intention are linked and predict sales in the future, but do so imperfectly (Muellerleile, 2001). Consumers buying intentions are one of the key inputs used by marketing managers to predict future sales and to assess how the decisions they are doing can affect the buying behavior of customers. Between 70 and 90 percent of market research suppliers customers confirmed in a study that they regularly calculate and use buying intentions(Jamieson & Bass, 1989). Purchase intentions was also used to assess customer demand for fresh products in product testing. Prior studies are prone to evaluate whether sufficient customers will purchase a fresh product to justify its launch, and if so, how best to use marketing mix components to maximize revenues (Namias, 1959).



**2.2 Related Literatures**

**2.2.1 Asset characteristic and purchase intention**

Previous researches explore various antecedents of property buyer decision. Table 2.1 show the antecedents employed in previous research. They tend includes property age, property size, metropolitan area, neighborhood and price.

Variables	Research Scope	Authors
Price/ Transaction price Age of the unit	Buyers' Property Asset Purchase Decisions: An Empirical Study on The High-End Residential Property Market In Hong Kong	Jayantha, W. M., & Lau, J. M. (2016).
Price Intention on Timing of purchase Intention to buy a house Location Financial Neighborhood Developer's reputation	First-Time Home Buyers: Factors Influencing Decision Making	Abdullah, L., Nor, S. I. B. M., Jumadi, S. N., & Arshad, S. H. (2012, April).
Price Location and design Type of neighborhood Facilities and amenities in the neighborhood	Influencing Factors of Property Buyer in Hillside Residential Development	Salleh, N. A., Zoher, S. A., Mahayuddin, S. A., & Abdul, Y. (2015).
Affordable price Quiet neighborhood Sense of security Proximity to one's family Proximity to kindergarten, school Neighborhood	The influence of environmental factors on property buyers' choice of residential location in Poland	Żróbek, S., Trojanek, M., Żróbek-Sokolnik, A., & Trojanek, R. (2015).
Financing Distance Environment Developer Brand	Understanding Factors That Influence House Purchase Intention Among Consumers In Kota Kinabalu : An Application Of Buyer Behavior Model Theory	Chia, J., Harun, A., Kassim, A. W. M., Martin, D., & Kepal, N. (2016).

Condition of neighbourhood Attractiveness of the area Steepness/topography of the land Vacant sites nearby Security from crime Interest rate Maximum mortgage (absolute amount) Maximum monthly repayments Rateable value of the house Length of time house was on the market	Residential real estate purchase decisions in Australia: is it more than location	Ratchatakulpat, T., Miller, P., & Marchant, T. (2009).
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Sr. Lizawati Abdullah MRISM (2012) examine a housing market. The first-time house buyers are important as they indirectly act as indicator to help regulating the housing policies and further promoting home ownership. Several factors have been recognized which may influence their decision-making. Among the factors are house price, location, family transition, neighbourhood and others. In this paper, the emphasis is placed on identifying the most important factors that influenced their decision.

Ratchatakulpat (2009) examines the factors considered by potential buyers when buying housing property in Queensland, Australia. A drop-off survey with 376 estate buyers and 62.7 percent response rate is used. The most significant factors on purchasing housing property is affordability, maintenance and interior design, as well as a nice neighborhood. The affluence and quality of the region, water, etc. are of less significance.

Sabina Żróbek (2015) attempted to identify the factors responsible for Polish property buyers' choice of residential. The questionnaire was completed by 269 residents of three Polish regions. The respondents assessed the quality of their home environment and identified environmental factors that might affect their health. Other factors that the respondents identified included the sense of security and a quiet neighbourhood. Wonggotwarin and Kim (2017) examine the impact of product quality, service quality, brand picture, and condominium product design variables on the intention of purchasing condominiums in Bangkok. A survey questionnaire was used and circulated through internet platforms. Data from a sample of 400 individuals considering buying condominiums in Bangkok were gathered. Research findings indicate that product quality, product design, and brand picture are statistically important predictors of buying intention.

Chia (2016) examine the perception of factors contributing to consumer decision-making in the real estate markets will help both buyers and the residential sector. The study confirms the effect of housing attributes such as house characteristics, living space, distance and environment on intention to purchase a house.

Therefore, this study proposed

Hypothesis 1: Asset characteristics (i.e., property age, property size, metropolitan area, neighbourhood and price) influence condominium purchase intention.

**2.2.2 Developer reputation and purchase intention**

Sultana and Pardhasaradhi (2012) studied the factors impact on investor decision. The study identifies factors affecting investment decisions such as individual eccentric eccentricity, wealth maximization, risk minimization, brand perception, social responsibility, financial expectations, accounting information, government and media, economic expectations and advocacy factors. The study collected the data from 891 investors of various stock broking firms in India. The study confirmed the impact of firm reputation on investor decisions.

In addition, Arron et al. (2012) examine investor reaction to signals of environmental management (EM) reputation. The study collected data from the top 100 companies and the bottom 100 companies in the 2009 Newsweek Green Rankings. The study found that the market responds positively to companies receiving favorable recognition for EM and negatively to firms receiving unfavorable recognition.

Zainudin Hj Awang(2009) seeks to assess, from a customer perspective, the impact of the corporate reputation of firms on their competitive advantage in the market. The study sampled 600 individual customers using mobile services for at least three years. Corporate reputation has an indirect impact on competitive advantage through perceived value and perceived service quality. In other words, firms should effectively communicate their favorable corporate reputation to the market so that the level of customer perception of their products and services can emerge.

Therefore, this study proposed

Hypothesis 2: Developer reputation has positive effect condominium purchase intention.

**2.3 Research Framework**

This study explore the influence of asset characteristics which include property age, property size, metropolitan area, neighbourhood and price as well as developer reputation on purchase intention as shown in figure 2.6.

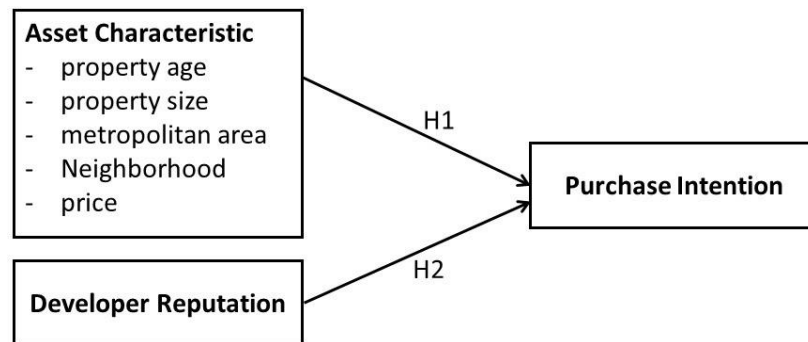


Figure 2.6 Research Model

**Research Methodology**

The purpose of this section is to explain the thesis ' primary study processes. This paper's study framework is focused on reading, summing up and analyzing the literature, combining associated studies into research design, and arranging, summarizing factors affecting the intention of consumer purchase condominium. The chapter uses a Quantitative methods design questionnaire, uses mail to deliver.

### 3.1 Research Design

Quantitative methods are used to identify the factors influence customer purchase intention condominium in Bangkok. Questionnaires were sent to Sansiri's 1,000 customers using e-mail on September 2019.

Participants were asked to finish the self-management survey. Surveys show that respondents' responses are entirely anonymous and include demographic information such as age, employment, education. Participants' privacy gets protected. Both respondents are voluntary and agree to focus their responses on using the data.

### 3.2 Population and Sample

#### Population

This research is intended to study factors influence customer purchase intention condominium in Bangkok. Researchers select the client of the Sansiri company that considered and also purchased the condo in Bangkok as the target population.

#### Sample

This study uses the formula from Cochran (1963) to determine the sample size. The formula for unknown population is:

$$n = (Z^2 pq) / e^2$$

where;

n = sample size

Z<sup>2</sup> = abscissa of normal curve

e = the level of precision

p = the estimate proportion of an attribute

q = 1 - p

Therefore, this formula assumes a confident level of 90% and the degree of variability of 0.1

Hence, where Z = 1.645, e = 0.05,

$$n = [(1.645^2)(0.5)(0.5)] / (0.05^2) = 0.6765 / 0.0025 = 270.60$$

Therefore, the sample size is 271 with 90% level of precision should be adequate.

In the study, the expected respond rate is 30%, researcher decides to use 1000 questionnaires in Bangkok. E-mail surveys would be the research method to be used.

### 3.3 Research Instrument

The questionnaire was developed in this study to be two parts. Part one is Demographic information. Part two is Measuring Variables, which researcher applied 5 Likert scale for the question which is 1 = strongly disagree, 2 = disagree, 3 = moderate, 4 = agree, and 5 = strongly agree.

Measurement items of asset characteristics adopted from Worzala & Bajtelsmit (1997). Five measurement ask the respondents to rate the importance of five items which are property age, property size, metropolitan area, neighborhood and price.

For developer reputation, 19 measurement items are developed from Gardberg and Fombrun (2002). The items are

Brand knowledge

1. I am very familiar with the condo and services of the Sansiri company.
2. I know a lot about Sansiri company's financial performance.
3. I know many people who work for Sansiri company.

Vision & leadership

1. Sansiri company is well-managed.
2. Sansiri company is led by an intelligent and competent CEO.

Products & Services

1. Sansiri company sells high quality products and services.
2. Sansiri company is an innovative company.
3. Sansiri company provides excellent value to the customer.
4. Sansiri company has extensive resources to draw on.
5. Sansiri company is a leader in the Thai real estate.
6. Sansiri company is very distinctive in the way it does things.

Emotional Appeal

1. I really identify with this company.
2. I have a good feeling about this company.
3. I usually believe what this company says.
4. I can trust Sansiri company.
5. Sansiri company is honest and straightforward in its communications with the public.

Work environment and social responsibility

1. Sansiri company really cares about its employees.
2. Sansiri company contributes a lot to the communities in which it operates.
3. This is an environmentally responsible company.

Measurement items of purchase intention are adapted from Bian and Forsythe (2012). The items are: 1.) If a condominium has all asset characteristics which I like, I intend to buy it; 2.) If a condominium comes with good Financing Arrangement, I intend to buy it; 3.) If a condominium comes from good Property Reputation, I intend to buy it; 4.) The probability I would consider buying a condo from Sansiri company.

**3.4 Data Collection and Procedure**

**3.4.1 Cronbach  $\alpha$  coefficient reliability analysis**

In order to measure consumers' willingness to purchase and influence factors (a total of three factors: Asset characteristics, Developer reputation, Purchase intention). A total of 38 questions, of which Q1 ~ Q16 and Q20 ~ Q 42 are scale questions, now hope to analyze the data reliability to verify the quality of the data.

Table 3.1 Criteria of Reliability

Cronbach's Alpha Coefficient	Reliability Level	Desirability Level
0.80-1.00	Very High	Excellent
0.70-0.79	High	Good

0.50-0.69	Medium	Fair
0.3-0.49	Low	Poor
Less than 0.30	Very Low	Unacceptable

Table 3.2 Reliability of Hypothesis (Asset characteristics, Developer reputation, Purchase intention)

	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Asset characteristics	.860	.864	5
Developer reputation	.793	.793	19
Purchase intention	.824	.824	4

According to Table 3.2, the overall reliability coefficient of the questionnaire is 0.839. And the internal consistency coefficient of the items of Asset characteristics, Developer reputation, Purchase intention are all greater than 0.7. Therefore, the questionnaire has a high degree of reliable.

### 3.4.2 Validity Test

. The KMO and Bartlett's validity analysis test has been used to evaluate construct validity.

The KMO value is between 0 and 1, and the closer the value is to 1, the higher the correlation of the phase change, the more suitable for factor analysis

Table 3.3 SPSS output : Interpretation of the magnitude of KMO value

KMO value	Interpretation
>0.90	Marvelous
0.80~0.89	Meritorious
0.70~0.79	Middling
0.60~0.69	Mediocre
0.50~0.59	Miserable
<0.50	Unacceptable

### Asset characteristics

Asset characteristics conducted by 5 items, conclude the impact of each item on asset characteristics is statistically at the level of 95%. Validity results of motivation are as follow:

The KMO and Bartlett's text

Table 3.4 SPSS output : Validity of Asset characteristics

<b>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</b>		<b>.846</b>
Bartlett's Test of Sphericity	Approx. Chi-Square	680.098
	df	10
	Sig.	.000

Regarding the 5 items of Asset characteristics, the overall KMO is 0.846 which is more than 0.6 thus, this confirm sampling adequacy. Bartlett's test of sphericity also confirms that there is a high degree of degree of convergent validity, with p-value of 0.000; which is less than 0.05.

**Developer reputation**

Developer reputation conducted by 19 items, conclude the impact of each item on developer reputation is statistically at the level of 95%. Validity results of motivation are as follow:

The KMO and Bartlett's text

Table 3.5 SPSS output : Validity of Developer reputation

<b>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</b>		<b>.837</b>
Bartlett's Test of Sphericity	Approx. Chi-Square	740.888
	df	171
	Sig.	.000

Regarding the 19 items of developer reputation, the overall KMO is 0.837 which is more than 0.6 thus, this confirm sampling adequacy. Bartlett's text of sphericity also confirms that there is a high degree of degree of convergent validity, with p-value of 0.000; which is less than 0.05.

**Purchase Intention**

Purchase intention conducted by 4 items, conclude the impact of each item on purchase intention is statistically at the level of 95%. Validity results of motivation are as follow:

The KMO and Bartlett's text

Table 3.6 SPSS output : Validity of Purchase intention

<b>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</b>		<b>.798</b>
Bartlett's Test of Sphericity	Approx. Chi-Square	396.317
	df	6
	Sig.	.000

Regarding the 4 items of purchase intention, the overall KMO is 0.941 which is more than 0.6 thus, this confirm sampling adequacy. Bartlett's text of sphericity also confirms that there is a high degree of degree of convergent validity, with p-value of 0.000; which is less than 0.05.

With the values of KMO and sig, generally KMO is greater than 0.7, and it is said to be 0.6. Naturally, the larger the better, the later sig is less than 0.05, then the confirmatory factor analysis can be performed.

### 3.5 Data Analysis

A total of 1000 questionnaires were sent to the target customers . A total of 282 respondents returned the questionnaires (response rate of 30%). The data are collected from the study were analyzed, utilizing Cronbach  $\alpha$  coefficient reliability analysis for analysis with SPSS v23.0 software. And next chapter , I will use descriptive analysis to analyze respondent characteristics and rating means of asset characteristics, developer reputation, and purchase intention.

This study also uses simple linear regression to test hypotheses.

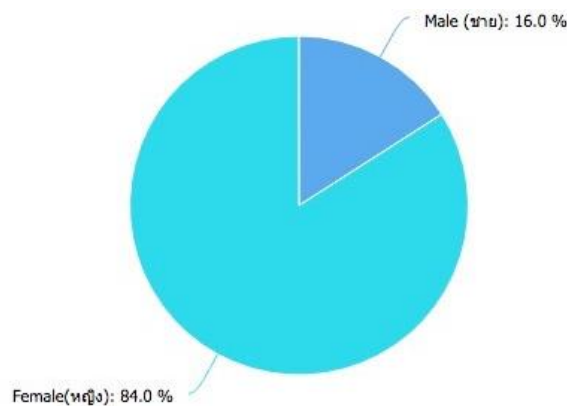
## Findings

The survey respondents included some of the company's customers, and sent an electronic questionnaire through the network to investigate. A total of 1000 questionnaires were distributed, a total of 282 valid questionnaires were obtained, and the effective recovery rate was 30%.

### 4.1 Descriptive analysis

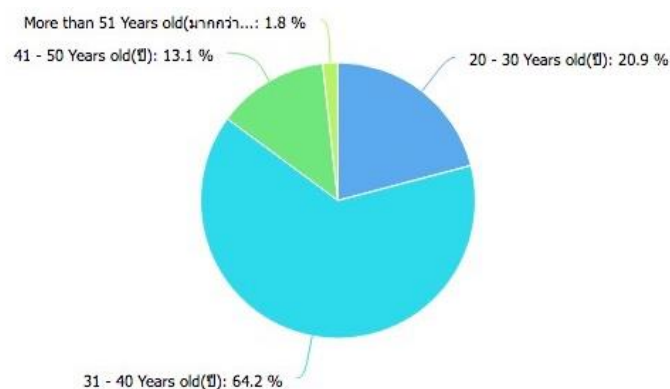
#### 4.1.1 Gender

Among 282 respondents, 84% (237) of respondents are female and 16% (45) are male.



#### 4.1.2 Age

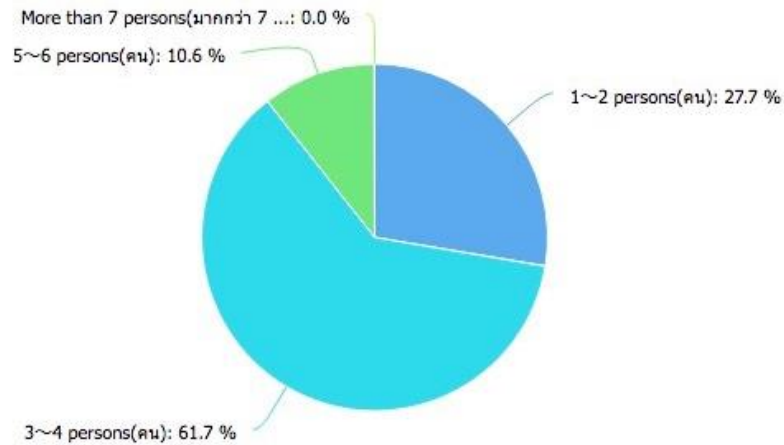
Most of respondents (64.2%, 181) are in the age between 31 to 40 years followed by the age between 20 to 30 year (20.9%, 59).





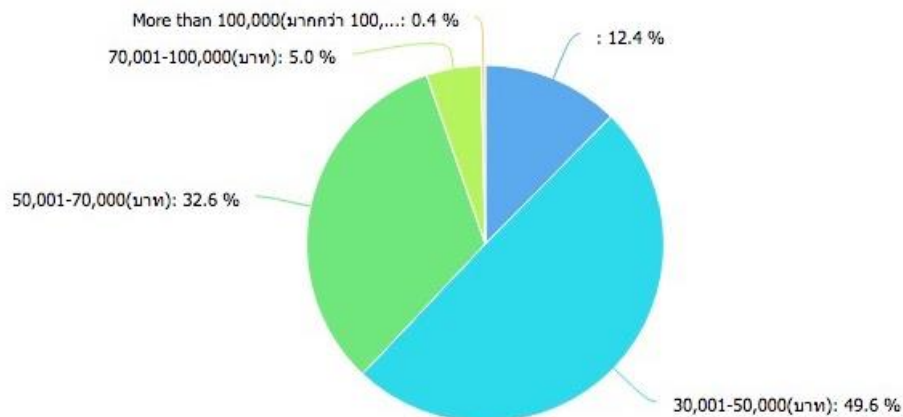
#### 4.1.3 Household size

Most respondents (61.7%, 174) has household size between 3 to 4 persons followed by between 1 to 2 persons 27.7% (78).



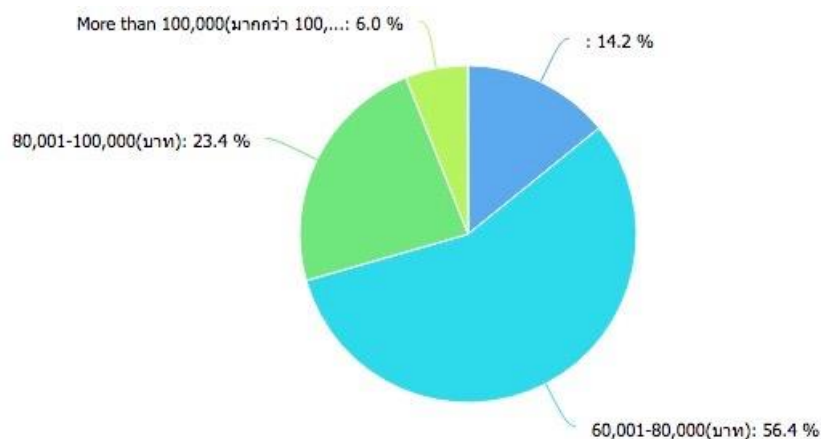
#### 4.1.4 Income

Most of respondents (49.7%, 140) earn monthly income between 30,001 to 50,000 baht, follow by those with income between 50,001 to 70,000 (32.6%, 92).



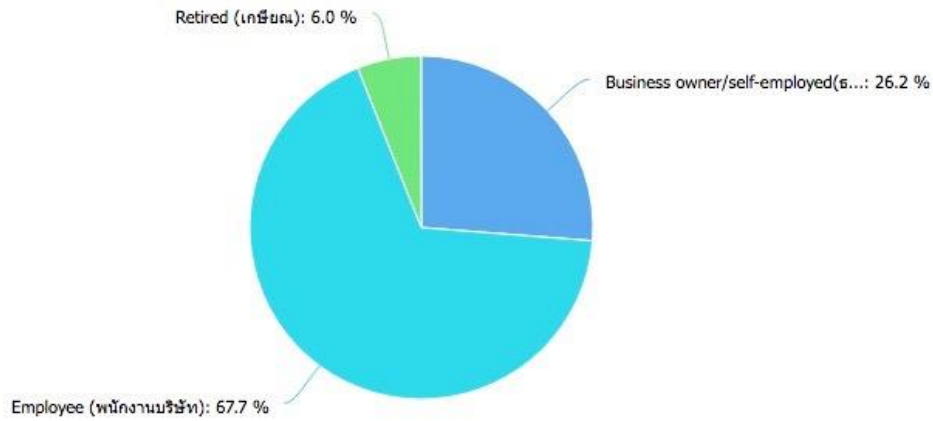
#### 4.1.5 Household Income

Most respondents (56.4%, 159) earn household monthly income between 60,001 to 80,000 baht, followed by those who obtain household income between 80,001 to 100,000 baht is 23.4% (66).



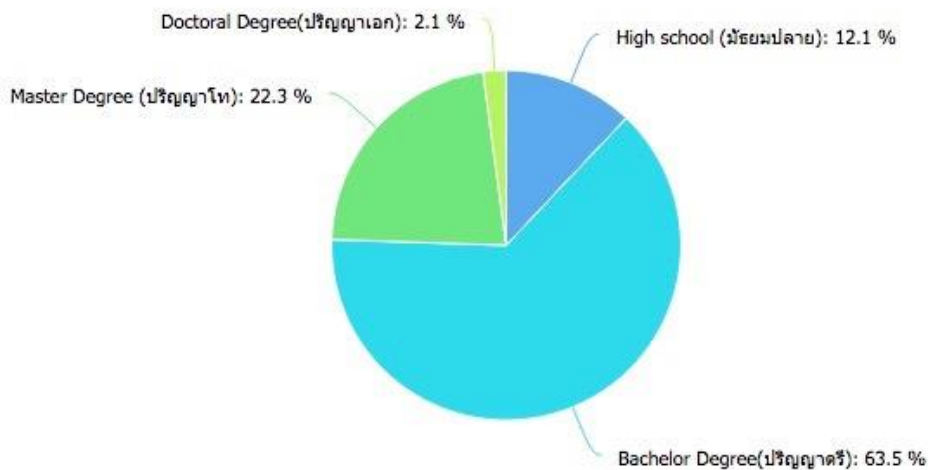
#### 4.1.6 Occupation

67.7% (191) of respondents are employee while 26.2% (74) of respondents are business owner/self-employed, and 6.1% (17) of respondents are retired.



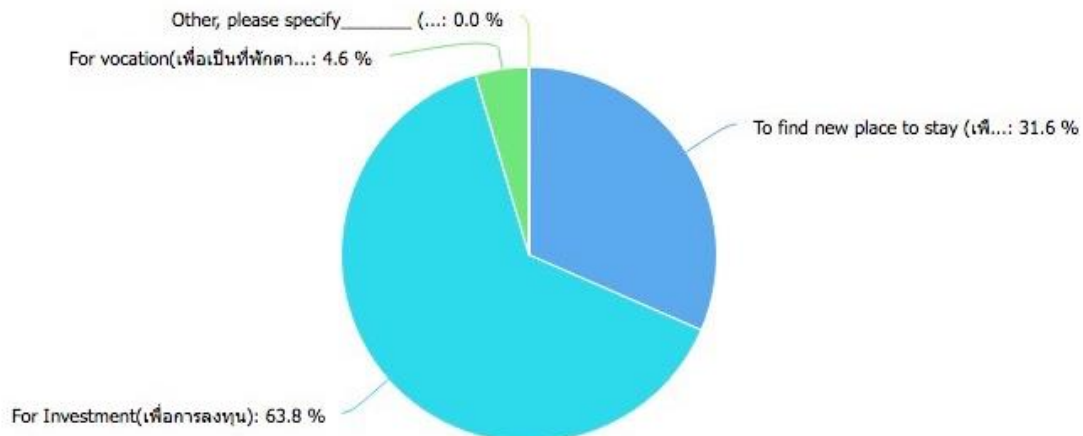
#### 4.1.7 Education Level

63.5% (179) of respondents hold bachelor degree and 22.3 % ( 63) hold master degree.



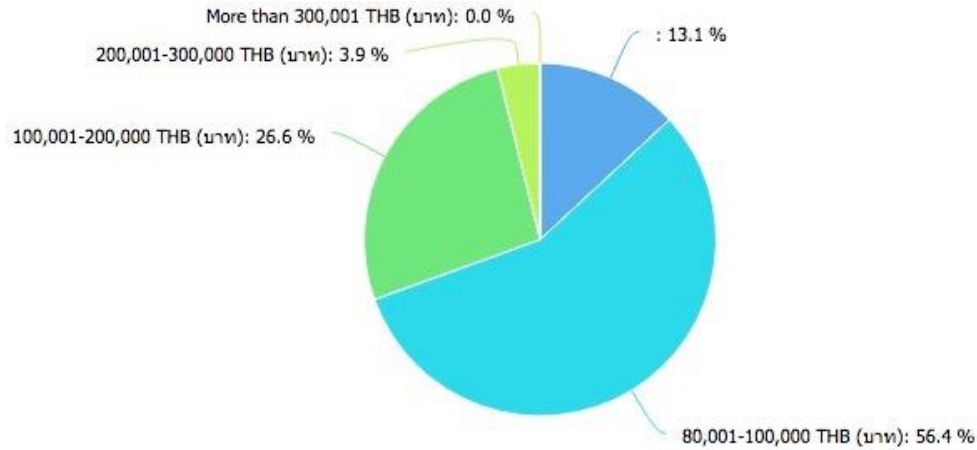
#### 4.1.8 Condominium Purchase Purpose

63.8% (180) of respondents purchase condominium for investment while 31.6% (89) of respondents intend to find new place to stay.



**4.1.9 Willingness to Pay**

Most of customers (56.4%, 159) expected to buy condominium at the price (Sq.m) between 80,001 to 100,000 baht, followed by the price between 100,001 to 200,000 baht (26.6%, 75).



**4.1.10 Room Size**

Most of customers (45.4%, 128) expected room size to be between 25 to 40 Sq.m, followed by between 41 to 55 Sq.m (25.9%, 73).

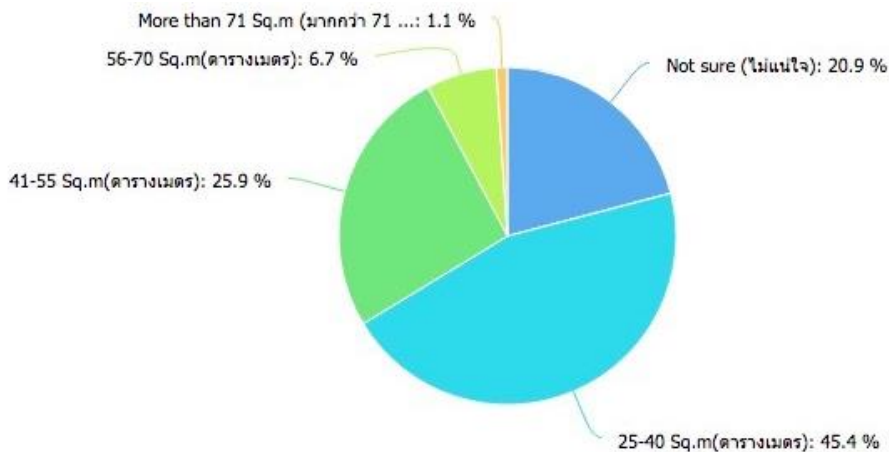


Table 4.1 Present demographic characteristics of 282 respondents.

	Frequency		Percentage (%)			Frequency		Percentage (%)	
( 1 ) Gender	Male	45	16		( 6 ) Household income/month (THB)	< 60,000	40	14.2	
	Female	237	84			60,001-80,000	159	56.4	
( 2 ) Age	20 - 30 Years old	59	20.9		80,001-100,000	66	23.4		
	31 - 40 Years old	181	64.2		More than 100,000	17	6		

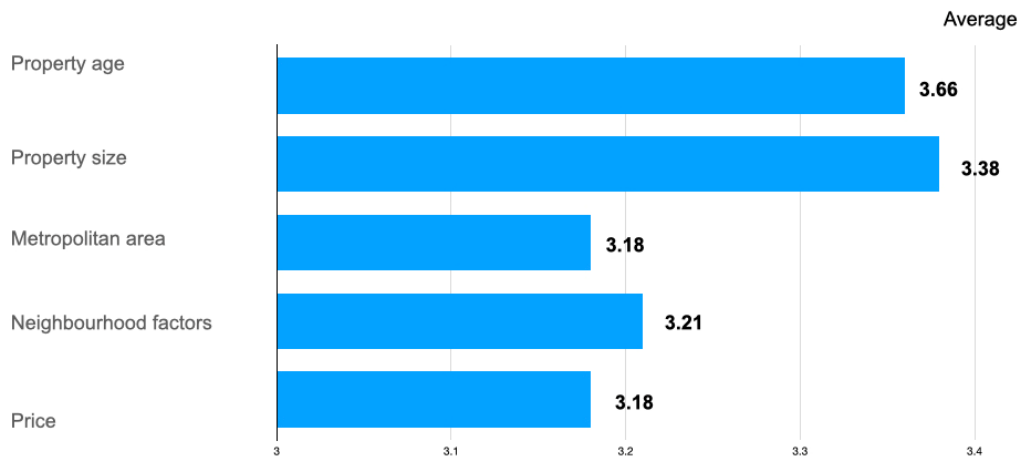
The 2<sup>nd</sup> International and National Conference

(Multidisciplinary Innovation Development in the 21<sup>st</sup> Century)

	41 - 50 Years old	37	13.1	( 7 ) Occupation	Business owner/self-employed	74	26.2
	More than 51 Years old	5	1.8		Employee	191	67.7
( 3 ) Nationality	Thai	71	25.2	( 8 ) Education level	Retired	17	6.1
	Chinese	146	51.8		High school	34	12.1
	Korean	45	16		Bachelor Degree	179	63.5
	Japanese	17	6		Master Degree	63	22.3
	Indonesian	3	1.1		Doctoral Degree	6	2.1
	Other, please specify_____	0	0			To find new place to stay	89
( 4 ) Household size	1 ~ 2 persons	78	27.7	( 9 ) Reason of seeking for new condo	For Investment	180	63.8
	3 ~ 4 persons	174	61.7		For vocation	13	4.6
	5 ~ 6 persons	30	10.6		Other, please specify_____	0	0
	More than 7 persons	0	0		< 80,000	37	13.1
( 5 ) Personal income/month(THB)	<30,000	35	12.4	( 10 ) Expected price(Sq.m)(THB)	80,001-100,000	159	56.4
	30,001-50,000	140	49.7		100,001-200,000	75	26.6
	50,001-70,000	92	32.6		200,001-300,000	11	3.9
	70,001-100,000	14	5		More than 300,001	0	0
	More than 100,000	1	0.4	( 11 ) Expected room size	Not sure	59	20.9
					25-40 Sq.m	128	45.4

	41-55 Sq.m	73	25.9
	56-70 Sq.m	19	6.7
	More than 71 Sq.m	3	1.1

### Asset characteristics



#### 4.2 Variable Analysis

##### 4.2.1 Mean of asset characteristics

Mean of asset characteristics is 3.2. Among five dimensions of asset characteristics. Property age was rated with the highest mean of 3.66.

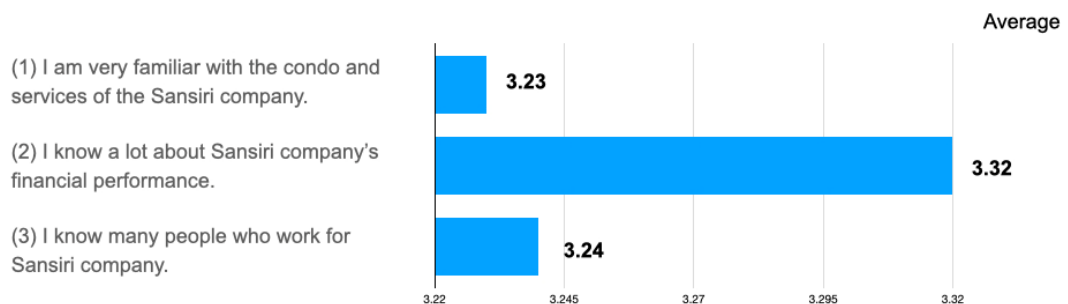
##### 4.2.2 Mean of developer reputation

Mean of developer reputation is 3.28. Among five dimensions of developer reputation. Brand knowledge was rated with the highest mean of 3.2.

##### Brand knowledge

Average value of Brand knowledge is 3.26. "I know a lot about Sansiri company's financial performance" got the highest average value is 3.32.

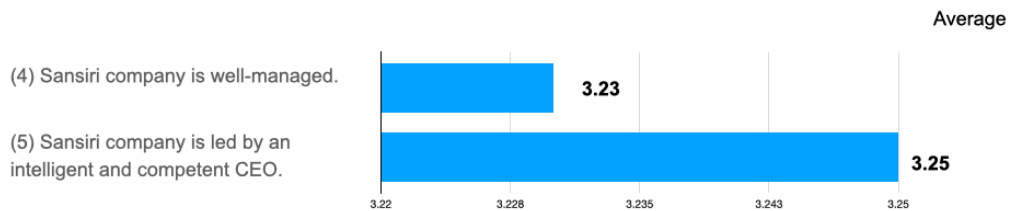
### Brand knowledge



### Vision and leadership

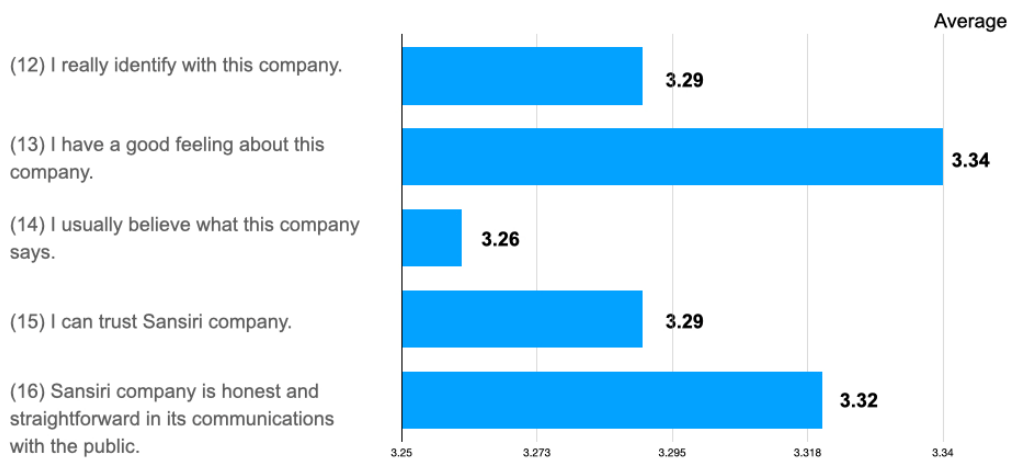
Average value of Vision and leadership is 3.24. "Sansiri company is led by an intelligent and competent CEO" got the highest average value, it is 3.25.

### Vision & leadership



### Products and services

### Emotional Appeal



Average value of Products and services is 3.27. "Sansiri company is a leader on the Thai real estate" got the lowest average value, It is 3.22.

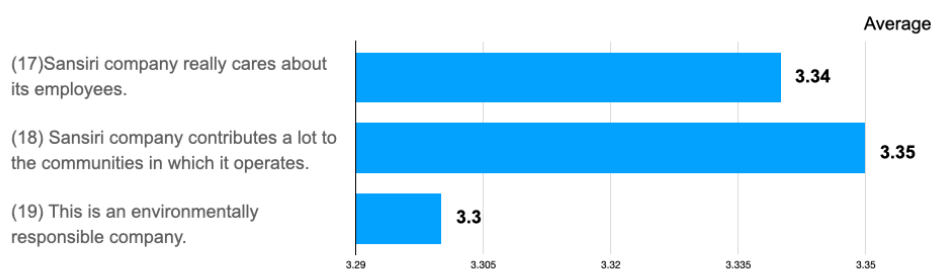
### Emotional appeal

Average value of Emotional appeal is 3.30. "I have a good feeling about this company" got the highest average value, It is 3.34.

### Work environment and Social Responsibility

Average value of Work environment and Social Responsibility is 3.33. "I have a good feeling about this company" got the highest average value, It is 3.34.

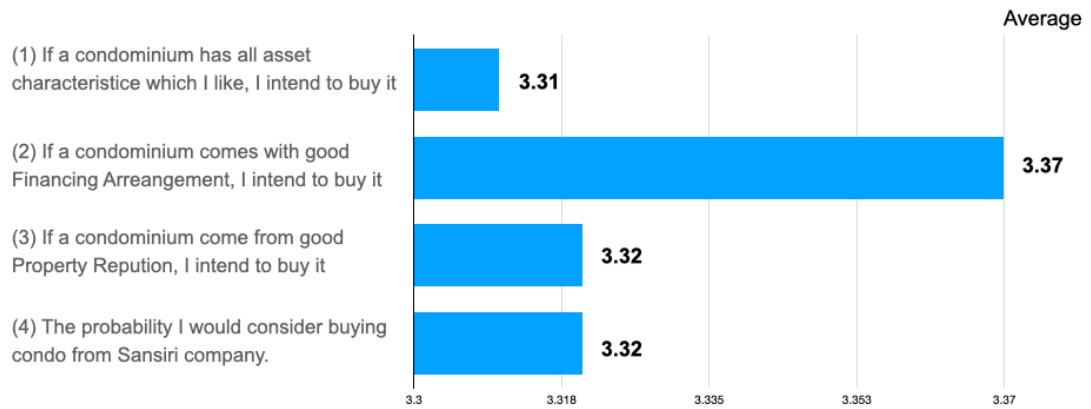
### Work environment and social responsibility



**4.2.3 Mean of purchase intention**

Mean of purchase intention is 3.33 Among five dimensions of developer reputation. “If a condominium comes with good financing arrangement, I intend to buy it” was rated with the highest mean of 3.37.

**Purchase intention**(of Sansiri Condominium)



**4.3 Hypotheses testing**

Regression analysis is an important market forecasting method. It can help us find the main factors influencing customers’ purchase intention of residential condominium. The regression analysis method is used to test the customer's purchase intention.

Table 4.2 SPSS output : Regression with Model Summary (N=282)

Model	R	R Square	Adjusted R Square	Std.Error of the Estimate
1	.729 <sup>a</sup>	.531	.528	.28200

a.Predictors:(Constant), Developer reputation, Asset characteristics

Table 4.3 SPSS output : Regression with Anovaa (N=282)

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	25.128	2	12.564	157.994	.000 <sup>b</sup>
Residual	22.187	279	0.080		
Total	47.315	218			

a.Dependent Variable : Purchase intention

b.Predictors:(Constant), Developer reputation, Asset characteristics

According to table 4.3, we get R square is .531, Adjusted R Square is .528, R squared is between 0 ~ 1, Which shows that the goodness of fit of the model is good.

Table 4.4 SPSS output : Regression with interaction coefficients (N=282)

**Coefficients<sup>a</sup>**

Model Variable	Unstandardized Coefficients		Standardized Coefficients	t	sig.
	B	Std. Error	Beta		
(Constant)	-.163	.221		-.735	.463
Asset characteristic	.583	.046	.562	12.702	.000
Developer reputation	.468	.069	.299	6.756	.000

a. Dependent Variable : Purchase intention

From the table 4.4, the dependent variable is purchase intention and the independent variable are asset characteristic and developer reputation, sig is .000, indicating that developer reputation and asset characteristic have at least one significant impact on purchase intention.

Table 4.5 SPSS output : Regression with asset characteristics correlation (N=282)

**Correlation**

	Asste Characteristic	Property age	Property size	Metropolitan area	Neighborhood factors	Price
Pearson Correlation		.239**	.206**	.239**	.187**	.212**
Purchase Intention	Sig.(2-tailed)	.000	.000	.000	.000	.000
	N	282	282	282	282	282

On the table 4.5, Correlation coefficient of property age and Correlation coefficient of metropolitan area was 0.239, significant p = 0.000 < 0.01, statistically significant. They are got the highest correlation with purchase intention. Neighbourhood factors has the lowest correlation with purchase intention. It was 0.187.

Table 4.6 SPSS output : Regression with developer reputation correlation (N=282)

**Correlation**

On the table 4.6, Emotional appeal got the highest correlation with purchase intention. It was 0.471. Vision and leadership has the lowest correlation with purchase intention. It was 0.226.



## Conclusions And Discussions

In this chapter, it will be focusing on the data analysis from chapter four. According to the result that has been collected, this chapter will give some suggestions and recommendations and also present the limits in this study.

### 5.1 Conclusion

#### 5.1.1 Conclusion of the study

The paper has verified that the findings for the key factors influencing customers's purchase decision of residential condominium in Bangkok, and the independent variables which include asset characteristic and developer reputation.

		Pearson Correlation	Sig.(2-tailed)	N
1	Brand knowledge	.318**	.000	282
2	Vision and leadership	.226**	.000	282
3	Products and services	.400**	.000	282
4	Emotional appeal	.471**	.000	282
5	Work environment and Social Responsibility	.362**	.001	282

This study includes 282 valid respondents. 84% of respondents are female and 16% of respondents are male. 64.2% of respondents are in the age between 31 to 40 followed by between 20 to 30 year (20.9%). In terms of the Household size the majority is between 3 to 4 persons, which is 61.7% for customers, followed by between 1 and 2 persons is 27.7%. The Personal income per month, most customers earn between 30,001 and 50,000 baht is 49.7% and the remaining income is between 50,001 to 70,000 baht is 32.6%. Household income per month, the majority of customers earn between 60,001 to 80,000 baht is 56.4% and the remaining income is between 80,001 to 100,000 baht is 23.4%. 67.7% of employees are employed, 26.2% are Business owner/self-employed, and 6.1% are retired.

For asset characteristic, property age and metropolitan area were rated the highest with the mean value of 3.2, followed by price, property size and neighbourhood factor.

For developer reputation, emotional appeal was rated with the mean value of 3.28, followed by products and services, work environment and Social Responsibility, brand knowledge, vision and leadership.

#### 5.1.2 Conclusion of the hypotheses

This study has extended the concept of resource based view by observing the customer ratings on the importance of asset characteristics which is the competitive edge of organization resource and developer reputation in five dimensions. This study confirmed the attribution theory for customer when evaluating developer reputation and its impact on condominium purchase intention.

This study confirmed hypothesis 1 Asset characteristics (i.e., property age, property size, metropolitan area, neighbourhood and price) have positive influence purchase intention of condominium. This study found that asset characteristics has positive impact on purchase intention ( $p = 0.000$ ). The coefficient of asset

characteristic in the regression equation is 0.562. Therefore, the increase of the asset characteristics for 1 unit would lead purchase intention to increase by 0.562 while holding other variables in the model constant.

This study confirmed hypothesis 2 developer reputation have positive influence purchase intention of condominium for Sansiri company customer. This study found that asset characteristics has positive impact on purchase intention ( $p = 0.000$ ). The coefficient of developer reputation in the regression equation is 0.299. Therefore, the increase of the developer reputation for 1 unit would lead purchase intention to increase by 0.299 while holding other variables in the model constant.

## 5.2 Discussion

The purchase behavior is generated by uncertain factors such as purchase intentions. The study of consumers' intention to purchase condominium in Thailand has a significant impact on the development of Thai real estate.

This study provides factors that influence behavior. This study focus on two factors that impact on condominium purchase intention which are asset characteristics and developer reputation.

According to the results of the survey and research, Thailand's real estate condominium market in 2019, most customers purchase condominium mainly for investment. Generally, they will choose a residential condominium with a size of 25~40 sq.m and a budget per square meter between 80,000 baht and 100,000 baht.

According to Hypotheses testing, we found that in the asset characteristics, the factor most relevant to the desire to buy is the project's old and new. At present, the Thai condominium market adds a lot of new condo every year, and everyone wants to buy a first-hand house instead of a second-hand house. The findings current study is consistent with Wonggotwarin and Kim (2017) that product quality, product design, and brand picture are statistically important predictors of buying intention.

In terms of developer reputation, customer 'emotions are most relevant to purchase desires, such as "I really identify with this company" and "I have a good feeling about this company". They are related to purchase desires. The higher quality is the quality of products and services. Good products and services are like a company's living signboard. Only with good product quality and services can customers be retained. The findings current study is consistent with Zainudin Hj Awang(2009) that suggest that firms should communicate their favorable corporate reputation effectively to the market so that the customers' perception level towards their products and service would arise.

This study found that asset characteristic ( $\beta=0.583$ ) has stronger impact on purchase intention than developer reputation ( $\beta=0.468$ ). The finding is consistent with Wonggotwarin and Kim (2017) examine the impact of product quality, service quality, brand picture, and condominium product design variables on the intention of purchasing condominiums in Bangkok. Research findings indicate that product quality, product design, and brand picture are statistically important predictors of buying intention.

The results of the survey will provide details on the intent to purchase the property and the factors that will influence the intent. Therefore, this study can provide a reference for real estate market research. This will help developers understand what factors influence consumers to make purchases and apply them to marketing programs. In addition, it will enable the Thai government to understand how the new real estate industry is in

the Thai economy and to establish appropriate real estate procedures and regulations for current and future plans.

### 5.3 Managerial Implications

According to Hypotheses testing, we found that the asset characteristic factor and developer reputation factor have the least correlation with the desire to buy. That a good reputation can attract excellent employees, excellent employees. It can also produce the expected products or provide better services. Uniforms improve corporate performance, make consumers and employees more satisfied, and form a better corporate reputation. Gregory (1998) believes that companies earning a good reputation will provide consumers with more potential value. It makes consumers not only willing to buy the company's products and make more consumption, but also willing to establish long-term relationships with the company.

This research still proves that the corporate reputation has a significant moderating effect between customer value proposition and customer perceived risk. Therefore, as a provider of products and services, it is still necessary to strive to implement corporate commitments, bear corresponding responsibilities, improve corporate reputation, and reduce Customer's perceived risk. It is hoped that Sansiri will pay more attention to the asset characteristic factor and developer reputation factor.

In terms of developer reputation, the company's vision and leadership have little effect on purchase intention. On the one hand, Although customers do not perceive the company's grand aspirations, and hope that the company can strengthen publicity in this regard. At last, the company's brand is not very impressive. In the Thai real estate market, there are thousands of real estate companies. It is hoped that sansiri can pay attention to the spread of its brand, highlight its own advantages, and have differences characteristics with other products.

### 5.4 Recommendation For Future Research

There are still some limitations found in this study. The results of this study did not fully reflect the needs of all Bangkok customers, as the survey came from a company's intended customers and only selected one place in Bangkok. As a result, the results obtained do not accurately reflect the actual customer's intention to purchase real estate across Thailand. There is limited shopping experience in contact with people in the Thai real estate market. Culture and other types of prejudice also affected the collection of information about condominium purchases throughout the project.

Factors that influence consumer buying behavior, including cultural, social, personal, and psychological factors. Future research should be more inclined to study the psychological factors of consumers. There is an important need to research the value of variables and buying intentions to attract customers to real estate companies, and how this can shift between different real estate industries. At present, the real estate market has not developed products for individual psychological needs. Therefore, more public surveys are needed to refine this common demand, and common needs are sought from the survey.

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## The Impact of Work Environment on Job Satisfaction and Employee

### Performance: a Case Study of a Medical Center in Nigeria

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#### Abstract

In the modern era, organizations are facing several challenges due to the dynamic nature of the environment. One of the many challenges for a business is to satisfy its employees in order to cope up with the ever changing and evolving environment and to achieve success and remain in competition. In order to increase employee performance, effectiveness, productivity and job satisfaction of employees, the organization must satisfy the needs of its employees by providing good working conditions. This study has extended Herzberg two-factor theory focusing on work environment. The objective of this paper is to analyze the impact of work environment on job satisfaction and employee performance. The study employed a quantitative methodology. Data was collected through a self-administered survey questionnaire. The questionnaire is adopted from a previous validated survey. The study population is 362 which are staff from nine departments in a selected medical center in Owerri, Imo state, Nigeria. Yamane sample size method was employed to sample out 190 respondents from the total population. The study concludes that work environment has positive impact on job satisfaction and employee performance. Job satisfaction also has positively impacted on employee performance. Hence, it is essential for an organization to motivate her employees to work hard using Conducive work environment for achieving the organizational goals and objectives

**Keywords:** Work environment, Employee satisfaction, Employee performance, Task performance, Contextual performance

#### Introduction

Working environment has contributed immensely to employee's performance. It is believed that working environment has impacted either positively or negatively towards the employee's performance (Chandrasekar, 2001). International bodies have emerged to bring to light the employee's right. According to Dorgan (1994), a lot of employee are kept in a closed environment which has created a negative impact on their mental state of mind and job performance. The better physical environment would enhance employees to perform better (Carnevale 1992, & Clements-Croome 1997). In the early 1990's, there has been several changes in work environment and these changes are as a result of some factors which are; social environment, information technology and the flexible ways of organizing work processes (Hasun & Makhbul, 2005). The physical and emotional fitness of an employee will increase their desire to work and also, their performance level will increase. When a work place environment is in good shape it will also reduce the number of absenteeism of an employee and also affect their performance positively (Boles *et al.*, 2004). Thus, the current study aims to explore the impact of work environment on job satisfaction and job performance. It will also study the impact of job

satisfaction on job performance. This study extended the concept of Herzberg two-factor theory focusing on work environment in a medical service sector.

### **Concept of work environment**

Working environment is seen to be the totality of all forces which includes, actions and other influential factors that are continually opposing with the employee satisfaction and performance (Kohun, 1992). It is also seen as the total interrelationship that exists within the employees and the environment in which the employees work. Work environment is said to be the present physical setting or locality, which involves the policies, rules, culture, working relationship/conditions, behavioral procedures, resources, all of which contribute to the way the employee's carryout their job (Heath, B. 2006). Briner, R. B. (2000) defined work environment as the place where all the interrelationships that are in play among employee and employer and the location in which the employees carry out their functions which include technical, the human and the organizational environment.

According to Brenner (2004), the ability to pass on knowledge throughout an organization is solely depends on how the work environment is designed. This aids the organization to increase in its level of effectiveness and allow employees to benefit from collective knowledge". In addition, Brenner argued that when working environment is designed to meet employee's satisfaction and also when there is a free flow of exchange of ideas, motivates the employee to an optimum performance. The work environment can be categorized into the following; social, technical and economic in which the work is normally viewed and designed (Brenner, 2004).

Employees deserve a comfortable physical work environment and working conditions as all these will influence job satisfaction. In turn this will render a more positive level of job satisfaction (Stephen P. R, 2001). Employees get benefited by work environment that provide sense of belonging. Also, when there is an appropriate work environment, the organization will notice a great reduction in sick leave and a significant increase in efficiency (Miller, E. &Yust 2001).

The following factors should be put into consideration in the physical work environment. It includes; building design and age, workplace layout, workstation set-up, furniture and equipment design and quality, space, temperature, ventilation, lighting, noise, vibration, radiation, air quality. The level of performance of an employee is measured/determined by the extravagant altitude on the environment in which they work. Work environment involves all the aspects which act and react on the body and mind of an employee (Kahya, 2007).

The advantages of a good work environment on job satisfaction cannot be overlooked. This is solely the reason why some employees feel very good with their job and contribute their quota to the achievement of the organization's objective. Research has shown that some employees feel very good with their job and achieve more while some just look forward to seeing the next day's challenge. According to Chapins (1995), job environment includes workers' immediate vicinity where they carry out their assignments in other to achieve management objective.

Work environment is seen as the place where people carry out their work. It includes the physical, social, and psychological work environment. Each aspect of the work environment is interlinked and has a great impact on the employee's job satisfaction and overall performance. It is the amount of quality the employers put in the employee's work environment that impact of the level of job satisfaction and afterwards adequate

performance (Tripathi, 2014). The quality of the work environment in which the employees operates on will determine if the organization will survive the taste of time (Chandrasekar, 2011). The work environment is made-up of physical factions which are the structure/layout of the organization, the psychosocial factors which among them are the organizational working condition, include working conditions and social support. Other perspectives of work environment are the policies and employment criteria (Tripathi, 2014).

In our today's competitive business world, a hale and hearty work environment will have a competitive edge over other competitors and as such managers should not rely on increasing the employee's pay package with the believe that it will impact on the performance rather proportional work should be done on the work environment too (Clark, 2000).

The concept of workers' satisfaction with their jobs with their job environment was originally developed from the study of a renowned scholar Elton Mayo in the late 1920s and early 1930s at Chicago, a Western Electric Company plant called Hawthorne. The result of the study brought to light that the general working the attitude of employees can be influenced by their sentiments. For job satisfaction and efficiency in personnel management to be achieved, social interactions along with psychological elements will be put into consideration because they are the core bases of contentment (Robbins *et al.*, 2003).

A favorable working environment is one of the most important factors which contribute to the level of employee satisfaction and also serves as a motivational influence on the employees to produce quality performance. According to Strong, et al, (1999). They opined that social, organizational and physical factors are great forces also contribute to the performance of workers. The productivity/performance of employees is highly determined by the environment of the workplace.

Work environment has the ability of making an employee to blend or un-blend with the work environment of the workplace. There are physical factors which can make the employee blend with the work environment such as lightings, the floor configuration, office layout and also the furniture layout and these can help the employee to carryout his/her job more effectively and in return it resultant effect is adequate employee performance. (McCoy & Evans, 2005). Whenever an employee is no longer satisfied with his/her work environment, it makes the employee to become a complainant at the workplace and as such he/she (employee) tends to carry out their job on a very slow pace which affects performance and productivity (McCoy & Evans, 2005).

### **Two-factor Theory**

Frederick Herzberg introduce motivator-hygiene theory. He asserted that the motivators are salaries, benefits, rewards, recognition, achievement while the non-motivator factor (hygiene factor) are working conditions, company policies, structure, communication, and job security. The motivators would enhance employee motivation and improve job satisfaction while absent of hygiene factor would lead to lower motivation and job satisfaction.

### **Concept of Job Satisfaction**

Job Satisfaction has been described by different authors to be the positive or negative state of mind of an employee towards his/her job (Freund, 2005). Furthermore, job satisfaction is defined by Spector (1997) as "a universal concept or as a collection of a different proportions to which the employee responds effectively". From psychologist point of view, Dawes (2004) discourse that job satisfaction is made up of components: (i)



cognitive component; where workers have a perception that their needs has been met or fulfilled, and (ii) affective component; the kind of feeling workers experience or have that comes with the perception.

According to Dawes (2004), he stated that for workers to be satisfied with the job depends solely on the unpredictable silent point such as work relationship with supervisor, the physical work quality of the environment, personal actualization, etc. An indebt look into the various definitions shows that Job satisfaction means different things to different people. Nevertheless, job satisfaction will be said to be subjective in nature as it depends different variables/factors such as one's fillings, the state of mind of the employee, the employee's perception and work content etc (Weiss, 2002).

### **Concept of Employee Performance**

Franco et al (2002) defined employee performance as productivity that relies on internal motivation but presence of internal factors such as necessary skills, intellectual capacity and resources to do the job clearly have an impact.

For employee performance to be on the growing side, it will depend on the willingness and also the positive attitude the employees in carrying out their job. Also, by having this willingness and positive attitude to job, there will be increase in production which will lead to high productivity and actualization of organizational goals and objectives (Sinha, 2001).

For performance to be attained, employers must make the employee execute their job on track which will also help in achieving organizational target, thus will definitely enhance performance on the employee's side (Stup, 2003). When jobs are done in tracks employers will be able to follow and monitor their employee's performance and also help them improve their performance. Again, a system that rewards employees' performance should put in place as this motivate the employees for better their performance. He also suggested several factors rewards the success of employee performance. This factors such as physical work environment, equipment, meaningful work, performance expectation, and feedback on performance, reward for good or bad system, standard operating procedures, knowledge, skills and attitudes (Stup, 2003).

#### **The Relationship between work environment and job satisfaction**

Kavita (2013) found that work environment has direct bearing on the job satisfactions of the employees in an organization. Most employee's sees salary/Compensation, job security, working hours as important to get effective result. Consistently, Kahya (2007) revealed that the there is a strong relationship between job characteristic, working conditions with job satisfaction such as building design and age, workplace layout, workstation set-up, furniture and equipment design and quality, space, temperature, ventilation, lighting, noise, vibration, radiation, air quality. These factors directly impact on job satisfaction.

In addition, working environmental factors such as pay, decision-making authority, and promotional policies, enjoyable co-workers and advancement, job security, support from superior and reward system etc. are the main sources to enhance job satisfaction and morale of the employees (Jamal Nazrul Islam, 2012). Alamdar Hussain Khan (2012) also confirmed that there is strong relationship between working environment and job satisfaction of employees. It was clear that if organization has favorable working conditions, it would result in job satisfaction of employee and ultimately high performance of the organization. It was examined that if working environment is favorable, it would improve employee loyalty. As employees perceive that the respect

and importance to them, job security, training and development, superior support, effective communication, teamwork etc., it would lead to high employee satisfaction (Alamdar Hussain Khan, 2012). Therefore, this study proposed

Hypothesis 1: Work environment has positive impact on job satisfaction

**The Relationship between job satisfaction and employee performance**

Prior to now, a lot of researchers have brought to light their views on the role of work environment on job satisfaction and employee performance. Almost all these researchers are of the opinion that work environment has a role to place in the level of job satisfaction and the level of satisfaction transcends to the level of performance displayed by the employee (Aziri, 2011).

According to Kappagoda (2012), he opined that the level of job satisfaction acts as a factor that speeds up the rate of carrying out a task. Awan et al. (2014) emphasized that when there is adequate pay package, job security and good reward system there will be increase in employee performance. They went further to state that employees are at the peak of their best when they are satisfied with their pay package, job security and good reward system (Awan et al, 2014)

Job Satisfaction has a great influence on employee performance. When employees are satisfied, they become assets to the organization because they contribute to the goals of the organization more than dissatisfied employees who the organization sees as waste of resources. (Shmailan, 2016)

Other researchers argue that employee performance affects level of job satisfaction. (Sonnentag et al., 2008) anchored their result on the fact that high performance gives birth to satisfaction, feelings of self-efficacy and mastery. Job performance causes job satisfaction because job performance affects self-esteem (Pugno & Depedri, 2009). Therefore, this study proposed

Hypothesis 2: Job satisfaction has positive impact on employee performance

**The Relationship between work environment and employee performance**

Studies on work environment as a factor for employee performance by various researchers have shown that there is a relationship between these variables. Tamessek (2009) brought to light how employees feel about their work place meeting their needs and how it affects their general job performance. He recommended that if the employee is provided with the needed work environment, it will in turn reduce the turnover rate and at the same time satisfy the employee which will positively affect the employee's job performance. According to Roelofsen (2002), he stated that when work environments improved, it will reduce the level of absenteeism and complain among employee which will also increase better performance and productivity. Therefore, this study proposed

Hypothesis 3: Work environment has positive impact on employee performance

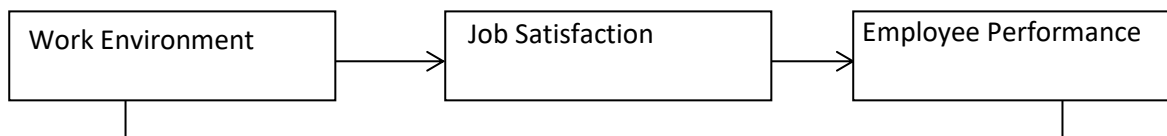


Figure1 Research Framework

## Methodology

### Sample

A total of 362 questionnaires were distributed to the employees of nine departments of a medical center in Owerri Imo State, Nigeria. Among distributed survey, 190 valid response were included in the analysis. Based on Yamane (1967) the selected organization has 362 employees, therefore, sample size of 190 should be adequate for this study. Out of 190 Respondents, 110 (57.9%) are male and 80 (42.1%) are female. In addition, 65.3% of respondent are in the age between 41 to 50 years old while 21.0% of respondents are in age between 30-40 years. Most of them work in the intermediate level (57.9%) and entry level (37.4%). Among respondents, 34.2% of them are nurses and 36.3% of them are supporting staff. The rest are medical doctors (13.2%) and technicians (16.3%).

### Measure

The questionnaire comprised of 35 items with 5-point Likert scale (1-5) ranging from 1-Strongly Disagreed, 2-Disagreed, 3-Neutral, 4-Agreed and 5-Strongly Agreed. For work environment, 13 items are adopted from Razak et al. (2016) and Sirgy et al. (2008). Example are "My organization cares for its employees and their families," "Almost everyone at my organization is a recognized expert in his or her field," "My organization helps its employee realize their potential" and was rated the lowest. For job satisfaction, three items are adopted from Brayfield & Rothe (1951). Example are "I feel fairly satisfied with my present job," "I am enthusiastic about my job," "I am finding real enjoyment in my work" and was rated the lowest. For job performance, 19 items are adopted from Goodman & Svyantek (1999). It includes ten items for contextual performance. Example is "I exhibit attendance at work beyond the norm, for example, takes fewer days off than most individuals or fewer than allowed". and nine items of task performance. Example is "I Fulfill all the requirements of the job"

According to table 1, the study found that work environment, job satisfaction, and job performance have sufficient convergent validity and reliability. The average variances extracted (AVEs) were above 0.5, confirming convergent validity (Fornell & Larcker, 1981). In addition, the composite reliability and Cronbach's alpha of variables exceeded 0.7, showing internal consistency for reliability. The loadings of all measurement items for each construct were above 0.5. In addition, this study employed Cronbach's Alpha to test the internal consistency of measurement items of each variable. This study found that all variables have Cronbach's Alpha value above 0.8 which reflected that all variables have high internal consistency.

Table 2: Validity and reliability test

	Loadings	Cronbach's Alpha	Composite Reliability	Average Variance Extracted	Number of Items
<b>Work Environment</b>	0.813 - 0.978	0.981	0.986	0.845	13
<b>Job Satisfaction</b>	0.831 - 0.971	0.918	0.948	0.859	3
<b>Employee Performance</b>	0.842 - 0.973	0.985	0.990	0.845	19

## Result

This study employed simple linear regression to test hypothesis 1. The result shows that the model is statistically significant at 95% confidence level as p-value of the model is less than 0.05. A linear regression indicated that work environment could statistically significantly predict job satisfaction, as  $F(1, 188) = 162.967$ , with p-value of .000. The adjusted R-Square of the model is 0.461, hence, work environment is accountable for the explained variability in job satisfaction with effect size medium. Hypothesis 1 is supported.

For hypothesis 2, the result shows that the linear regression model is statistically significant at 95% confidence level as p-value of the model is less than 0.05. A linear regression indicated that job satisfaction could statistically significantly predict employee performance as  $F(1, 188) = 168.868$  with p-value of .000. The adjusted R-Square of the model is 0.473, hence the job satisfaction is accountable for the explained variability in employee performance with effect size medium. Thus, hypothesis 2 is supported. In addition, employee performance was measured in two dimensions, contextual performance and task performance. The result show what standardize coefficients reflect the effect of job satisfaction on task performance ( $\beta=0.695$ ) is slightly stronger than that on contextual performance ( $\beta=0.678$ ).

For hypothesis 3, the result shows that the linear regression model is statistically significant at 95% confidence level as p-value of the model is less than 0.05. A linear regression indicated that Work Environment could statistically significantly predict Employee Performance, as  $F(1, 188) = 6415.074$  with p-value of .000. The adjusted R-Square of the model is 0.971, hence work environment is accountable for the explained variability in the employee performance with effect size medium. Consistently to previous, employee performance was measured in two dimensions, contextual performance and task performance. Therefore, hypothesis 2 is supported. Standardize coefficients from simple linear regression show that the effect of work environment on contextual performance ( $\beta=0.986$ ) is slightly stronger than that on task performance ( $\beta=0.977$ ).

Table 4.2 Summary of Hypothesis Testing

Variable	P-Value	Adjust R-Square	F-Value	Coefficient	Result
H <sub>1</sub> : Work Environment > Job Satisfaction	.000	0.461	162.967	0.319	Supported
H <sub>2</sub> : Job Satisfaction > Employee Performance	.000	0.473	168.868	1.153	Supported
H <sub>3</sub> : Work Environment > Employee Performance	.000	0.971	6415.074	0.774	Supported

## Discussions and conclusions

This study found that work environment has positive impact on job satisfaction. The finding align with Razak et al. (201) and Sirgy et al. (2016) which it was discovered that if there is an adequate work environment more especially when organization have good/quality plan towards the wellbeing of employees and their family, job satisfaction becomes the resultant effect. It is also evident in the concept of work environment were Kohun

(1992) state categorically that work environment is seen to be the totality of all forces which includes, actions and other influential factors that are continually opposing with the employee satisfaction and performance. In this study it was evident in item 4 of the work environment variable with the highest mean of 4.74. The analysis found work environment lead to higher level of job satisfaction.

According to Brayfield & Rothe (1951), he opined that where there is job satisfaction, the performance of employee will be high. Maslow's need hierarchy theory was one among the first theories to highlight and inspect the essentials of job satisfaction to employee performance. Abraham Maslow, brought to light that the human needs are sub-divided into five different categories according to their level of preference and it consist of basic physiological needs, safety and security needs, belongingness/affiliation needs, and self-actualization. In this study it was discovered from the regression analysis that job satisfaction has a string impact on the employee performance.

Franco et al (2002) defined employee performance as productivity that relies on internal motivation but presence of internal factors such as necessary skills, intellectual capacity and resources to do the job clearly have an impact. For employee performance to be on the growing side, it will depend on the willingness and also the positive attitude the employees in carrying out their job. Employee performance was measured in two dimensions, contextual performance and task performance. The current study found that standardize coefficients reflect the effect of job satisfaction on task performance ( $\beta=0.695$ ) is slightly stronger than that on contextual performance ( $\beta=0.678$ ). From the aforementioned, the Medical Center in Owerri, Imo State Nigeria should invest in job satisfaction. Job satisfaction will improve individual performance which will collectively grow the organization. In addition, this study also found that the effect of work environment on contextual performance ( $\beta=0.986$ ) is slightly stronger than that on task performance ( $\beta=0.977$ ). This reflects that work environment could lead to individual contribution toward their department.

### Suggestion for Future Research

The study is limited to the health sector with focus on the selected medical center in Owerri Imo State, Nigeria. It will benefit the academic if the research will be channeled to transport, finance and communication sector of the Nigerian economy so as to highlight the loopholes therein and proper adequate solutions.

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## **Challenges on the Implementation of Inclusive Education and their Relationship with the Pupils' Reading and Numeracy Skills**

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### **Abstract**

The researcher assessed the challenges on the implementation of inclusive Education and their relationship with the pupils' reading and numeracy skills in the Division of Lipa City, Philippines. It employed the quantitative descriptive method of research design, whereby a careful analysis of the gathered data is made to arrive at the needed answers to the problems posited in the study. It utilized 140 K to 3 teachers responded out of 216 from the top three schools of the four districts in the entire division having pupils with disabilities or special needs school year 2019- 2020. A survey questionnaire was used as the primary data gathering instrument of the study. Self- made questionnaire was subjected to content validation by the experts. School facilities were assessed by the respondents as to moderate extent. It is significant to mention that the respondents assessed to a great extent that their inclusive classrooms can accommodate number of pupils enrolled and has reading materials available. The study revealed that challenges on the socio-cultural barriers of inclusive environment creation were encountered by the teachers was to moderate extent. Specified to a great extent that there is little felt support for inclusive education from communities; there are no readily available professional support systems for teachers to help students with special needs; most communities do not really understand the term inclusive education; and the challenges of inclusive education are blamed on the students' challenges instead of the shortcomings of the support systems. The Division of Lipa City should intensify efforts in conducting in-service trainings on the delivery of inclusive education among teachers to address manifesting challenges. Teachers have a huge role in every learner's development.

**Keywords:** challenges, Pupils, Literacy, Numeracy skills, Inclusive education

### **Introduction**

Inclusive Education (IE) is known as one of the ways of instructing children who encounter learning difficulties and disabilities along with the normal children in a learning space. The approach gathers the pupils in a classroom or community, despite their advantages or disadvantages in any area. The strategy seeks to explore and expand the abilities of each student. The approach is one of the most successful ways of encouraging an "inclusive and tolerant community."

In 2010, it was recognized that 73 million children were out-of-school; those children consist of primary school age. Despite the vast number, it is lesser in number compared to over 110 million out-of-school children way back in the mid-1990s; this new estimate is presented by the UNESCO Institute of Statistics. In India for instance, about eighty percent of India populates in rural areas has no special education. The result shows that there are approximately 8 million Indian children who are out-of-school (MHRD 2009 statistics), the majority of these children marginalized by factors such as poverty, gender, disability, and caste.



In light of the recent worldwide attention given to inclusivity in education, most countries have forwarded legislation providing that all people, including those with special educational needs, be given the same academic opportunities and rights. The strategy is generally applied in delivering specialized education courses, which differ from general education in the methods of instruction it employs, its learning objectives, and the measurement of student outcomes.

In the Philippines, out of the 84.4 million Filipinos, approximately 5.486 million or 13 percent are considered individuals with special needs. Around 4.8 percent provided with appropriate educational services, but 95.2 percent of those with exceptionalities remain unserved.

It is stipulated on Republic Act 7277, otherwise known as The Magna Carta for Disabled Persons, more explicitly states what provision in the area of education for learners with disabilities is expressly required. The act covers increased opportunities through the development of skills and potentials, the rights and respect of persons with disabilities, service provision, and collaborative support. Section 12 of the act states that disabled persons should have access to quality education and opportunities. In this way, they will be able to develop their skills through the formulation of educational policies and programs taking special needs into account, thus making it unlawful for any learning institution to deny admission to courses on the grounds of handicap or disability. Further, Section 14 addresses special education, requiring the State to establish, maintain and support in all regions a complete, adequate, and integrated system of special education for those with vision impairment, hearing impairment, intellectual disabilities, and other types of exceptional children.

The Department of Education (DepEd) has organized a program to guarantee the right of the children with disabilities to receive suitable education within the standard or inclusive learning space. Inclusive Education promotes the philosophy of welcoming all children despite their potential or disorder with assistance from school staff, students, parents, and the community, and it was mandated on DepEd Order no. 72, s.2009.

Education Program Supervisor of SPED in the Division of Lipa City, Philippines cited in her study that there are four divisions in the province of Batangas, Philippines which have a total of 2,054 learners with disabilities. There are 72 learners with visual impairment, 335 have a hearing impairment, 370 diagnosed to have autism spectrum disorder, 51 learners have behavioral problems, 76 are orthopedically handicapped or physically disabled, 115 have multiple disabilities, 30 learners have speech defects. A total of 1,005 learners have an intellectual disability. Among the given data, the researcher observed that there were still learners in the Division of Lipa City with manifestations of disabilities who enrolled in a regular classroom setting. Most of these learners have no clinical assessment by medical professionals or doctors who specialize in serving learners with special needs. During the Division Training Workshop in Teaching Beginning Reading and Numeracy, which was attended by the researcher, these issues were raised.

Based on the researcher's observations and from the interviews she had conducted with the teachers, she found out that the teachers struggle in selecting the appropriate competencies in reading and numeracy for the learners that they are handling because the students with disabilities follow the same K to 12 Curriculum as of the children without limitations. Further, the pacing of the lessons is relatively slow, which makes it difficult for the teacher to cope with the needs of the learners with special needs and, at the same time, teaching pupils in a regular classroom setting. The teachers mentioned that some parents are not supportive and

cooperative in the performance of the learners in a class. These issues compounded by the fact that teachers experienced challenges in handling pupils with special needs under inclusive education.

In light of these realities and pressing concerns, the schools' division superintendent of Lipa City through the initiative of the Education Program Supervisor on SPED (2020) looked for stakeholders who sponsored the assessment of children with manifestations of disabilities. The evaluation was in GB Lontok Memorial Integrated School, and Sen. Claro M. Recto Memorial Integrated School conducted on November 4-6, 2019, and November 18-21 in the same year. There were 100 pupils with manifestations of disabilities who undergo the assessment, but still, there were also pupils with indications, but, unfortunately neglected by the parents.

The researcher believed that the challenges of Kinder to Grade 3 teachers did not stop only on the assessment because some parents had children with special needs and cannot afford to send their children in the private institutions due to their financial status. Instead, parents have forced their children to a regular classroom setting despite their unique needs and expecting that their children can learn in an inclusive setting so that they become successful individual in the future.

With the current situation of inclusive education in the Division of Lipa City, it is high time to study the challenges of K-3 teachers on the implementation of inclusive education and their relationship with the pupils' reading and numeracy skills. The existing assessment of the respondents in this study helped develop and improve the challenges of K-3 teachers on the implementation of IE and their relationship with the pupils' reading and numeracy skills in the area of study.

## **Methodology**

This study used the quantitative descriptive method to assess the status of challenges on the implementation of inclusive education and their relationship with the pupils' literacy and numeracy skills in the Division of Lipa City. Teachers' data on reading and numeracy were used by the researcher to assess the level of recognition and comprehension of pupils and the level of mastery on four fundamentals. The researcher evaluated the pupils' scores out of eight (8) items to determine their level of recognition, comprehension, and mastery on four fundamentals. For pupils who got the score of 5 and above had a level of recognition, comprehension, and mastery on four fundamentals of above eight years old, scores of 4 to 5 had a level of 8 years old and pupils with scores of 4 below had a level of fewer than eight years old. A School Policy on the implementation of inclusive education was recommended in this study.

In order to assess the challenges of the implementation of Inclusive Education and its relationship with the pupils' acquisition of reading and numeracy skills in the Division of Lipa City, 140 respondents out of 216 K to 3 teachers from the top three schools of the four districts in the entire division having pupils with disabilities or special needs were asked to participate. The number of respondents was identified using Slovin's Formula.

Below is the tabulated presentation of the number of respondents in this study.

Table 1.0 Presentation of the number of respondents

District	School	Number of Respondents
North	Teodoro M. Kalaw Memorial School	23
	Senator Ma Kalaw Katigbak Memorial School	26
	Inosloban Marawoy Elementary School	31
East	G.B. Lontok Memorial Integrated School	28
	Brion Silva Elementary School	11
	San Celestino Elementary School	7
West	Padre Valerio Malabanan Memorial School	22
	Paninsingin Elementary School	8
	Tambo Elementary School	15
South	Senator Claro M.Recto Memorial Integrated School	17
	Lodlod Elementary School	18
	Mabini Elementary School	10
<b>Total</b>		<b>140</b>

The researcher used purposive sampling to get essential information from the respondents. In order to gather pertinent data to materialize this research work and achieve its objectives, a questionnaire was developed, and a focus group discussion and interviews were conducted. The researcher used a researcher-constructed questionnaire to gather quantitative data. primary data It is the main gathering instrument of this study. Items on the questionnaire were framed based on the readings on the special education program. Concepts on these were framed to suit the purpose of the study.

The questionnaire had three parts. The first part of the questionnaire was on teachers' demography. The second part dealt with the gathered information reading the school profile with regard to facilities, teacher effectiveness, and type of disability being handled by the respondents. Part III uncovered the challenges encountered by the teacher on the implementation of Inclusive Education.

For the completion of this study, a step by step data gathering procedure was accomplished accordingly: in doing so, the researcher gathered research literature and samples of research questionnaire from other studies. Based on this, the researcher formulated her own questionnaire validated by Basic Education Specialists and Psychologist. Permission and evaluated of the School Division Superintendent was asked prior to the distribution of the questionnaire to the respondents. Interview was conducted to further substantial and affirms the data gathered. When the researcher met the target respondents, the questionnaires were tallied and subjected to statistical treatment.

The data collected were tabulated and analyze through *frequency count, percentage, weighted mean, ranking and Pearson Product Moment Correlation Coefficient Analysis of Variance (ANOVA)*.

## Results and Discussions

The researcher focused on the analysis and interpretation of the gathered data. The researcher presented and discussed the data in congruence with specific questions posited on the statement of the problem.

In this study, most of the respondents handling pupils with disabilities belonged to the age bracket of 26-30 and 36-40, followed by age 31-35, respectively. Respondents whose age was from 56-60 had the least in number, which means only a few of them are handling pupils with disabilities.

Moreover, majority of the respondents are female, while there are only six (6) males or 3.6 percent. More female respondents were handling pupils with disabilities rather than males.

The respondents who belong from the range of 1-5 years of teaching got the highest frequency. The result means that most of the young teachers in the service were handling pupils with disabilities. They were followed by teachers who belonged to 6-10 years and 11-15 years of teaching, respectively.

Table 1.1 Profile of the Respondents in Terms of Type of Disability Being Handled

Disability	F	R
1. Visual Impairment	17	2.5
2. Hearing impairment	2	8
3. Intellectual Disability	17	2.5
4. Learning Disability	50	1
5. Speech-language Impairment	16	4
6. Orthopedic impairment	4	5
7. Serious Emotional disturbance	3	6.5
8. Autism	3	6.5
<b>Total</b>	<b>112</b>	

As shown in Table 1.1, most of the respondents were handling pupils with learning disabilities, followed by pupils who were visually impaired and with intellectual disabilities. The result showed that there were 112 pupils with disabilities and were enrolled in a regular classroom setting education.

The respondents attested that inclusive education has adequate facilities that support learning; this result was revealed by the assessments that there are sufficient “classrooms that can accommodate a number of pupils enrolled.” Meanwhile, the result on “classrooms have adequate reading materials” was revealed by the weighted means of 3.29 and 3.26, both of which verbally interpreted as “great extent.” Least in the assessment of the respondents were on the items “classroom is accessible for the wheelchair user” and “classroom has extra chairs and tables available for PWD pupils,” which yield weighted means of 2.49 and 2.41 respectively with verbal interpretations of “moderate extent.”

In this study, it was revealed that teachers are highly supported by school administrators when it comes to the practice of teaching unique children. The result also implies that they are qualified enough as they were able to satisfy the educational requirements needed for the profession.

According to Dawn M. Hanson (2011), administrators can affect teachers to become knowledgeable about particular education policies and issues. When principals are more involved and understand the role of special education, they will then possess the information and skills necessary to support new Special Education teachers.

Inclusive education cannot work in all schools due to numerous challenges the teachers have to face in the implementation of the program.

To a moderate extent, the inclusive education teachers somehow attested that there are instances where “a child’s behavior is beyond the teacher’s ability to correct.”

Since the Department of Education released the DepEd Order no. 40 s.2012 on Child Protection Policy, teachers experience many challenges on a child’s behavior. The educators cannot correctly handle the discipline inside the classroom. There is limited opportunity for teachers to discipline and correct the behaviors of their children inside the classroom due to fear that parents will complain and file a case against the teacher if pupils’ misbehavior is corrected. As a last resort, teachers either call up the parents or send letters to them. They let the parents decide what sanction to give.

According to Daniels, (1998) teachers should ensure that the strategies are developmentally appropriate and take into consideration the student’s disability and due process rights when selecting behavior interventions for students with disabilities.

On the other hand, the challenges where “teachers do not expect for improvement” and that “teachers are not consistent in their words” are considered least among the challenges as indicated by the lowest weighted means of 2.12 and 2.20 respectively with verbal interpretations of “less extent.” This means that teachers are always hopeful that their students would show gradual improvements as days passed by and that they are firm when it comes to making decisions regarding the learning of their students.

In this study, it was discovered that the teachers are affected by the challenges of socio-structural barriers of teacher training to a moderate extent, as indicated by the composite mean of 3.21.

Among the indicators, the teachers pointed out that “there are no specific or higher training allocated for teachers teaching learners with special needs like auditory impairment, autism, and mental illness” and that the “training often falls short of real effectiveness.” One of the least considered among the challenges is the item “There is limited incorporation of inclusion concepts in teacher training curriculum”. Also, the item, “There are no regular workshops held to train teachers on how to teach learners who need special care”.

It was also revealed in this study that teacher-respondents are moderately affected by the challenges encountered in terms of the socio-structural barrier of materials and resources. Among the barriers, the teachers complained that the “The tools and materials are not accessible to learners” and that “There are no special toilets for learners.”

On the other hand, the least considered the item “There are no adequate resources to support inclusive education curriculum in school” as it got the lowest weighted mean of 2.87 and with a verbal interpretation to a moderate extent.

More specifically, the teachers attested that one of their most significant problems is when “the challenges of inclusive education are blamed on the students’ challenges instead of the shortcomings of the support systems.” Also, when “there is a little support felt for inclusive education from communities.”

Filipino communities have an enduring stigma towards individuals with special (learning) needs. Exceptional individuals are prejudiced, hastily-judged as a burden to their families, and society. Unless stakeholders maturely opened their minds to support less-fortunate pupils, efforts to educational mainstreaming will remain futile.

On the other hand, the teachers least encounter the challenge of “having a problematic relationship with parents of children with special needs,” as revealed by the weighted mean of 1.95.

There are interrelated circles in educational endeavors, namely teaching, learning, and learning environment. The deficit in any of these circles would create a huge impact to the achievement of any educational goal. In this paper, the researcher placed “teacher circle” as profile of teacher effectiveness variable, “learning circle” as pupils’ literacy and numeracy variable, and “learning environment circle” as profile of facilities variable.

In this study, it was discussed that there is a significant relationship between the pupils’ literacy and numeracy and the schools’ facilities. Likewise, significant relationship is established between the pupils’ literacy and numeracy and teacher effectiveness.

Learning and behavior are interrelated. It can be recalled that learning is seen as change in behavior due to experience. Thorndike in his classic study in behaviorism and its association to learning even formulated a number of laws that govern aspects of behavior such as the law of effect, the law of exercise, and the law of readiness.

Furthermore, it was revealed that there is a significant relationship between the pupils’ literacy and numeracy and the instructional challenges of managing pupils behavior.

Learning in inclusive education and teacher training are not necessarily interrelated. Just because teachers were sent into multi-faceted workshops on educational mainstreaming does not mean learning of pupils with exceptional needs can be guaranteed. At the same manner, learning in inclusive education and creation of an inclusive educational environment are not related. The needs of exceptional pupils are diverse ranging from intellectual to communicative, from sensory to behavioral. It can even be a combination of all these forms.

The challenges of teacher training and creation of inclusive environment is deemed not of any relationship with the pupils’ literacy and numeracy.

The teachers’ profile of age, years of teaching, and sex have significant relationship with the challenges they encountered in the implementation of inclusive education which include students’ behavior, teacher training, materials and resources, and that of the creation of inclusive education. This means, with the teachers’ profile has very little to do with the management of implementing inclusive education.

In the final analysis, teachers are cognizant that inclusive education is now a global issue and that educational systems are trying to search for ways to make its development and practice possible. Recognizing themselves as the key factor in allowing and supporting every child’s access to education, they are driven to take every child’s needs into consideration, select plans and implement inclusive settings in such a way that they meet the needs of the child.

To further strengthen the result of the study, the researcher recommended a localized school policy which features the plans on the implementation of inclusive education among the schools having pupils with disabilities. The policy memo addressed all concerns.

### **Summary, Finding, Conclusions and Recommendations**

Respondents, mostly female, belong to age brackets 26-30 and 36-40. While they mostly have one to five-year teaching experience (36.4%), the majority has handled pupils with a learning disability.

The respondents evaluated the indicators of profiles of the schools in terms of facilities to a moderate extent. It is significant to mention that the respondents evaluated to a great extent that their inclusive classrooms can accommodate the number of pupils enrolled and has reading materials available.

The respondents assessed the indicators of teachers' effectiveness to a moderate extent.

Seventy-three percent (73%) of the pupils belonging to inclusive education have literacy and numeracy skills below an eight-year-old.

As to the challenges encountered by the teachers in managing students' behavior, respondents assessed their indicators to less extent. To a moderate extent, respondents assessed that child behavior is beyond the teacher's ability to correct.

As to the socio-structural barriers of teacher training, indicators were assessed to a moderate extent. Respondents indicated to a great extent that (1) there are limited appropriate inclusive education teacher training programs; (2) There are no specific or higher training allocated for teachers teaching learners with special needs like auditory impairment, autism, and mental illness; (3) Training often falls short of real effectiveness.

As to socio-cultural barriers of materials and resources, the researcher assessed that teachers encountered such challenge to a moderate extent. In detail, respondents of the study indicated to a great extent that (1) the tools and materials are not accessible to learners and (2) there are no special toilets for learners.

The teachers encountered the challenges on the socio-cultural barriers of inclusive environment creation to a moderate extent. There were four items that the respondents specified to a great extent. (1) There a little support felt for inclusive education from communities. (2) There are no readily available professional support systems for teachers to help students with special needs. (3) Most communities do not understand the term inclusive education. (4) The challenges of inclusive education are blamed on the students' challenges instead of the shortcomings of the support systems.

1. P-value 0.194 indicates that there is a significant relationship between the pupils' literacy and numeracy and the school facilities profile.

2. P-value 0.223 indicates that there is no significant relationship between the pupils' literacy and numeracy and the teachers' effectiveness profile.

3. P-value 0.182 indicates that there is a significant relationship between the pupils' literacy and numeracy and the behavioral challenges to inclusive education implementation.

4. P-value 0.017 indicates that there is no significant relationship between the pupils' literacy and numeracy and the teacher training challenges to inclusive education implementation.

5. P-value 0.092 indicates that there is no significant relationship between the pupils' literacy and numeracy and the creation of inclusive environment challenges to inclusive education implementation.

6. There is no significant relationship between the teachers' profile and the students' behavior, teachers' training, materials and resources, and the creation of an inclusive environment.

## **Conclusions**

From the findings above, the researcher draws out the conclusions below.

1. The chance of a classroom teacher to handle a pupil with a learning disability is complicated, regardless of the teacher's sex, age, and teaching experience.

2. School facilities for inclusive education are satisfactory. Teachers' effectiveness to carry out inclusive instruction is, likewise, satisfactory.

3. There is a need to improve the literacy and numeracy skills of the children in inclusive education.

4. Manifestations of teachers' struggle in managing learners in inclusive education behavior are thin.

5. Manifestations of socio-cultural barriers on the delivery of inclusive education, namely (1) teachers training, (2) materials and resources, and (3) creation of an inclusive environment are statistically significant.

6. Students' literacy and numeracy correlate with the school facilities profile, the teachers' effectiveness, and the behavioral challenges to inclusive education. However, it does not correlate with challenges in teacher training and with challenges in the creation of an inclusive learning environment.

7. The study has established that teachers' profile does not correlate with the challenges in inclusive education, namely: (1) students' behavior, (2) teachers' training, (3) materials and resources, and (4) creation of an inclusive learning atmosphere.

8. While facilities are adequately provided for learners with disabilities, specifically classrooms and reading materials, there is a need for specialized facilities accessible for wheelchairs and with complete sets of learning equipment.

9. No Significant relationship between pupils' literacy and numeracy and that of the facilities in teacher effectiveness as established in the study.

## **Recommendations**

From the conclusions enlisted above, the researcher highly recommends the items below.

1. The principal should request facilities for special children like wheelchair ramps. The principal should forward a request for an additional set of equipment to the Schools Division Superintendent (SDS), who will facilitate the request from the Education Support Services Division (ESSD) to provide funding and materials for the provision of such items and facilities.

2. It is the appropriate time for the Division of Lipa City to propose another school design for inclusive students that will cater to the needs of the students.

3. The Division of Lipa City should intensify efforts in conducting in-service training on the delivery of inclusive education among teachers to address manifesting challenges. The action is to ensure the effectiveness of such program implementation. A teacher has a crucial role in safeguarding every learner's well-rounded development no matter what his/her condition is.



4. The Division of Lipa City should hire additional medical professionals like psychologists to assess children with manifestations of disability as part of the government support services.

5. Studies on what contributes to the statistically significant findings sought in the paper must be conducted.

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## **Crime Analysis with Crime Mapping in Lipa City: Basis for Crime Prevention Program**

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### **Abstract**

This study entitled Crime Analysis with Crime Mapping in Lipa City: Basis for Crime Prevention Program was conducted to identify the barangays in Lipa City with the most number of crimes committed. This study is a documentary analysis which utilized all the available data from Lipa City Police Station. The statistics safely concluded that Barangay Maraouy, Sabang and Balintawak top three barangays in Lipa City with the most number of crimes committed. Said crimes are committed form 9:00 am – 12 midnight and most offenders are male who are 30 – 39 years old and committed violations of RA 9287 otherwise known as An Act Increasing The Penalties For Illegal Number Games, Amending Certain Provisions of Presidential Decree No. 1602, and for other Purposes. Researcher also found out that most of the crimes in Lipa City is solved. The researcher recommended to deploy more police officers and barangay tanod to those areas identified to be crime prone. Provision of training to barangay tanod is also recommended. Since community members plays a big role in crime solution and prevention it is also recommended that self - policing training should be provided for them. The researcher further recommended to established police satellite office to those areas/ barangays identified to be crime prone.

**Key words:** Crime mapping, Crime analysis, Program formulation, Lipa City

### **Introduction**

The introduction of different programs to combat crimes is being initiated by different law enforcement agencies, putting the best trained and highly technical individuals. The modes of operation or modus operandi of the organized groups of the underworld puzzle the authorities on how they operate without being detected and can evade the hands of justice.

Crime maps have been around since the earliest days of policing. Picture a push-pin map stuck on a police captain's wall, with different colored pins representing different crimes. Looking at the wall, a police administrator could develop a good understanding of the crime patterns in his jurisdiction. Tracking crime along geographic lines makes sense because most crimes involve a particular physical location. Most police departments are localized and target the specific "places" where crime occurs in their jurisdictions. Thus, crime-mapping technologies have taken on the routine task of recording the place of a crime and have adapted sophisticated analytical tools to better understand, organize, and express the information. The fundamental reason for collecting crime data—to understand past criminal activity in order to combat future criminal activity—remains unchanged. (Ferguson,2011).

GIS crime-mapping technologies can produce almost perfect information about the frequency and geographic location of crimes in any given area. The crime data can be broken down and analyzed by location,

crime, and time period. Some jurisdictions have almost real-time data collection and daily reports of problematic areas to officers in the field. There is no longer a statistical question about which areas, in fact, have higher levels of crime. Maps can be created detailing the last twenty auto thefts in a given neighborhood, the last three months of drug arrests within a city, or the locations of all of the homicides committed in a given year. Typically, the data collection, storage, and analysis are done by police administrators to determine staffing needs or allocate resources. However, these technologies can now be used officially to label areas as having an empirically higher level of crime. While these technologies serve as effective policing tools, they also present unexamined constitutional questions. Under existing Supreme Court precedent, *Illinois v. Wardlow*, the fact that an area is designated a high-crime area has Fourth Amendment implications. Such a finding in a suppression hearing can affect a court's determination about whether police officers had "reasonable suspicion" to stop an individual suspected of a crime.

According to Wirth as cited in Malik (2016), the size, density, heterogeneity, and impersonality are reasonable for mode of living that generates more crime. He viewed that the close livings together of individual who have no sentimental and emotional ties foster a spirit of competition, aggrandizement and mutual exploitation.

Lipa City Batangas is sited at the heart of the fast growing industrial hub – the CALABARZON, for instance is a city with high urbanization growth. Labeled as the center of the region according to the Regional Physical Framework Plan of Region IV – A and conveniently located in the outskirts of Metro Manila, it has become an attractive investments destination. Though compose of more than 70% agricultural land, Lipenos don't engage much in agricultural activities nowadays because of their growing interest in doing commerce and trade.

Lipa City's strategic location proves to be an economic bonus as it able to obtain the spill over effects of the development in Metro Manila and Batangas City. Similarly, its centralized location makes it not only the commercial center but the financial center of the Region as well. The increasing number of financial institutions particularly banks, an indicator of beneficial business environment is apparent in the city.

In addition, there are other financial institutions that can be found in the city including lending investors, pawnshop and credit cooperatives. These financial institutions play important in the growth of the business sector especially the small and medium scale industries. Owing to the city, geographic location, the city is also a haven for the government institutions. Regional and provincial offices can be found in the area that draws many people.

Lipa City is also the second most populous city in the province of Batangas, with a projected population of more or less three hundred fifty thousand as of 2018 and a total of seventy two (72) barangays. Despite of the advancement of Lipa City, it is also the city in Batangas Province with the highest crime rate. Data from Batangas Provincial Police Office revealed that on 2016 the crime rate in Lipa is 25.31% compared to 22.30% of Tanauan and 20.25% of Batangas City. On the year 2017, the crime rate in Lipa is 19.89 % as compared to 15.89% of Tanauan and 13.94% of Batangas City. On 2018, Lipa City has 17.74% recorded crime rate compared to 14.80% of Tanauan and 12.86% of Batangas City. Though there is an obvious decrease on the percentage of crime rate in Lipa City, it is also clear that within three - year period Lipa City is consistent to have the highest percentage of crime rate.

Considering the foregoing discussion, the researcher become interested to conduct a study relative to the volume of crimes committed in each barangay of Lipa City in terms of index and non – index crimes. It was also the aim of the study to determine the status of the different crimes committed in the different barangays of Lipa City. After assessing the crime volume and crime status in the different barangays of Lipa City, this research can be considered as a guide for Lipa City Police Officers to formulate crime prevention plan since areas or barangays prone to criminality are already identified.

## **Method**

### **Research Design**

In this study the research method used is the Data analysis. Data analysis is a social research method and is an important research tool in its own right and is an invaluable part of the mot schemes of triangulation. It refers to the various procedures involved in analyzing and interpreting data gathered from the examination of documents and records relevant to a particular study. In other words, documentary works includes reading lots of written material (Zonio et al, 2017).

### **Locale of the Study**

The locale of the study includes the seventy - two (72) barangays in the City of Lipa. These seventy – two barangays are: Adya, Anilao, anilao Labac, Antipolo del Norte, Antipolo del Sur, Bagong Pook, Balintawak, Banay – banay, Barangay 12, Bolbok, Bugtong na Pulo, Bulacnin, Bulaklakan, Calamias, Cumba, Dagatan, Duhatan, Halang, Inosluban, Kayumangi, Latag, Lodlod, Lumbang, Mabini, Malagonlong, Malitlit, Maraouy, Mataas na Lupa, Munting Pulo, Pag Olingin Bata, Pag Olingin East, Pag Olingin West, Pangao, Pinagkawitan, Pinagtung – Ulan, Plaridel, Poblacion 1, Poblacion 2, Poblacion 3, Poblacion 4, Poblacion 5, Poblacion 6, Poblacion 7, Poblacion 8, Poblacion 9, Poblacion 9 – A, Poblacion 10, Poblacion 11, Pusil, Quezon, Rizal, Sabang, Sampaguita, San Benito, San Carlos, San Celestino, San Francisco, San Guillermo, San Jose, San Lucas, San Salvador, Sana Sebastian, Sto. Nino, Sto Toribio, Sapac, Sico, Talisay, Tambo, Tangob, Tangway and Tibig.

### **Data Gathering Instrument**

Since this research is data analysis, the researcher utilized the recorded police reports on crime rate and crime volume of different barangays in Lipa City from 2016 – 2019.

### **Data Gathering Procedure**

Before conducting the survey, the researcher conducted an interview and data gathering to the police officers in Lipa City to have an idea of what topic will be the subject of research. After gathering pertinent data, the researcher presented the problem to the Research Director for critic and approval. After such, the researcher personally approached all the barangay captains in every barangay in Lipa City to collect data and furnish the crime rate and crime volume of Lipa City to the Lipa City Police Station. However, due to the confidentiality of data, the barangay officials refuse to provide data to the researcher.

### **Statistical Treatment of Data**

The statistical tools used to interpret the data gathered from the respondents were frequency count, percentage, ranking and the chi square test. The frequency count was used to classify barangay respondents according to crime rate, crime volume and status of crimes committed in each barangay.

## Results

The obtain results are as follows:

Table 1.1.Place of Occurrence of the Crimes

Barangay	Frequency	Percentage	Rank
Adya	1	0.06	72
Anilao	18	1.08	27.5
AnilaoLabac	15	0.90	32.5
Antipolo del Norte	39	2.33	11
Antipolo del Sur	14	0.84	35.5
BagongPook	16	0.96	30
Balintawak	128	7.66	3
Banay-Banay	54	3.23	8
Barangay 12	3	0.18	68.5
Bolbok	36	2.15	12
BugtongnaPulo	28	1.67	14
Bulacnin	26	1.56	16
Bulaklakan	5	0.30	61
Calamias	7	0.42	57
Cumba	4	0.24	65
Dagatan	13	0.78	39
Duhatan	4	0.24	65
Halang	8	0.48	53
Inosluban	46	2.75	9
Kayumanggi	22	1.32	19
Latag	19	1.14	24
Lodlod	41	2.45	10
Lumbang	18	1.08	27.5
Mabini	15	0.90	32.5
<b>Sub-Total</b>	<b>580</b>	<b>34.69</b>	

Table 1.2.Place of Occurrence of the Crimes.

Barangay	Frequency	Percentage	Rank
Malagonlong	7	0.42	57
Malitlit	19	1.14	24
Maraouy	173	10.35	1
MataasnaLupa	65	3.89	5
MuntingPulo	13	0.78	39
Pagolingin Bata	3	0.18	68.5

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Pagolingin East	9	0.54	49.5
Pagolingin West	6	0.36	59
Pangao	13	0.78	39
Pinagkawitan	27	1.61	15
Pinagtungulan	13	0.78	39
Plaridel	20	1.20	22
Poblacion 1	63	3.77	6
Poblacion 10	11	0.66	46.5
Poblacion 11	13	0.78	39
Poblacion 2	19	1.14	24
Poblacion 3	61	3.65	7
Poblacion 4	18	1.08	27.5
Poblacion 5	25	1.50	17
Poblacion 6	15	0.90	32.5
Poblacion 7	21	1.26	21
Poblacion 8	15	0.90	32.5
Poblacion 9	12	0.72	43.5
Poblacion 9-A	4	0.24	65
<b>Sub-Total</b>	<b>645</b>	<b>38.58</b>	

Table 1.3.Place of Occurrence of the Crimes

<b>Barangay</b>	<b>Frequency</b>	<b>Percentage</b>	<b>Rank</b>
Pusil	8	0.48	53
Quezon	2	0.12	70.5
Rizal	5	0.30	61
Sabang	139	8.31	2
Sampaguita	22	1.32	19
San Benito	5	0.30	61
San Carlos	34	2.03	13
San Celestino	4	0.24	65
San Francisco	8	0.48	53
San Guillermo	4	0.24	65
San Jose	12	0.72	43.5
San Lucas	12	0.72	43.5
San Salvador	9	0.54	49.5
San Sebastian	22	1.32	19
Sto. Nino	7	0.42	57
Sto. Toribio	18	1.08	27.5

Sapac	2	0.12	70.5
Sico	14	0.84	35.5
Talisay	10	0.60	48
Tambo	71	4.25	4
Tangob	8	0.48	53
Tangway	12	0.72	43.5
Tibig	8	0.48	53
Tipakan	11	0.66	46.5
<b>Sub-Total</b>	<b>447</b>	<b>26.73</b>	
<b>Grand Total</b>	<b>1,672</b>	<b>100</b>	

Table 1.1 – 1.3 reflect the place of crime commission. It can be reflected that , Barangay Maraouy has the most number of crimes occurred, 173 or 10.35% at rank 1 followed by Barangay Sabang and Barangay Balintawak with crimes occurred of 139 and 128 or 8.31% and 7.66% at ranks 2 and 3, respectively. On the contrary, Barangays Quezon, Sapac and Adya made the least crimes occurred of 2,2 and 1 or 0.12%, 0.12% and 0.06%,at ranks 70.5, 70.5 and 72, respectively.

1.2. In Terms of Time of Occurrence of Crime

As revealed in Tables 2.1, 2.2 and 2.3, 9:01 pm – 12:00 am time of crime occurrence made the highest frequency count of 356 or 21.29%. These were followed by 3:01 pm – 6:00 pm and 12:01 pm – 3:00 pm with frequency counts of 319 and 309 or percentages of 19.08 and 18.48, respectively. Meanwhile, 6:01 am – 9:00 am, 12:01 am – 3:00 am and 3:01 am – 6:01 am made the least frequency counts of 77, 76 and 35 or 4.61%, 4.55% and 2.09%, respectively.

Table 3.1. Gender Profile of the Suspect

Barangay	Male		Female		Unidentified	
	F	P	F	P	F	P
Adya	1	0.06	0	0.00	0	0.00
Anilao	13	0.78	1	0.06	4	0.24
AnilaoLabac	11	0.66	1	0.06	3	0.18
Antipolo del Norte	25	1.50	6	0.36	8	0.48
Antipolo del Sur	11	0.66	0	0.00	3	0.18
BagongPook	12	0.72	1	0.06	3	0.18
Balintawak	84	5.02	24	1.44	20	1.20
Banay-Banay	43	2.57	3	0.18	8	0.48
Barangay 12	3	0.18	0	0.00	0	0.00
Bolbok	25	1.50	5	0.30	6	0.36
BugtongnaPulo	24	1.44	3	0.18	1	0.06
Bulacnin	22	1.32	1	0.06	3	0.18

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Bulaklakan	5	0.30	0	0.00	0	0.00
Calamias	7	0.42	0	0.00	0	0.00
Cumba	4	0.24	0	0.00	0	0.00
Dagatan	12	0.72	0	0.00	1	0.06
Duhatan	2	0.12	2	0.12	0	0.00
Halang	7	0.42	1	0.06	0	0.00
Inosluban	39	2.33	4	0.24	3	0.18
Kayumanggi	16	0.96	4	0.24	2	0.12
Latag	15	0.90	2	0.12	2	0.12
Lodlod	35	2.09	4	0.24	2	0.12
Lumbang	11	0.66	3	0.18	4	0.24
Mabini	13	0.78	1	0.06	1	0.06
<b>Sub-Total</b>	<b>440</b>	<b>26.32</b>	<b>66</b>	<b>3.95</b>	<b>74</b>	<b>4.43</b>

Table 3.2. Gender Profile of the Suspect

Barangay	Male		Female		Unidentified	
	F	P	F	P	F	P
Malagonlong	6	0.36	1	0.06	0	0.00
Malitlit	9	0.54	6	0.36	4	0.24
Maraouy	125	7.48	35	2.09	13	0.78
MataasnaLupa	53	3.17	4	0.24	8	0.48
MuntingPulo	11	0.66	0	0.00	2	0.12
Pagolingin Bata	2	0.12	1	0.06	0	0.00
Pagolingin East	7	0.42	1	0.06	1	0.06
Pagolingin West	4	0.24	1	0.06	1	0.06
Pangao	12	0.72	1	0.06	0	0.00
Pinagkawitan	21	1.26	3	0.18	3	0.18
Pinagtungulan	9	0.54	2	0.12	2	0.12
Plaridel	18	1.08	2	0.12	0	0.00
Poblacion 1	44	2.63	17	1.02	2	0.12
Poblacion 10	9	0.54	0	0.00	2	0.12
Poblacion 11	9	0.54	2	0.12	2	0.12
Poblacion 2	10	0.60	6	0.36	3	0.18
Poblacion 3	46	2.75	12	0.72	3	0.18
Poblacion 4	17	1.02	1	0.06	0	0.00
Poblacion 5	20	1.20	2	0.12	3	0.18
Poblacion 6	13	0.78	0	0.00	2	0.12
Poblacion 7	16	0.96	2	0.12	3	0.18



Poblacion 8	13	0.78	2	0.12	0	0.00
Poblacion 9	10	0.60	1	0.06	1	0.06
Poblacion 9-A	1	0.06	1	0.06	2	0.12
<b>Sub-Total</b>	<b>485</b>	<b>20.01</b>	<b>103</b>	<b>6.16</b>	<b>57</b>	<b>3.41</b>

Table 3.3. Gender Profile of the Suspect

Barangay	Male		Female		Unidentified	
	F	P	F	P	F	P
Pusil	8	0.48	0	0.00	0	0.00
Quezon	2	0.12	0	0.00	0	0.00
Rizal	4	0.24	0	0.00	1	0.06
Sabang	107	6.40	23	1.38	9	0.54
Sampaguita	17	1.02	3	0.18	2	0.12
San Benito	5	0.30	0	0.00	0	0.00
San Carlos	25	1.50	5	0.30	4	0.24
San Celestino	4	0.24	0	0.00	0	0.00
San Francisco	6	0.36	1	0.06	1	0.06
San Guillermo	2	0.12	2	0.12	0	0.00
San Jose	7	0.42	2	0.12	3	0.18
San Lucas	10	0.60	1	0.06	1	0.06
San Salvador	7	0.42	1	0.06	1	0.06
San Sebastian	20	1.20	0	0.00	2	0.12
Sto. Nino	6	0.36	1	0.06	0	0.00
Sto. Toribio	15	0.90	2	0.12	1	0.06
Sapac	2	0.12	0	0.00	0	0.00
Sico	13	0.78	1	0.06	0	0.00
Talisay	8	0.48	1	0.06	1	0.06
Tambo	55	3.29	9	0.54	7	0.42
Tangob	7	0.42	1	0.06	0	0.00
Tangway	10	0.60	2	0.12	0	0.00
Tibig	8	0.48	0	0.00	0	0.00
Tipakan	9	0.54	1	0.06	1	0.06
<b>Sub-Total</b>	<b>357</b>	<b>21.35</b>	<b>56</b>	<b>3.35</b>	<b>34</b>	<b>2.03</b>
<b>Grand Total</b>	<b>1,282</b>	<b>76.67</b>	<b>225</b>	<b>10.46</b>	<b>165</b>	<b>9.87</b>

As given in Table 3, out of 1,672 total respondents, 1,282 of them or 76.67% were male, the highest. These were followed by female with a frequency count of 225 or 10.46 % and unidentified with a frequency count of 165 or 9.87%.

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1.4. In terms of Age Profile of the suspect

Table 4.1. Age Profile of the Suspect.

Barangay	Below 20 y. o.		20 – 29 y. o.		30 – 39 y. o.		40 – 49 y. o.		50 y. o. and Above		Unidentified	
	F	P	F	P	F	P	F	P	F	P	F	P
Adya	0	0.00	0	0.00	0	0.00	0	0.00	1	0.06	0	0.00
Anilao	1	0.06	2	0.12	6	0.36	4	2.03	1	0.06	4	0.24
Anilao Labac	0	0.00	5	0.30	3	0.18	3	0.18	1	0.06	3	0.18
Antipolo del Norte	4	0.24	10	0.60	12	0.72	5	0.30	2	0.12	6	0.30
Antipolo del Sur	0	0.00	7	0.42	5	0.30	2	0.12	0	0.00	0	0.00
Bagong Pook	4	0.24	5	0.30	4	0.24	2	0.12	0	0.00	1	0.06
Balintawak	7	0.42	25	1.50	38	2.27	32	1.91	9	0.54	17	1.02
Banay-Banay	7	0.42	13	0.78	16	0.96	3	0.18	7	0.42	8	0.48
Barangay 12	0	0.00	0	0.00	3	0.18	0	0.00	0	0.00	0	0.00
Bolbok	2	0.12	8	0.48	11	0.66	5	0.30	4	0.24	6	0.36
Bugtong na Pulo	2	0.12	9	0.54	3	0.18	9	0.54	2	0.12	3	0.18
Bulacnin	0	0.00	5	0.30	9	0.54	5	0.30	4	0.24	3	0.18
Bulaklakan	1	0.06	0	0.00	3	0.18	1	0.06	0	0.00	0	0.00
Calamias	0	0.00	4	0.24	3	0.18	0	0.00	0	0.00	0	0.00
Cumba	0	0.00	2	0.12	1	0.06	1	0.06	0	0.00	0	0.00
Dagatan	0	0.00	0	0.00	6	0.36	2	0.12	4	0.24	1	0.06
Duhatan	0	0.00	1	0.06	3	0.18	0	0.00	0	0.00	0	0.00
Halang	1	0.06	2	0.12	3	0.18	1	0.06	1	0.06	0	0.00
Inosluban	6	0.36	7	0.42	17	1.02	10	0.60	3	0.18	3	0.18
Kayumanggi	2	0.12	6	0.36	9	0.54	3	0.18	0	0.00	2	0.12
Latag	1	0.06	4	0.24	10	0.60	2	0.12	0	0.00	2	0.12
Lodlod	3	0.18	13	0.78	14	0.84	8	0.00	1	0.06	2	0.12
Lumbang	0	0.06	1	0.48	8	0.18	4	0.48	1	0.06	4	0.24
Mabini	2	0.12	6	0.36	3	0.18	1	0.06	2	0.12	1	0.06
<b>Sub-Total</b>	<b>43</b>	<b>2.57</b>	<b>135</b>	<b>8.07</b>	<b>190</b>	<b>11.36</b>	<b>103</b>	<b>6.16</b>	<b>43</b>	<b>2.57</b>	<b>66</b>	<b>3.95</b>

Table 4.2. Age Profile of the Suspect.

Barangay	Below 20 y. o.		20 – 29 y. o.		30 – 39 y. o.		40 – 49 y. o.		50 y. o. and Above		Unidentified	
	F	P	F	P	F	P	F	P	F	P	F	P
	Malagonlong	4	0.24	0	0.00	1	0.06	0	0.00	2	0.12	0
Malitlit	5	0.30	3	0.18	8	0.48	0	0.00	1	0.06	2	0.12
Maraouy	23	1.38	47	2.81	41	2.45	38	2.27	11	0.66	13	0.78
Mataas na Lupa	5	0.30	17	1.02	22	1.32	10	0.60	3	0.18	8	0.48
Munting Pulo	0	0.00	2	0.12	5	0.30	1	0.06	3	0.18	2	0.12
Pagolingin Bata	0	0.00	1	0.06	2	0.12	0	0.00	0	0.00	0	0.00
Pagolingin East	1	0.06	3	0.18	4	0.24	0	0.00	0	0.00	1	0.00
Pagolingin West	0	0.00	1	0.06	1	0.06	1	0.06	2	0.12	1	0.06
Pangao	1	0.06	3	0.18	3	0.18	3	0.18	2	0.12	1	0.06
Pinagkawitan	5	0.30	5	0.30	8	0.48	5	0.30	1	0.06	3	0.18
Pinagtungulan	0	0.00	2	0.12	6	0.36	2	0.12	1	0.06	2	0.12
Plaridel	1	0.06	5	0.30	10	0.60	4	0.24	0	0.00	0	0.00
Poblacion 1	3	0.18	24	1.44	17	1.02	12	0.72	5	0.30	2	0.12
Poblacion 10	0	0.00	1	0.06	7	0.42	1	0.06	0	0.00	2	0.12
Poblacion 11	3	0.18	2	0.12	3	0.18	2	0.12	1	0.06	2	0.12
Poblacion 2	1	0.06	2	0.12	5	0.30	7	0.42	1	0.06	3	0.18
Poblacion 3	3	0.18	21	1.26	20	1.20	7	0.42	6	0.36	4	0.24
Poblacion 4	3	0.18	0	0.00	10	0.60	2	0.12	0	0.00	3	0.18
Poblacion 5	4	0.24	10	0.60	4	0.24	4	0.24	0	0.00	3	0.18
Poblacion 6	1	0.06	3	0.18	7	0.42	1	0.06	1	0.06	2	0.12
Poblacion 7	2	0.12	5	0.30	8	0.48	2	0.12	1	0.06	3	0.18
Poblacion 8	0	0.00	4	0.24	6	0.36	2	0.12	3	0.18	0	0.00
Poblacion 9	0	0.00	3	0.18	6	0.36	1	0.06	1	0.06	1	0.06
Poblacion 9-A	0	0.00	0	0.00	2	0.12	0	0.00	0	0.00	2	0.12
<b>Total</b>	<b>65</b>	<b>3.89</b>	<b>164</b>	<b>9.81</b>	<b>206</b>	<b>11.32</b>	<b>105</b>	<b>6.28</b>	<b>45</b>	<b>2.69</b>	<b>60</b>	<b>3.59</b>

Table 4.3. Age Profile of the Suspect.

Barangay	Below 20 y. o.		20 – 29 y. o.		30 – 39 y. o.		40 – 49 y. o.		50 y. o. and Above		Unidentified	
	F	P	F	P	F	P	F	P	F	P	F	P
	Pusil	1	0.06	5	0.30	1	0.06	1	0.06	0	0.00	0
Quezon	0	0.00	2	0.12	0	0.00	0	0.00	0	0.00	0	0.00
Rizal	0	0.00	1	0.06	2	0.12	1	0.06	0	0.00	1	0.06
Sabang	7	0.42	36	2.15	59	3.53	20	1.20	7	0.42	10	0.60

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Sampaguita	4	0.24	6	0.36	5	0.30	4	0.24	2	0.12	1	0.06
San Benito	0	0.00	2	0.12	3	0.18	0	0.00	0	0.00	0	0.00
San Carlos	6	0.36	5	0.30	12	0.72	3	0.18	5	0.30	3	0.18
San Celestino	0	0.00	2	0.12	1	0.06	1	0.06	0	0.00	0	0.00
San Francisco	0	0.00	2	0.12	4	0.24	0	0.00	1	0.06	1	0.06
San Guillermo	0	0.00	1	0.06	1	0.06	1	0.06	1	0.06	0	0.00
San Jose	0	0.00	4	0.24	5	0.30	0	0.06	0	0.06	3	0.18
San Lucas	3	0.18	2	0.12	4	0.24	2	0.12	0	0.00	1	0.06
San Salvador	1	0.06	3	0.18	3	0.18	1	0.06	0	0.00	1	0.06
San Sebastian	7	0.42	1	0.06	8	0.48	2	0.12	0	0.00	4	0.24
Sto. Nino	0	0.00	3	0.18	0	0.00	0	0.00	4	0.24	0	0.00
Sto. Toribio	0	0.00	5	0.30	7	0.42	4	0.24	0	0.00	2	0.12
Sapac	0	0.00	0	0.00	0	0.00	2	0.12	0	0.00	0	0.00
Sico	0	0.00	5	0.30	6	0.36	1	0.06	2	0.12	0	0.00
Talisay	1	0.06	2	0.12	3	0.18	2	0.12	1	0.06	1	0.06
Tambo	3	0.18	16	0.96	23	1.38	14	0.84	8	0.48	7	0.42
Tangob	2	0.12	1	0.06	2	0.12	2	0.12	1	0.06	0	0.00
Tangway	1	0.06	5	0.30	5	0.30	1	0.06	0	0.00	0	0.00
Tibig	0	0.00	5	0.30	2	0.12	1	0.06	0	0.00	0	0.00
Tipakan	0	0.00	1	0.06	5	0.30	2	0.12	2	0.12	1	0.06
<b>Sub-Total</b>	<b>36</b>	<b>2.15</b>	<b>115</b>	<b>6.88</b>	<b>161</b>	<b>9.63</b>	<b>65</b>	<b>3.89</b>	<b>34</b>	<b>2.03</b>	<b>36</b>	<b>2.15</b>
<b>Grand Total</b>	<b>144</b>	<b>8.61</b>	<b>414</b>	<b>24.76</b>	<b>557</b>	<b>33.31</b>	<b>273</b>	<b>16.33</b>	<b>122</b>	<b>7.30</b>	<b>162</b>	<b>9.69</b>

As gleaned in Table 4.1 – 4.3, the age range of 30 – 39 years old got the highest frequency count of 557 or 33.31% followed by the age range of 20 – 29 which gained a frequency count of 414 or 24.76%. Meanwhile, the age ranges of below 20 years old and 50 years old and above yielded the least frequency counts of 144 and 122 or 8.61% and 7.30%, respectively.

**5. In terms of crime committed**

As stated in Table 5.1 – 5.3, violation of RA 9287 or An Act Increasing The Penalties For Illegal Number Games, Amending Certain Provisions of Presidential Decree No. 1602, and for other Purposes made the highest frequency count of 203 followed by physical injury and theft with frequency counts of 179 and 158, respectively. On the contrary, violation of PD705(The Forestry Reform Code of The Philippines), swindling and slander obtained the least frequency counts of three, three and one, respectively.

It can also be noted from the table that in the three barangays which were identified to have the most number of crime committed violation of RA 9165 or Comprehensive Dangerous Drug Act of 2002 is rampant in barangay Balintawak and barangay Maraouy. In barangay Sabang it was found out that the common crime committed is violation of RA 9287 of otherwise known as An Act Increasing The Penalties For Illegal Number Games, Amending Certain Provisions of Presidential Decree No. 1602, and for other Purposes. However, though gambling is identified as the common crime committed in barangay Sabang, it can also glean from the

table that drug related cases also attain high frequency count of 25 and rank as the second common crime committed.

Table 6.1. Status of Crime

Barangay	Solved		Unsolved		Under Investigation		Cleared	
	F	P	F	P	F	P	F	P
Adya	1	0.06	0	0.00	0	0.00	0	0.00
Anilao	10	0.60	4	0.24	0	0.00	4	0.24
AnilaoLabac	3	0.18	4	0.24	0	0.00	8	0.48
Antipolo del Norte	16	0.96	11	0.66	0	0.00	12	0.72
Antipolo del Sur	5	0.30	7	0.42	0	0.00	2	0.12
BagongPook	7	0.42	4	0.24	0	0.00	5	0.30
Balintawak	59	3.53	29	1.73	0	0.00	40	2.39
Banay-Banay	22	1.32	10	0.60	0	0.00	22	1.32
Barangay 12	0	0.00	0	0.00	0	0.00	3	0.18
Bolbok	19	1.14	7	0.42	0	0.00	10	0.60
BugtongnaPulo	13	0.78	2	0.12	0	0.00	13	0.78
Bulacnin	13	0.78	4	0.24	0	0.00	9	0.54
Bulaklakan	0	0.00	0	0.00	0	0.00	5	0.30
Calamias	5	0.30	1	0.06	0	0.00	1	0.06
Cumba	0	0.00	0	0.00	0	0.00	4	0.24
Dagatan	3	0.18	1	0.06	0	0.00	9	0.54
Duhatan	2	0.12	0	0.00	0	0.00	2	0.12
Halang	3	0.18	0	0.00	0	0.00	5	0.30
Inosluban	24	1.44	9	0.54	0	0.00	13	0.78
Kayumanggi	12	0.72	3	0.18	0	0.00	7	0.42
Latag	9	0.54	4	0.24	0	0.00	6	0.36
Lodlod	22	1.32	7	0.42	0	0.00	12	0.72
Lumbang	5	0.30	6	0.36	0	0.00	7	0.42
Mabini	7	0.42	4	0.24	0	0.00	4	0.24
<b>Sub-Total</b>	<b>260</b>	<b>15.55</b>	<b>117</b>	<b>7.00</b>	<b>0</b>	<b>0.00</b>	<b>203</b>	<b>12.14</b>

Table 6.2. Status of Crime

Barangay	Solved		Unsolved		Under Investigation		Cleared	
	F	P	F	P	F	P	F	P
Malagonlong	2	0.12	0	0.00	0	0.00	5	0.30
Malitlit	5	0.30	4	0.24	0	0.00	10	0.60
Maraouy	75	4.49	26	1.06	0	0.00	72	4.31
MataasnaLupa	29	1.73	12	0.72	0	0.00	24	1.44
MuntingPulo	6	0.36	3	0.18	0	0.00	4	0.24
Pagolingin Bata	0	0.00	0	0.00	0	0.00	3	0.18
Pagolingin East	1	0.06	2	0.12	0	0.00	6	0.36
Pagolingin West	2	0.12	1	0.06	0	0.00	3	0.18
Pangao	3	0.18	1	0.06	0	0.00	9	0.54
Pinagkawitan	13	0.78	8	0.48	0	0.00	6	0.36
Pinagtungulan	8	0.48	2	0.12	0	0.00	3	0.18
Plaridel	6	0.36	2	0.12	0	0.00	12	0.72
Poblacion 1	32	1.91	8	0.48	0	0.00	23	1.38
Poblacion 10	2	0.12	2	0.12	0	0.00	7	0.42
Poblacion 11	2	0.12	5	0.30	0	0.00	6	0.36
Poblacion 2	9	0.54	6	0.36	0	0.00	4	0.24
Poblacion 3	29	1.73	6	0.36	0	0.00	26	1.56
Poblacion 4	11	0.66	1	0.06	0	0.00	6	0.36
Poblacion 5	13	0.78	5	0.30	0	0.00	7	0.42
Poblacion 6	9	0.54	2	0.12	0	0.00	4	0.24
Poblacion 7	10	0.60	4	0.24	0	0.00	7	0.42
Poblacion 8	9	0.54	3	0.18	0	0.00	3	0.18
Poblacion 9	4	0.24	2	0.12	0	0.00	6	0.36
Poblacion 9-A	1	0.06	2	0.12	0	0.00	1	0.06
<b>Sub-Total</b>	<b>281</b>	<b>16.81</b>	<b>107</b>	<b>6.40</b>	<b>0</b>	<b>0.00</b>	<b>257</b>	<b>15.37</b>

Table 6.3. Status of Crime

Barangay	Solved		Unsolved		Under Investigation		Cleared	
	F	P	F	P	F	P	F	P
Pusil	4	0.24	2	0.12	0	0.00	2	0.12
Quezon	0	0.00	0	0.00	0	0.00	2	0.12
Rizal	0	0.00	2	0.12	0	0.00	3	0.18
Sabang	60	3.59	21	1.26	0	0.00	58	3.47

Sampaguita	7	0.42	3	0.18	0	0.00	12	0.72
San Benito	4	0.24	0	0.00	0	0.00	1	0.06
San Carlos	10	0.60	7	0.42	0	0.00	17	1.02
San Celestino	2	0.12	2	0.12	0	0.00	0	0.00
San Francisco	4	0.24	1	0.06	0	0.00	3	0.18
San Guillermo	2	0.12	1	0.06	0	0.00	1	0.06
San Jose	4	0.24	4	0.24	0	0.00	4	0.24
San Lucas	8	0.48	2	0.12	0	0.00	2	0.12
San Salvador	4	0.24	1	0.06	0	0.00	4	0.24
San Sebastian	7	0.42	3	0.18	0	0.00	12	0.72
Sto. Nino	5	0.30	0	0.00	0	0.00	2	0.12
Sto. Toribio	5	0.30	3	0.18	0	0.00	10	0.60
Sapac	1	0.06	0	0.00	0	0.00	1	0.06
Sico	6	0.36	0	0.00	0	0.00	8	0.48
Talisay	4	0.24	2	0.12	0	0.00	4	0.24
Tambo	25	1.50	14	0.84	0	0.00	32	1.91
Tangob	6	0.36	1	0.06	0	0.00	1	0.06
Tangway	5	0.30	2	0.12	0	0.00	5	0.30
Tibig	3	0.18	0	0.00	0	0.00	5	0.30
Tipakan	7	0.42	1	0.06	0	0.00	3	0.18
<b>Sub-Total</b>	<b>183</b>	<b>10.94</b>	<b>72</b>	<b>4.31</b>	<b>0</b>	<b>0.00</b>	<b>192</b>	<b>11.48</b>
<b>Grand Total</b>	<b>724</b>	<b>43.30</b>	<b>296</b>	<b>17.70</b>	<b>0</b>	<b>0.00</b>	<b>652</b>	<b>39.00</b>

As revealed in Table 6.1-6.3, out of 1,672 crimes committed, 724 of them or 43.30%, the highest were already solved; 652 or 39.00% were already cleared and 296 or 17.70% were still unsolved. None of the said crime cases were under investigation.

## Discussion

The study results show that barangay Maraouy, Sabang, and Balintawak are the top three barangays in Lipa City, having the most number of crimes committed. The result of this study supports Zonio et al.'s (2017) findings, which revealed that among the different barangays in Lipa City, those inside the first district or central business have the most number of crime occurrences. A previous study stated that since barangay Balintawak, Maraouy, and Sabang are under central business, they are also the barangays in Lipa City with the most number of crime. In addition, the study of Comia (2016), which focuses on the effect of Muslim Migration in Lipa City, considered Muslim migration to Brgy. Balintawak is a primary factor for crime occurrence. The study further recommends that barangay officers in Balintawak should exert more effort to control and combat crimes. Seminars relative to Muslim and Christian cultures should also be given to both Muslim and Christian in the barangay provide culture conflict.

It was also found out that crime is mostly committed between 9:01 pm – 12:01 am. This means that criminals are considering the elements of darkness in the crime commission. Caplan and Kennedy (2011) stress that darkness afford offenders the advantageous anonymity conditions; darkness is “deindividuating”. Considered in this way, darkness weakens the ability of guardians to identify potential offenders; they cannot distinguish them from other community members in the dark. Hence, darkness can be thought of as a key inhibitor to capable guardianship.

This study further found out that most of the offenders are male between thirty – thirty- nine years old. While scholars have long debated the reasons behind gender differences, there is limited published research that uses empirical data to investigate the issue. The study of Choy et al. (2017) revealed that heart resting rate has something to do with crime commission. Since men have high heart resting rate, they are more prone to commit crimes than females. Their findings complement traditional theoretical accounts of the gender gap and have implications for advancing integrative criminological theory.

In addition, since most of the crime committed requires physical strength, men can commit crime than women (Manwong, 2006). Except sexual assault and domestic violence, men have a higher risk of assault than women. Among the different types of crimes, this study discovered that gambling is prevalent in Lipa City. De La Salle University professors Marvin Castell and Joel Tanchuco, described gambling as a “habitual and pervasive social activity” among Pinoys. “From the humblest barrios to the most affluent villages, Filipinos are into gambling,” they observed, citing the abundance of casinos, lotto and bingo outlets, municipal cockpit arenas, card games and “cara y cruz” on city streets, and bookies that go house to house for the illegal numbers game called jueteng. [Source: Alecks P. Pabico. Philippine Center for Investigative Journalism, February 3, 2008].

However, despite the prevalence of gambling in Lipa City, most of the crimes committed in the City are solved. The study of Tamayo, Chaves, and Nabe (2013) found a strong relationship between crime prevalence and inflation rate. Researchers concluded that the lowest crime volume corresponds to the year on which the inflation rate’s lowest value occurred, in the same manner that the highest occurrence of crime occurred on the year when the inflation rate was high, though there was an observed lag period of occurrence.

## **Conclusions**

Most of the crimes are committed in Maraouy, Sabang and Balintawak form 9:00 am – 12 midnight and most are offenders are male 30 – 39 years old and committed violations of RA 9287 otherwise known as An Act Increasing The Penalties For Illegal Number Games, Amending Certain Provisions of Presidential Decree No. 1602, and for other Purposes. Also, most of the crimes in Lipa City are solved.

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## **Competency Needs Analysis in Research among Employees of Lipa City**

### **Colleges: Basis for Professional Development Program**

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#### **Abstract**

Lipa City Colleges is a dynamic provider of quality education through responsible and competent individuals. It has its trifold area wherein one of it is research. The research service is under the Research and Development Office that aims to steer and guide innovative and competitive researchers that promulgate human development and social transformation. This research aims to analyze the competency needs analysis of faculty-researchers in terms of the research competency skills such as Scientific Thinking, Technical Skills, Personal Attitudes, and Professional Ethics, and Dissemination and Publication. The Competency Theory anchored this study; this theory believes that skills in any given domain may be associated with the ability to self-assess the skill set. The result shows that employees have difficulties utilizing and determining the correct statistical treatment of data and statistical software. In addition, one of the needed competencies of employees is demonstrating strategic leadership that enhances the abilities of individuals, organizations, and systems to undertake and disseminate high-quality research efficiently and effectively. Thus, the result shows that employees' competency in dissemination and publication in local, national, and international avenues is one of the challenges. To address the results, the researcher formulated recommendations for professional development. The RDO must design a series of training/workshops to utilize statistical software such as SPSS. Nowadays, every researcher must know how to use statistical tools. The researchers must also continue to conduct scientific research that is publishable and present it to international presentations. And lastly, the office must include publication and dissemination as their priority areas to meet national research directions.

**Keywords:** Competency, Needs analysis, Research skills, Employees

#### **Introduction**

The present day specifies more requirements for a person's ability for self-improvement and self-development, and professional and social mobility, to the level of intellectual development as these qualities determine human value as a personality and as an expert in modern society (Biktagirova, et.al. 2013).

Competencies can be acquired through multiple means. Knowledge alone is unlikely to allow an individual to achieve competency. Other experiences that complement training should reinforce the acquisition of competencies. It is the skills and knowledge that enable an employee to be successful. To maximize learning, employees must have expertise in a wide-ranging array of competencies in an especially complex environment where hundreds of critical decisions are required each day.

Research is one of the major functions of higher education institutions. It basically refers to the process of generating, discovering, inventing and creating new knowledge. In the universities, research is one of the

key tools in academic achievement and excellence. It is considered an indispensable means of colleges and universities to discover or learn about the success of students and departments, tracer alumni, recruit new students, hire new faculty and much more.

As cited in the study of Yalçın, 2017, the higher education institutions around the World have begun to a process of reconstruction. Within the scope of reconstruction in the higher education, the quality, and accreditation in high education, the topics as the managing of the higher education constituted the base of these reconstructions. In this process, the case “the quality in higher education” was taken as the base. One of the most important dynamics, which determine the quality of the institutions of higher education, is the quality of the academicians. The quality of the academicians can only be measured with how much they do their tasks related to education and training, research, support to the administration and the help to the society (Esen et.al. 2015).

According to Gomez, 2013, research is also one of the standards of accreditation in assessing the development of competent professionals. Likewise, in the evaluation of programs and institutions relative to accreditation, the research element is one of the areas being assessed by the accreditors. This concretizes the ability of university to produce research that would generate knowledge for productivity of the institutions (Palispis, 2008). In the academic institutions, the academic reputation of the professor lies in their ability to investigate scientifically, to come up with new ideas, knowledge and new discoveries that will improve existing practices, processes and strategies.

Malari, et.al., 2013 defined research competency as needed skills and experience to do research. Such skills could have been developed or enhanced through schooling, seminars and similar activities attended. Experiences in the conduct of research also contribute to enhancing research competencies. In academic institutions in developing countries they face the need to strengthen research competencies and outputs, as the next frontier, after the improved educational delivery.

LCC employees, both teaching and non-teaching are encouraged to be involved in research activities such as conducting of institutional researches. It is the RDO’s culture to produce quality research outputs that can be disseminated and utilized. In the data gathered by the office, the productivity of research study of the faculty- researchers from school year 2015-2018 were decreased by almost 10% since the start of the revision of the designed research policies in conducting research studies and the process involved the required competencies a researcher may have. Also, one problem that the RDO is facing is that, when requesting new set of faculty- researchers, some department submitted same name of researchers even if conducting research is open for all the academic members of the institution.

In line with this, the researcher aims to make empirical data for the competency needs analysis of faculty- researchers that may be pursued to further enhance research competencies of the faculty- researchers of Lipa City Colleges.

## Methodology

### Research Design

This study entitled “Competency Needs Analysis in Research among Employees of Lipa City Colleges: Basis for Professional Development Program” employed the descriptive research, specifically the survey method which is a method of gathering the desired information.

According to Calmorin ,2007, the descriptive method focuses at the present condition. The purpose is to find a new truth which may have different forms to increase the quality of knowledge, a new generalization and to increase insights regarding new factors.

### Research Locale, Population and Sampling

This study was conducted at Lipa City Colleges. To determine the usability of the data, the researcher used the simple random sampling. A simple random sampling is a subset of a statistical population in which each member of the subset has an equal probability of being chosen. A simple random sample is meant to be an unbiased representation of a group.

### Data- Gathering Instrument

For the quantitative data, a survey questionnaire was used as the main data-gathering instrument for this study. The questionnaire was divided into two main parts: first was the demographic profile of faculty respondents and the second was the set of indicators for research competencies.

The questionnaire was structured using Likert format. In this survey type, five choices were provided for several statements in line with the variables being measured. The choices represent the level each respondent has on the given statements. The sample scale below was used to interpret the total responses of all the respondents for every survey question by computing the weighted mean:

Symbol	Range	Interpretation
5	4.20-5.00	Very High (VH)
4	3.40-4.19	High (H)
3	2.60-3.39	Moderate (M)
2	1.80-2.59	Low (L)
1	1.00-1.79	Very Low

To ensure the validity of the questionnaire, the draft version constructed by the researcher was validated using face validation of two experts in research process.

### Data Gathering Procedure

The researcher prepared copies sufficient for the target population and personally delivered the letter of request and copies of the questionnaire to the different departments. It was during the delivery of the letter and copies of the questionnaire that she explained the details to guide the respondents in answering the items/indicators in the instrument.

After sufficient time, the researcher personally retrieved the copies of the questionnaire through the same channel as they were distributed. The results of the retrieved copies were tallied and tabulated in accordance with the frequency counts for the given options. Then the data were analyzed and interpreted.

### Statistical Treatment of Data

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After gathering all the completed questionnaires from the respondents, total responses for each item will be obtained and tabulated. Data was treated using frequency distribution, frequency, ranking, weighted mean, standard deviation and Slovin's formula.

### Results

This part of the study presents the data gathered which were analyzed and interpreted.

Table 1.1 Profile of the Respondents in Terms of Gender

Gender	Frequency	Percentage	Rank
Male	29	23	2
Female	97	77	1
Total	126	100	

It is shown in Table 1 that most of the respondents were female, 77% and 23% were male.

Table 1.2 Profile of the Respondents in Terms of Educational Attainment

Educational Attainment	Frequency	Percentage	Rank
College Degree	89	70.6	23
Masters (or with units)	30	23.8	77
Doctoral (or with units)	7	5.6	100
Total	126	100	

Table 1.2 indicates that majority of the respondents are college degree holder with 70.6%. Results also revealed that next in rank is a Master's graduate or earned at least units with a percentage of 23.8% and least in the rank were Doctoral or earned at least units with 5.6%.

Table 1.3 Profile of the Respondents in Terms of Department

Department	Frequency	Percentage	Rank
Pre-Elementary	5	4.0	6
Elementary	13	10.3	5
Junior High School	26	20.6	3
Senior High School	37	29.4	1
College	31	24.6	2
Institutional	14	11.11	4
Total	126	100	

Table 1.3 indicates that majority of the respondents were from the Senior High School Department with 29.4 percentage. This follows College Department with 24.6%, Junior High School, 20.6%, Institutional 11.11%, Elementary, 10.3% and Pre-elementary 4.0%, respectively.

The Senior High School department comprises the highest population in the institution with a total of thirty nine (39) full-time faculty members. Meanwhile, the Grade School Department has only (8) faculty members.

Table 1.4 Profile of the Respondents in Terms of Years in Service

Years	Frequency	Percentage	Rank
1 year or below	33	26.2	2
2 – 4 years	70	55.6	1
5 – 7 years	15	11.9	3
8 years and above	8	6.3	4
Total	126	100	

The research findings show that majority of the employees are newly hired with the highest retention years of 2-4 years while lowest in rank were 8 years above.

Table 2.1 Extent of Competencies of the Employees in terms of Scientific Thinking

Indicators	WM	VI	R
Identifying research problem and formulating feasible research topic.	3.55	H	11
Formulating scientific research questions.	3.56	H	10
Developing hypothesis.	3.63	H	5
Conducting and synthesizing the literature review.	3.58	H	9
Exploring concepts and theories.	3.59	H	8
Identifying the research design.	3.49	H	13.5
Formulating program enhancement.	3.49	H	13.5
Understanding the different types of research methods.	3.61	H	7
Formulating a comprehensive questionnaire.	3.53	H	12
Execute the data gathering procedure.	3.65	H	4
Application of the statistical treatment of data.	3.45	H	15
Analyzation of the data gathered.	3.67	H	3
Presentation and interpretation of the data.	3.62	H	6
Formulating conclusion and recommendation.	3.69	H	2
Citing of resources.	3.75	H	1
Composite Mean	3.59	H	

The table above shows the competencies of employees in terms of scientific thinking. Highest in rank was the statement “Citing of resources” with a weighted mean of 3.75. On the other hand, the indicator, “Application of the statistical treatment of data”, was the least in rank with the weighted mean of 3.45. All verbally interpreted as High.

The composite mean is 3.59, verbally interpreted as High.

The research study focused on the needed competencies of employees in conducting research study. The findings have shown that respondents have difficulties in the application of the different statistical treatment of data.

Statistical treatment of data in research is part of research methodology that includes different statistical tools such as frequency distribution, raking, weighted mean, standard deviation, Pearson r, etc.

Ali, 2016 said that statistical methods involved in carrying out a study include planning, designing, collecting data, analyzing, drawing meaningful interpretation and reporting of the research findings. The statistical analysis gives meaning to the meaningless numbers, thereby breathing life into a lifeless data. The results and inferences are precise only if proper statistical tests are used. Improper statistical methods may result in erroneous conclusions which may lead to unethical practice.

Koç, et.al., 2015, in their study found out that medium level needs were found in the competencies in statistical data analysis thus, they recommend to have more importance to research principles, quantitative data analysis techniques.

It is important that a researcher knows the concepts of the basic statistical methods used for conduct of a research study. This will help to conduct an appropriately well-designed study leading to valid and reliable results. Inappropriate use of statistical techniques may lead to faulty conclusions, inducing errors and undermining the significance of the article. (Ali, 2016).

Table 2.2 Extent of Competencies of the Employees in terms of Technical Skills

Indicators	WM	VI	R
Finding and utilizing accurate resources.	3.73	H	4.5
Use library and information technology effectively.	3.84	H	1
Recognize and know when to use primary and secondary resources.	3.81	H	3
Demonstrate basic computer competency.	3.82	H	2
Manage data collection.	3.73	H	4.5
Use research statistical software. (e.g. SPSS)	3.32	M	7
Establish best practices for plagiarism and grammar error.	3.56	H	6
Composite Mean	3.67	H	

The above table shows the technical skills of the employees. Highest in rank was the “Use of Library and information technology effectively” with 3.84 weighted mean, verbally interpreted as High. While least in rank is the indicator, “Use research statistical software. (e. g. SPSS)”, 3.32, verbally interpreted as Moderate. The composite mean was 3.67, verbally interpreted as High.

One of the competency needs of researchers is their knowledge in the use research statistical software. (e.g. SPSS) wherein nowadays, it is considered a pre-requisite.

Begum, 2015 said that statistics is a wide subject useful in almost all disciplines especially in Research studies. Each and every researcher should have some knowledge in Statistics and must use statistical tools in his or her research, one should know about the importance of statistical tools and how to use them in their research or survey.



The findings of the study of Yalcin, 2017, the academicians had problems with choosing the appropriate data analysis method for the research problem, reporting the analysis results and interpretation, and in advanced statistics. In writing these parts, the researchers apply primarily to their academic consultants and those, who are experienced in mentioned field, while they are benefiting the resources and research method and techniques lessons (Tok et.al., 2016).

Table 2.3 Extent of Competencies of the Employees in terms of Professional Ethics and Personal Attributes

Indicators	WM	VI	R
Demonstrate strategic leadership that initiates research capacity building (both for their institutions and on a wider scale).	3.64	H	8
Demonstrates interpersonal skills and apply the essence of teamwork.	3.76	H	6
Highly organized and able to plan work independently, taking into account deadlines and competing requirements.	3.77	H	4.5
Demonstrates a proactive and professional approach to work.	3.75	H	7
Strive for honesty in all scientific communications.	3.81	H	3
Strive to avoid bias or self-deception.	3.86	H	2
Know the relevant laws and institutional and governmental policies.	3.77	H	4.5
Open to criticism and new ideas.	3.98	H	1
Composite Mean	3.79	H	

The above table shows the competencies of the employees in terms of professional ethics and personal attributes. Highest in rank is the indicator “Open to criticism and new ideas” with weighted mean of 3.98, verbally interpreted as High, while lowest in rank was the indicator “Demonstrate strategic leadership that initiates research capacity building (both for their institutions and on a wider scale) verbally interpreted as 3.64, all are verbally interpreted as High. The composite mean is 3.79, verbally interpreted as High.

Demonstrate strategic leadership that initiates research capacity building (both for their institutions and on a wider scale) is one of the key professional and personal attributes a researcher has to be. Strategic leadership is a critical component in effective school management and leadership (Adair, 2011). According to a recent study of school turnaround in USA, the principals of schools who had higher practices level of strategic leadership appeared to achieve significant improvements in the greatest number of areas (National Center for Education Evaluation and Regional Assistance, 2014).

Research indicates that the ability to implement a strategy is viewed as considerably more important as strategy formulation, and that strategy implementation, rather than strategy formulation, is the key to superior organizational performance. However, the high failure rate of strategy implementation efforts is well documented, and many barriers to effective strategy implementation exist. A lack of leadership, and specifically strategic leadership, at the top of the organisation has been identified as one of the major barriers to effective strategy implementation. (Jooste, 2009).

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Table 2.4 Extent of Competencies of the Employees in terms of Dissemination and Publication

Indicators	WM	VI	R
Participate and present in institutional research presentations.	3.36	M	1
Participate and present in a local, national and international presentation.	3.20	M	5
Knowledge in the quality of scientific writing for acceptability in international publications.	3.25	M	3
Knowledge in the techniques and process of publication of research.	3.26	M	2
Knowledge in the culture of scholarly publications.	3.23	M	4
Composite Mean	3.26	M	

The table above shows the competencies of the employees in terms of dissemination and publication. Highest in rank is the indicator “Participate and present in institutional research presentations”, with 3.36 weighted mean, verbally interpreted as Moderate. It was followed by the indicators, “Knowledge in the techniques and process of publication of research”, 3.26, “Knowledge in the quality of scientific writing for acceptability in international publications”, 3.25, “Knowledge in the culture of scholarly publications”, 3.23, “Participate and present in a local, national and international presentation”, 3.20, respectively, all with the weighted mean of 3.26. The composite mean is 3.26 verbally interpreted as Moderate.

Dissemination refers to a planned process that involves consideration of target audiences and the settings in which research findings are to be received, and where appropriate, communicating and interacting with wider policy (Wilson et.al. 2010), delivering and receipt of message, engaging of an individual in a process, or the transferring of a process or product (Ordonez, 2017) and the process of spreading information, findings, output, and products to the targeted audience (Acielo, 2019).

Dangal, 2017 said that, any research work is completed only after completion of the final step which is “dissemination”. Even though the philosophy of publish or perish has been well accepted by the scientific community for a long time, till date, for most of the researchers, dissemination has been limited to sharing of the findings to their colleagues or to the audience at the local, regional or national conferences. The real essence of publication is the sharing of discoveries and ideas to the wider network and learning what others have already found in the specific area and get insights on what more needs to be searched. It is to be internalized that if the research works were not shared, the progress in scientific world would be slow and negligible. Dangal, 2017.

Table 3.1 Relationship Between the Profile and the Scientific Thinking Competencies of the Employees of Lipa City Colleges

Variables Compared		Comp. r	P-value	Description	Decision	Interpretation
Scientific Thinking	Gender	-0.078	0.383	Not Significant	P > .05	Accept Ho
	Educational Attainment	0.163	0.069	Not Significant	P > .05	Accept Ho

	Department	-0.152	0.090	Not Significant	P > .05	Accept Ho
	Years in Service	0.144	0.107	Not Significant	P > .05	Accept Ho

Results revealed that there is no significant relationship between the profile and scientific thinking competency of employees as indicated in the p-value of .383, .069, .090, .107, respectively. The obtained figures meant that significant level was not reached, thus, accepting the null hypotheses in all areas.

Table 3.2 Relationship Between the Profile and the Technical Competencies of the Employees of Lipa City Colleges

Variables Compared		Comp. r	P-value	Description	Decision	Interpretation
Technical Skills	Gender	0.028	0.759	Not Significant	P > .05	Accept Ho
	Educational Attainment	0.029	0.747	Not Significant	P > .05	Accept Ho
	Department	-0.068	0.451	Not Significant	P > .05	Accept Ho
	Years in Service	0.210	0.018	Significant	P < .05	Reject Ho

Results revealed that there is no significant relationship between the profile and technical competency of employees as indicated in the p-value of .028, .029, -.068, respectively. The obtained figures meant that significant level was not reached, thus, accepting the null hypotheses in all areas.

However, there is a significant relationship between the technical competency and the years of service and the technical competency as revealed in the p-value of .210. The obtained figure meant that significant level was reached, thus, rejecting the null hypotheses.

Table 3.3 Relationship Between the Profile and the Professional Ethics and Personal Attributes of the Employees of Lipa City Colleges

Variables Compared		Comp. r	P-value	Description	Decision	Interpretation
Professional Ethics and Personal Attributes	Gender	-0.009	0.916	Not Significant	P > .05	Accept Ho
	Educational Attainment	0.060	0.505	Not Significant	P > .05	Accept Ho
	Department	-0.180	0.044	Significant	P < .05	Reject Ho
	Years in Service	0.176	0.048	Significant	P < .05	Reject Ho

Results revealed that there is no significant relationship between the profile in terms of gender and educational attainment and professional ethics and personal attributes of employees as indicated in the p-value .009, .060, respectively. The obtained figures meant that significant level was not reached, thus, accepting the null hypotheses in all areas.

However, there is a significant relationship between the profile in terms of the department and years of service as revealed in the p-value of -.180 and .176, respectively. The obtained figure meant that significant level was reached, thus, rejecting the null hypotheses.

Table 3.4 Relationship Between the Profile and the Dissemination and Publication of the Employees of Lipa City Colleges

Variables Compared		Comp. r	P-value	Description	Decision	Interpretation
Dissemination and Publication	Gender	-0.022	0.805	Not Significant	P > .05	Accept Ho
	Educational Attainment	0.047	0.598	Not Significant	P > .05	Accept Ho
	Department	-0.074	0.413	Not Significant	P > .05	Accept Ho
	Years in Service	0.226	0.011	Significant	P < .05	Reject Ho

Results revealed that there is no significant relationship between the profile in terms of gender and educational attainment and department and dissemination and publication of employees as indicated in the p-value of -.022, .047, -.74 respectively. The obtained figures meant that significant level was not reached, thus, accepting the null hypotheses in all areas.

However, there is a significant relationship between the profile in terms of the years of service as revealed in the p-value of 0.226, respectively. The obtained figure meant that significant level was reached, thus, rejecting the null hypotheses.

## Conclusions

1. Employees have difficulties in utilizing and determining the correct statistical treatment of data and the use of statistical software.

2. One of the needed competencies of employees is demonstrating strategic leadership that enhances the abilities of individuals, organizations and systems to undertake and disseminate high quality research efficiently and effectively. Also, international dissemination and publication are weak points as revealed in this study.

3. There is a significant relationship between the technical competency and the years of service of the employees; dissemination and publication and the years of service; the profile in terms of the department and years of service and the professional ethics and personal attributes of the employees.

4. There is no significant relationship between the profile and scientific thinking competency of employees; the profile in terms of gender, educational attainment and department and technical competency of employees; profile in terms of gender and educational attainment and professional ethics and personal attributes

of employees; profile in terms of gender and educational attainment and department and dissemination and publication of employees.

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## **Socio-Emotional Competencies of the Freshmen Students of Lipa City Colleges: Basis for the Proposed Socio-Emotional Development Integrated Curriculum**

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### **Abstract**

This research seeks to analyze the socio-emotional competencies of the freshmen students of Lipa City Colleges which is the basis of a socio-emotional development integrated curriculum for the said academic institution. The socio-emotional competencies of students are very important concepts to be considered as these impact not only their academic performance but also their inter-personal and intrapersonal aspect as an individual. Self-awareness, Social-awareness, Self-Management, Peer-Relationship Management, and Responsible Decision Making are the socio-emotional competency variables used for this research. The results of the statistics show that for self-awareness, self-awareness, respondents strongly agree that they understand their strengths, limitations, and consistent desire for self improvement. The result social awareness shows that the respondents agree that they have the capacity to interact with others with respect for their ideas and behaviors as well as to the society. Also the outcome of the study shows that the respondents agree that they have the characteristics in handling and controlling their emotions regardless of how easy or tough the situation is. In addition, for relationship management, the respondents agree that they can establish and maintain healthy and rewarding relationships while acting in accordance with social norms. Lastly, for responsible decision making, the respondents agree that they learned how to make constructive choices about personal behavior and social interactions across diverse settings. A socio-emotional development integrated curriculum was developed by the researchers in line with the outcome of the study to help address and resolve issues related to the socio-emotional competencies of the freshmen students of Lipa City Colleges.

**Keywords:** Socio-emotional competency, Self-awareness, Social-awareness, Self-Management, Peer-Relationship Management, Responsible Decision Making

### **Introduction**

Transitions happen in every stages of life. From being an infant to an adult, people experience changes in every aspect of their personality. These changes might be in a positive or negative direction which depends on the factors that may cause an individual to change. One of these changes is when an individual is facing the transition of his socio-emotional development.

Cohen et.al, (2005) states that socio-emotional development includes the person's experience, expression, and management of emotions and the ability to establish positive and rewarding relationships with others which encompasses both intrapersonal and interpersonal processes. As an individual grows older, his experiences become wider as he interacts with his environment and the result of this interaction might lead to

either positive or negative response, thus, indicates that emotion and cognition are profoundly interrelated process which later on become a challenge and these challenges are faced commonly by teenagers.

Every teenager's socio-emotional development is different which means that they also faced it differently. Every teen's social and emotional development is different and this is an important concept to give importance because it molds how an individual interact with other people and considering emotions.

During adolescence, there are changes in the way teens interact with their family, peers, and friends. Significant changes characterize socio-emotional development during teenage year. They will begin to form many different types of relationships, and many of their relationships will become more deeply involved and more emotionally intimate. During the younger years of children, their family, few friends, and teachers are their social sphere. But as they reached the teenage years, social networks will expand which will include more people and different relationship types. With this, we can say that adolescent social development includes dramatic change in the quality and quantity of their social relationships.

A research from Weissberg (2016), there are a number of social changes that can be noticed to teenagers. One is their search for social identity which can be influenced by gender, peer group, culture, school, and even family expectations. They are also now seeking for more independence most especially during decision making. Teens are also now thinking about what is right and wrong and are more matured in deciding for their life. This is also the stage that they are being influenced more by their friends especially when it comes to behaviour and self-esteem. And due to the current digital age, they tend to communicate in more ways such as through the internet, mobile phones, and social media which can greatly influence how they socialize and learn about the world.

On the other hand, there are also emotional changes being experienced by teens. One of which are the swings in their feelings and emotions at different times. Since mood is unpredictable, these changes can cause social conflicts. Teens are also more self-conscious especially since the main source of their self-esteem is from their appearance. They even tend to compare their bodies to their friends or peers. And during the teenage years, they are more emotional if people are giving them feedback regardless if positive or negative commentaries to them. Since they can feel their superiority during this stage, giving them feedback will surely be big deal for them and might lead to emotional issues.

Though emotion and cognition is interrelated with each other, it can be observed that there are changes in the social and emotional development separately. Sometimes, they undergo dramatic changes and shifts and if not supported and given attention might lead to a more negative reaction. Furthermore, this transition is a time of tumultuous learning and growing. As they become more conscious and curious with their environment, the more they need assistance whether it be at home or school.

Moreover, Eisenber (2015) explains that socio-emotional development is an important precursor for successful adjustment at school and for academic achievement and as well as for building and maintaining positive relationships with peers and teachers. It sets a foundation for an individual to engage on some developmental tasks. Social and emotional abilities can be considered as indicators of how well an individual adjusts to their environment, adapts to changes and, how successful he or she will be in life.

Core development abilities such as conscientiousness, emotional stability, openness and agreeableness can be as or even more important than cognitive intelligence in determining future employment. Despite these competencies being related to consequential life outcomes, it can be challenging for educators to find effective ways to prioritize, teach and assess social and emotional skills.

Young people entering college are going through a major transition, so it's understandable that social and emotional problems are common on college campuses. College can be an overwhelming place, especially for students' just starting college. The shift to a new life at school can trigger socio-emotional challenges. "Emotional issues that were absent, controlled, or hidden in high school may start to cause problems in this new environment," says Guy Napolitana, MD, chairman of the primary care department at the Lahey Clinic at Tufts University School of Medicine in Burlington, Massachusetts.

An article from Education Week (2013) states that schools must broaden their approach beyond a narrow focus on academic work because students' social, emotional, and academic development are deeply intertwined and all are central to learning. With this, teachers should be the engines that drive socio-emotional development with the aid of programs and practices in schools and classrooms as well as influence the student's with their own socio-emotional competence and well-being.

In addition to that, research proposes that when schools advance positive social and passionate environment, it lessens negative social practices, yet additionally has a long heave positive effect on youngsters' achievement in different areas. Since no curriculum is developed integrating socio-emotional development in the institution, it is timely to conduct this study as a basis for proposed curriculum in the near future. Likewise, the study might be a way to improve and help students facing the challenges of their transition stage

## **Method**

### **Research Design**

In this study, a quantitative research method and a survey design are deemed appropriate for identifying and analysing the socio-emotional challenges of the incoming freshmen students of Lipa City Colleges. Based on the result of the study, a proposed socio-emotional integrated curriculum is recommended.

Quantitative research, as defined on Quantitative Research: Definition, Methods, Types and Examples (2020), is a systematic investigation of phenomena by gathering quantifiable data and performing statistical, mathematical, or computational techniques. Quantitative research collects information from existing and potential customers using sampling methods and sending out online surveys, online polls, questionnaires, etc., the results of which can be depicted in the form of numerical. After careful understanding of these numbers to predict the future of a product or service and make changes accordingly.

### **Respondents of the Study**

This study was conducted in Lipa City Colleges, Lipa City Batangas. The target respondents were one hundred seventy (170) college freshmen students of any course who graduated from Senior High School in any of the academic tracks of any school.



The researchers chose freshmen students to be the participants of the study to be able to gather necessary information with regard to their socio-emotional competencies. They are the most fitted respondents for the study as their academic level, being on the freshmen year, serves as the foundation stage for their collegiate degree and considering that they are on their first year of being a college student, this is the perfect time to address issues concerning socio-emotional competencies for them to be a better student and a better individual.

The research instrument used in gathering data was a readily constructed survey questionnaire from the internet. The Social Emotional Competency Questionnaire is divided into five major categories with five questions each. The major categories are Self Awareness, Social Awareness, Self Management, Relationship Management, and Responsible Decision Making.

For the response of each item, the respondents will be given 5 options to choose from. A 5 point Likert scale will determine the responses of the respondent with the following choices: Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree. Each option was given a numerical weight for the quantification of data with corresponding verbal descriptions.

The options were as follows:

Range	Verbal Descriptions
4.20 – 5.00	Strongly Agree
3.40 – 4.19	Agree
2.60 – 3.39	Neutral
1.80 – 2.59	Disagree
1.00 – 1.79	Strongly Disagree

**Validity of the Questionnaire**

The Social Emotional Competency Questionnaire was found to have been validated and checked by a research conducted by Mingming Zhou and Jessie Ee of National Institute of Education, Nanyang Technological University, Singapore. Their student entitled “Development and Validation of the Social Emotional Competence Questionnaire” was published on the 4th volume of the International Journal of Emotional Education last November 2012. On the said research, Zhou and Ee stated that there were three studies were carried out to provide the empirical evidence for the reliability and validity of the measure.

For their first study, five hundred and seventy-nine fourth-graders responded to the questionnaire. The validity of a five-factor structure for primary school students was tested using Confirmatory Factor Analysis. The analyses were conducted on covariance matrices, and the solutions were generated on the basis of maximum-likelihood estimation. Based on the results, all of the subscales demonstrated acceptable levels of internal consistency. For self-awareness, social awareness, self-management, relationship management and responsible decision-making, the Cronbach’s alpha were .62, .72, .68, .62 and .72, respectively.

The second study is for construct validity replication. The purpose of the second study was to reassess scale items in a different sample for dimensionality, and fit. Three hundred and fifty-six secondary school students in responded and the results shows that all of the subscales demonstrated good levels of internal

consistency with Cronbach Alpha being .71, .78, .76, .73 and .79, for self-awareness, social awareness, self-management, relationship management and responsible decision-making, respectively. Zhou and Ee's third study focused on internal consistency replication wherein they asked 344 secondary students to respond on the questionnaire. The crosscheck of internal consistency revealed Cronbach's alphas of .72, .77, .73, .71, and .76 for self-awareness, social awareness, relationship management, self-management, and responsible decision-making, respectively. The figures still show good scores on internal consistency properties.

All of the subscales demonstrated acceptable levels of internal consistency. For self-awareness, social awareness, self-management, relationship management and responsible decision-making, the Cronbach's alpha were .62, .72, .68, .62 and .72, respectively. The Education Endowment Foundation presents on their website [educationendowmentfoundation.org.uk](http://educationendowmentfoundation.org.uk) the psychometric properties of the Social Emotional Competency Questionnaire (SECQ). The questionnaire has an acceptable Cronbach's  $\alpha$  of .62-.79. The CFA or Confirmatory Factor Analysis are as follows; Chi-square(265)= 539.98,  $p < .001$ , Chi-square/df = 2.04, RMSEA or Root Mean Square Error Of Approximation of .05, CFI or Confirmatory Fit Index of 0.9, and an IFI or Incremental Fit Index of 0.9. To assess construct validity the scale items were reassessed in a different sample for dimensionality and fit. Results showed: Chi-square= 712.20 (df = 265,  $p < .001$ ), Chi-square/df = 2.69, RMSEA = .069, CFI = .86, IFI = .86

### **Data Gathering Procedure**

With the availability of the questionnaire, the researchers prepared the copies sufficient for the target population and respondents. Permission was requested through a letter signed by the school administrators to conduct the study and for the distribution of the survey questionnaires to the participants which are the incoming freshmen college students of Lipa City Colleges.

The researchers personally distributed and conducted the questionnaires to the respective respondents to ensure fast retrieval and at the same time to be able to answer possible clarifications. After sufficient time, the researchers personally retrieved the copies of the questionnaire. The result of the retrieved copies were tallied and tabulated in accordance to the frequency counts for the given options and then the data was analyzed and interpreted.

### **Statistical Treatment of the Data**

The following statistical procedures was used to interpret the data gathered from the respondents of the study; percentage and rank, weighted mean, and Pearson R. Pearson R is considered for this research to check the significant relationships on the variables.

#### **Results**

The obtained descriptive results are as follows:

Table 1 Extent of Self-Awareness of the Respondents

Indicators	WM	VI	Rank
I know when I am moody.	4.35	SA	1
I know what I am thinking and doing.	4.34	SA	2
I understand why I do what I do.	4.25	SA	3
I understand my moods and feelings.	4.04	A	4
I can read people's faces when they are angry.	3.98	A	5
Composite Mean	4.19	A	

Legend: WM for Weighted Mean, VI for Verbal Interpretation, SA for Strongly Agree, and A for Agree

Table 1 reflects the extent of the self awareness of the respondent as an indicator of their social-emotional development. It can be observed that the respondents strongly agree with their understanding of their strengths and limitations and consistent desire for self-improvement as attested by the composite mean of 4.19. Specifically, they strongly agree that they know when they're moody as it has the weighted mean of 4.35. Similarly they also strongly agree that they know what they're thinking and doing as it this indicator has a weighted mean of 4.34 and they understand why they do what they do as it got the weighted mean of 4.25. On the other hand, for the lowest rank, the respondents agree that they understand their moods and feelings and they can read people's daces when they're angry, as supported by the weighted mean of 4.04 and 3.98, respectively.

Table 2 Extent of Social-Awareness of the Respondents

Indicators	WM	VI	Rank
I recognise how people feel by looking at their facial expressions.	4.04	A	1
It is easy for me to understand why people feel the way they do	3.89	A	2
I understand why people react the way they do	3.61	A	3.5
If a friend is upset, I have a pretty good idea why.	3.61	A	3.5
If someone is sad, angry or happy, I believe I know what they are thinking.	3.34	A	5
Composite Mean	3.7	A	

Legend: WM for Weighted Mean, VI for Verbal Interpretation, and A for Agree

Table 2 shows the extent of social awareness of the respondents as an indicator of their social-emotional development. The data reveals that the respondents agree that they have the capacity to interact with others with respect for their ideas and behaviours as well as its impact to society as supported by the composite mean of 3.70. Furthermore, it was affirmed by the respondents' recognition of how people feel by

looking at their facial expressions and it's easy for them to understand why people feel the way they do as attested by the weighted mean of 4.04 and 3.89, respectively with the verbal interpretation of agree. Likewise, they agree that they understand why people react the way they do and when they're friend is upset, they have an idea why, as attested by the weighted mean of 3.61 for both indicators. However, for the lowest rank, they agree that when someone is sad, angry or happy, they believe they know what they're thinking as supported by the weighted mean of 3.34.

Table 3 Extent of Self-Management of the Respondents

Indicators	WM	VI	Rank
When I am upset with someone, I will wait till I have calmed down before discussing the issue.	3.88	A	1
I can control the way I feel when something bad happens.	3.69	A	2
I can stay calm in stressful situations.	3.68	A	3
I stay calm when things go wrong.	3.66	A	4
I stay calm and overcome anxiety in new or changing situations.	3.54	A	5
Composite Mean	3.69	A	

Legend: WM for Weighted Mean, VI for Verbal Interpretation, and A for Agree

Table 3 shows the extent of self management of the respondents as an indicator of their social-emotional development. As shown above, the respondents agree that they have the characteristics in handling or controlling their emotions regardless of how easy or tough the situation is as attested by the composite mean of 3.69. It can be observed that for the highest rank in the indicators above, the respondents agree that when they're upset with someone, they will wait till they have calmed down before discussing the issue and they can control the way they feel when something bad happens, as supported by the weighted mean of 3.88 and 3.69, respectively. In addition, they also agree that they can stay calm in stressful situations and when things go wrong as it got the weighted mean of 3.68 and 3.66, respectively. However, for the lowest rank with the weighted mean of 3.54, they agree that they can stay calm and overcome anxiety in new or changing situations.

Table 4 Extent of Relationship-Management of the Respondents

Indicators	WM	VI	Rank
I always try and comfort my friends when they are sad.	4.36	SA	1
I will always apologise when I hurt my friend unintentionally.	4.29	SA	2
I stand up for myself without putting others down.	4.14	A	3
I try not to criticise my friend when we quarrel.	3.84	A	4

I am tolerant of my friend's mistakes.	3.11	A	5
Composite Mean	3.95	A	

Legend: WM for Weighted Mean, VI for Verbal Interpretation, SA for Strongly Agree and A for Agree

Table 4 reflects the extent of self management of the respondents as an indicator of their social-emotional development. It reveals that the respondents agree that they can establish and maintain healthy and rewarding relationships, and to act in accordance with social norms as supported by the composite mean of 3.95. Furthermore, the respondents strongly agree that they always try and comfort their friends when they are sad and will apologize when they hurt them unintentionally as attested by the weighted mean of 4.36 and 4.29, respectively. Similarly, they agree that they can stand up without putting others down and tried not to criticize their friends when they quarrel as it got the weighted mean of 4.14 and 3.84, respectively. However, for the lowest rank, they agree that they are tolerant of their friend's mistake as supported by the weighted mean of 3.11.

Table 5 Extent of Responsible Decision Making of the Respondents

Indicators	WM	VI	Rank
I ensure that there are more positive outcomes when making a choice.	4.16	A	1
I weigh the strengths of the situation before deciding on my action.	4.13	A	2
I consider the strengths and weaknesses of the strategy before deciding to use it.	4.06	A	3
When making decisions, I take into account the consequences of my actions.	4.05	A	4
I consider the criteria chosen before making a recommendation.	3.97	A	5
Composite Mean	4.07	A	

Legend: WM for Weighted Mean, VI for Verbal Interpretation, and A for Agree

Table 5 presents the extent of responsible-decision making of the respondents as an indicator of their social-emotional development. The data reveals that the respondents agree that they learned how to make constructive choices about personal behavior and social interactions across diverse settings as attested by the composite mean of 4.07. As shown above, the respondents agree that they ensure that there are more positive outcomes when they're making choice and they weigh the strengths of situations before dicing on their action as supported by the weighted mean of 4. 16 and 4.13, respectively. On the other hand, they also agree to consider the strengths and weaknesses of the strategy before deciding to use it and making account of the consequences of their actions as it got the mean of 4.06 and 4.05, respectively. For the lowest rank, it got the weighted mean of 3.97 as they agree that they consider the criteria chosen before making recommendations.

Table 6 Test of Significant Relationship Between the Demographic Profile of the Respondents and Their Social-Emotional Competencies

Demographic Profile		Self-Awareness	Social Awareness	Self Management	Relationship Management	Responsible Decision-Making
Age	R-coefficient	0.17	0.16	0.016	0.031	0.097
	P-value	0.027	0.037	0.839	0.686	0.209
	Decision	S	S	NS	NS	NS
Gender	$\chi^2$	2.63	5.92	11.76	3.36	0.03
	P-value	0.452	0.206	0.008	0.34	0.999
	Decision	NS	NS	S	NS	NS
Secondary School Type	$\chi^2$	0.71	5.63	6.21	1.61	3.39
	P-value	0.87	0.229	0.102	0.657	0.336
	Decision	NS	NS	NS	NS	NS
No. of Siblings	$\chi^2$	22.05	8.89	9.11	8.81	5.15
	P-value	0.009	0.712	0.427	0.455	0.821
	Decision	S	NS	NS	NS	NS
Residency Status	$\chi^2$	6.11	9.19	7.25	9.52	3.9
	P-value	0.728	0.687	0.612	0.391	0.918
	Decision	NS	NS	NS	NS	NS

Legend: S for Significant and NS for Not Significant

Table 6 presents the test of significant relations of respondents' demographic profile and their socio-emotional competencies. It can be observed on the table that the age has a significant relationship with self and social awareness as attested by the probability value of 0.027 and 0.037 which are less than the 0.05 significance level, respectively. Thus, the null hypothesis must be rejected.

## Discussion

The result of the study shows that the respondents are really aware of what they think, do and feel. However, they're a bit struggling in knowing when a person is angry through their faces.

It was discussed by Psychologist Daniel Goleman (2014) who suggests that self-awareness is crucial for all levels of success. Therefore, this should be the leading skill in Social Emotional Learning. Before even beginning implementation with students, it is also important to ensure that the adults working with these students have an accurate self-perception of themselves so as to better build these skills with students.

Self awareness has a big impact on the socio-emotional learning of the students. When a person is self-aware he or she strives to understand how he or she can improve and better themselves. Additionally, the people tend to adopt a problem-solving attitude that encourages them to develop habits like seeking and using information in the moment. People do this as a part of managing challenges in school and in life. They are skills that never leave people and are always useful. In this sense, self-awareness in social-emotional learning can also involve the development of critical, analytical, and creative thinking, all of which contribute to higher academic results.

Addressing issues about self awareness will benefit the academic performance of the students. This will also help the students' academic performance which was proven by the study of Yahaya, A., Ee, N. S., Bachok, J. D. J., Yahaya, N., Boon, Y., Hashim, S., & Lee, G. M. (2012) concluding that self-awareness, self-motivation and empathy elements have significant relationship as a predictor of academic achievement. It was also shown on this study that the respondents are good in recognizing and understanding people emotions through their expressions. Though, they are not that good in knowing what a person thinks when he/she is sad, angry or happy.

Beland (2007) defined social awareness as the ability to take the perspective of and empathize with others from diverse backgrounds and cultures, to understand social and ethical norms for behavior, and to recognize family, school, and community resources and supports. When the students exhibit social awareness they encourage the qualities of professionalism, proper communication, and personal responsibility both in themselves and others. It's about learning to manage our emotions while empathizing with those of our peers. When we seek to understand others, we develop a higher understanding of ourselves.

This crucial element of social-emotional learning contributes directly to maintaining proactive and enjoyable classroom environments. Interestingly enough, it's also part of what defines the ideal global digital citizen.

It was also proven that the respondents can control their emotions and be calm in times of stressful situations. However, they are struggling to overcome anxiety in new situations.

[www.selpractices.org](http://www.selpractices.org) provides the importance of self-management to socio-emotional learning. It serves as a key enabler for all learning whether for academic subjects, other content areas, or skills like playing a musical instrument. Self-management allows students to follow through on plans to complete assignments, study for tests, and stay focused in class. In adults, it is critical to reaching goals related to learning or life, like developing a new professional skill.

Also upon analyzing the result of the statistics, it concludes that the respondents value their friendship with other people, especially in terms of emotional support. Nevertheless, beyond their care for their friends, they aren't tolerating their mistakes.

[www.wabisablearning.com](http://www.wabisablearning.com) explains that the kinds of connections learners make with both teachers and fellow classmates can greatly impact their performance in school. They're not going to try as hard or do as well with people that they don't like or don't find interesting. On the other hand, if they feel a sense of alienation from those around them, their productivity in learning will also suffer.

From the get-go our students need to feel like the classrooms they come to are safe places to be. They should be environments where learners of all definitions are welcome, and are free to interact and grow in ways that enrich and support them in their personal journeys.

Meaningful relationship-building ensures students maintain quality interactions throughout their formative years. With a system of support from staff and students alike, everyone benefits and excels in the achievement of common learning goals.

Also based on the computed data, the respondents consider positive outcomes in every choice and plans well before deciding on anything. However, their weakness is taking on account with the consequences and considering criteria chosen for their decision.

The kind of responsible decision-making we're talking about takes ethics, personal behaviours social norms, and deep critical thinking into consideration. The secret to great decision-making is first having a full understanding of the problem or task, and then doing the appropriate background work. Such skills serve our students in many aspects of their learning, including tackling assignment challenges in a productive and results-oriented way.

As supported by [www.landmarkoutreach.org](http://www.landmarkoutreach.org) on their article, it explains that to make the most appropriate behavioral choices, students need to learn how to evaluate the situation, analyze their options, and consider the potential consequences of each of those options for themselves and others.

Many traditional college-aged students lack the social awareness that leads to social change (Bickford & Reynolds, 2002). The research of Forland (2014) as discussed on [pdfs.semanticscholar.org](http://pdfs.semanticscholar.org) revealed that social awareness can be beneficial for university students in their working and social activities, facilitating cooperation, and sharing of resources and providing a good social climate.

The study of Mallouh Mufdi Barakat Slaihate as stated on [pdfs.semanticscholar.org](http://pdfs.semanticscholar.org) recommended the necessity to reconsider the roles of university, curriculum, and methods of teaching and evaluation in promoting the social awareness by preparing programs which promote the social awareness, and to design university courses that enrich the students' humanistic knowledge in different fields that suits their social status.

[www.heartlightministries.org](http://www.heartlightministries.org) discussed that younger children generally don't care what others think; but all of that changes in adolescence. As a teen matures, carefree living can quickly turn into brutal self-awareness. So when your teen's behavior becomes unlike anything you've seen before, it can be because they are thinking about themselves in a new way.

However, self management, relationship management and responsible decision making has no significant relationship with the age profile of the respondents. Moreover, in terms of gender, it has a significant relationship with self-management as attested by the probability value of 0.008 which is less than the 0.05 significance level. Thus, null hypothesis must be rejected.

The study conducted by Heo et al (2008) as published on the [PublicMed.gov](http://PublicMed.gov) journal dated 2008, they concluded that there are gender differences in factors affecting self-care, even though at baseline men and women have similar knowledge levels, physical, psychological, and behavioral status. Bjorklund and Kipp (1996) provide an evolutionary framework predicting that there is a female advantage in inhibition and self-regulation



due to differing selection pressures placed on males and females. It was also discussed and concluded ob the study of Karmar and Morton (2014) that at least during potentially reproductive periods, females employ a more self-controlled and less impulsive behavioural strategy.

On the other hand, self and social awareness, relationship management and responsible decision making has no significant relationship with the gender profile of the respondents. Furthermore, secondary school type has no significant relationship with any of the socio-emotional competencies above. Thus, null hypothesis must be accepted. In addition, number of siblings has a significant relationship with self-awareness of the respondents. It is attested by the probability value of 0.009 which is less than the 0.05 significance level, thus, null hypothesis must be rejected, while the rest of the competencies have no significant relationship with the number of siblings of the respondents. Lastly, for the residency status, it has no significant relationship to any of the competencies above. This concludes that the null hypothesis must be accepted.

## **Conclusion**

Majority of the respondents are on the age bracket of 17 to 18 years old. There are more female respondents than male participants. Student respondents who came from private Senior High School have the most participants on this study. Majority of the participants have 3 and above number of siblings. In terms of living arrangements, respondents who are living with their parents have the highest number in frequency.

For self-awareness, respondents strongly agree that they understand their strengths, limitations, and consistent desire for self improvement. The result social awareness shows that the respondents agree that they have the capacity to interact with others with respect for their ideas and behaviours as well as to the society. Also the outcome of the study shows that the respondents agree that they have the characteristics in handling and controlling their emotions regardless of how easy or tough the situation is. In addition, for relationship management, the respondents agree that they can establish and maintain healthy and rewarding relationships while acting in accordance with social norms. Lastly, for responsible decision making, the respondents agree that they learned how to make constructive choices about personal behaviour and social interactions across diverse settings.

The age of the respondents have significant relationship with Self-Awareness and Social Awareness. For gender, significant relationship was also evident with Self-Management. The secondary school type of the respondents, the number of their siblings, and their living arrangement has no significant relationship across all socio-emotional competencies.

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## Depression and Its Implications Among People Living with HIV Attending a Treatment Center in Nepal

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### Abstract

Depression is one of the most frequently observed psychiatric disorders among people living with HIV (PLHIV), and it has been associated with increased risky behaviors, reduced medication adherence, impaired quality of life, and possibly worsening the progression of the illness and increasing mortality. In this study, the objectives were to determine the prevalence of symptoms of depression and to identify risk factors in PLHIV in Nepal. In this cross-sectional study, we describe socio-demographic, clinical, and psychosocial data related to depression in 325 PLHIV of Sukraraj Tropical and Infectious Diseases Hospital, Kathmandu, Nepal. The Depression Scale (PHQ-9) was used for measuring depression in the prior month. A PHQ-9 score of  $\geq 10$  was used to identify possible cases of depression. Multivariate logistic regression analysis was performed to identify factors associated with symptoms of depression. The prevalence of depression among PLHIV was 18.8% (PHQ  $\geq 10$ ). Of the 325 PLHIV, 16.1% were male, 22.3% were unable to read and write, 1.0% were unemployed, and 33.8% were single or divorced/widowed. Multivariate analysis showed that individuals having internalized stigma, non-adherence to HIV treatment, lack of social support, dissatisfaction with health care service, cannabis use, and being female were significantly more likely to have depressive symptoms. Study findings have implications for designing and implementing interventions to increase social support and decrease HIV-related stigma in order to decrease depression among HIV+ persons. Prevalence of symptoms of depression was high in these PLHIV. This suggests a need for training on the screening and management of depression among PLHIV.

**Keywords:** Depression, Stigma, Social support, HIV/AIDS

### Introduction

Human immunodeficiency virus (HIV) is a disease of major public health concern and has attracted the attention of psychosocial researchers (Shanthi et al; 2007). A cause for concern is the emergence of depression (a mood disorder that causes a persistent feeling of sadness and loss of interest) as one of the most frequently observed psychiatric disorders among people living with HIV (PLHIV) with prevalence rates ranging from 20% to above 70% across the globe. A study in India found prevalence of depression in PLHIV receiving anti-retroviral therapy (ART) of 58.8%. The prevalence of depression increased with the severity of HIV/AIDS symptoms, being unemployed, being uneducated, being unmarried, belonging to a joint (i.e., extended) family, having low or no family income, being a migrant, having indifferent or poor relationship with spouse, and having poor social support (Bhatia and Munjal; 2014). Studies in Africa revealed that depression among PLHIV was associated with poorer health status overall, low weight gain, poor CD4 improvement (Kingori et al; 2015), and faster progression to AIDS (Abas et al; 2014). A recent study reported that non-ART-adherent PLHIV had a 3-fold higher risk of presenting with moderate to severe depressive symptoms in comparison to ART-adherent PLHIV (Nel and Kagee; 2013).

Depression is responsible for more 'years lost' to disability than any other condition. According to the World Health Organization (WHO), 350 million people around the world suffer from depression (Smith; 2014). Depression is a common mental disorder that presents with depressed mood, decreased energy, disturbed sleep/appetite, loss of interest or pleasure, feelings of guilt or low self-worth, and poor concentration. Depression should be diagnosed and treated in people undergoing treatment for HIV/AIDS in view of its effects on the health and wellbeing of these people. Unfortunately, despite its high prevalence, both in the general population and among PLHIV on treatment for HIV/AIDS, depression is commonly under-diagnosed and, consequently, untreated in general medical practice. In primary care, physicians miss between one-half to two-thirds of clients with depression (Bhatia; 2014).

Importantly, infection with HIV and depression are interlinked. Over half of all HIV-infected individuals suffer from mental health disorders (Niu; 2016), and depression disorders are more common in PLHIV than in the general population (Charlson et al; 2016; Pappin, Wouters & Booyesen; 2012). People suffering from major depression may be more likely to contract HIV, have reduced adherence, have impaired immune function, have increased health care cost, suffer disability, and die prematurely (Nacher et al; 2010; Garey et al; 2015). Conversely, an HIV+ diagnosis may trigger symptoms of depression (Boarts et al; 2009; Hand, Phillips & Dudgeon; 2006), which could, once again, lead to risky sexual behavior and the spreading of the virus. In addition, studies have shown that people suffering from depression are less likely to adhere to treatment for mental illness and ART (Nanni et al; 2014; Horberg et al; 2008). Unfortunately, more than half of the HIV+ population that suffer from depression have not received an official diagnosis of their depression (Asch SM et al; 2003).

The prevalence of depression among PLHIV is higher than in the general population (36% vs. 7%) and is associated with increased mortality (Berger-Greenstein et al; 2007; Bing et al; 2001; Chichetto et al; 2019; Cook et al; 2004; Do et al; 2014). Although an association between depression and ART-non-adherence is reported in PLHIV (Yun et al; 2005), treatment for depression in PLHIV has not always led to an improvement in viral suppression (Pence et al; 2015). Conversely, PLHIV with well-controlled HIV still exhibit high rates of depression. Studies report an association between depression and low CD4 cell counts, opportunistic infections, being female, experiencing stressful life circumstances, food insecurity, injection drug use, and low socioeconomic status (Algoodkar et al; 2017; Yeneabat et al; 2017). Tests of the association between the ART drug efavirenz and depression are mixed. Four randomized trials, in which efavirenz was randomly assigned as a first-line therapy compared to regimens without efavirenz, found a two-fold increased hazard for suicide in the efavirenz group (Mollan et al; 2014).

In this study, the objectives were to determine the prevalence of symptoms of depression and to identify risk factors in PLHIV in Nepal.

#### Method and Material

**Study setting and design:** A hospital-based cross-sectional study was conducted at an HIV-treatment center at Sukraraj Tropical and Infectious Diseases Hospital, Kathmandu, Nepal. This is the only Infectious & Tropical Diseases Hospital established in 1933 in Kathmandu, Nepal. Data collection was conducted in between July and December 2020. The hospital is a tertiary healthcare facility with a capacity of 100 beds inpatient

service and consists of out-patient services, laboratory, X-ray services and 24 hours emergency services including all clinical departments and units where preventive, curative, and rehabilitative services are provided. It is also one of the centers designated for treating PLHIV in Kathmandu, Nepal. It is also considered as one of the first designated government hospital to treat Covid -19 cases in Nepal. The hospital has been providing free treatment to the infected people since very beginning of the pandemic.

**Study population:** The study population consisted of all adult PLHIV who were on follow-up at Sukraraj Tropical and Infectious Diseases Hospital, including both ambulatory and hospitalized cases. The sample was composed of PLHIV over 18 years old of both genders. Those PLHIV with difficulty in answering the questionnaire properly, such as the ones with hearing, speech or mental impairment, or were non-consenting, were excluded from the study.

**Sampling procedures:** Sample size was determined based on the single-population proportion formula using Epi-info version 7 with a 95% confidence interval (CI), 5% margin of error, assuming a background prevalence of depression to be 16.9% (Camara et al; 2020), assuming a precision level of 5%, and an anticipated 90% response rate. Given these assumptions, a total sample size of 325 HIV cases was prescribed. Systematic sampling was used to select ambulatory PLHIV. The sampling interval was determined by dividing the total study population ( $n = 650$ ) of PLHIV who had been followed-up during the six-month data collection period by the target sample size ( $n = 325$ ), with a random starting point. During the several months preceding the study, 820 outpatients had been seen and, thus, the sampling interval was estimated to be 2. In addition, all hospitalized PLHIV during the study period were invited to participate in the study.

**Data and measures:** Data were collected using a pretested, interviewer-administered questionnaire, which contained questions on socio-demographic characteristics (age, gender, education, occupation, marital status, education level, dwelling type, etc.), clinical characteristics (time since first HIV test, CD4 count, whether or not on ART, interruption of ART at any point in the last year) and symptoms of depression. Symptoms of depression were measured using the Patient Health Questionnaire (PHQ-9). The scale contains four response options and comprises five subscales of nine questions each. The subscales measure depression, and potential scores range from 0 to 27, with a higher score denoting a greater number of symptoms of depression: 0-4 denotes minimal depression, 5-9 denotes mild depression, 10 -14 denotes moderate depression, 15-19 denotes moderately-severe depression, and 20 -27 denotes severe depression (Kroenke et al; 2001). For the purpose of this study, the instrument was translated into the native language of the participants. The PHQ-9 scores were converted into a binary categorical variable. Depression was measured by using nine items of the depression subscale of PHQ-9, with a cut-off point at 10. A review of the psychometric properties of PHQ-9 found that, in most studies, an optimal balance between sensitivity and specificity was achieved when a case was defined by a score of 10 or above on both. We classified PLHIV as experiencing moderate to severe depression if their PHQ-9 score was  $\geq 10$ , or as experiencing no or mild depression if their PHQ-9 score was  $< 10$ . The PHQ-9 assesses patients for the nine symptoms of Major Depressive Disorder. Although the PHQ-9 measures depression symptoms which may not always equate with depression, it has been used widely as a tool to screen those at high risk of having depression. The psychometrics of this measure have been well-established, especially in primary care settings (Mamta et al; 2020).

Ethical consideration: Ethical clearance was obtained from the Mahidol University (MUSSIRB No: 2020/080(B2) and the Government of Nepal, Nepal Health Research Council 518/2020. Participants were informed that the information collected for this research project would be kept confidential, and information collected by this study would be coded with a unique identification number. Participants who were found to have depression were referred for further investigation and care if necessary.

Data analysis: Data were analyzed using SPSS version 24. Means, frequencies, proportions, and rates for each variable were calculated. Single-variable analysis was done to characterize the association of each independent variable with the outcome variable. Those variables having P-value <0.05 were entered into the multivariate analysis (by logistic regression model) to identify the net effect of each independent variable with the outcome variable. A backwards/forwards stepwise procedure was conducted for the multivariate analysis. A P-value of <0.05 was considered statistically significant, and adjusted odds ratios (AOR) with 95% CI were calculated to determine the strength of the association. The sets of logistic regression analyses were run, using depression as a separate dependent variable, to independently investigate correlates of depressive symptoms.

## Results

Figure 1 presents the proportion of the study population with depression: 4.2% had severe depression, 2.5% had moderately-severe depression, 12.0% had moderate depression, 24.6% had mild depression, and 56.6% had mild or no depression.

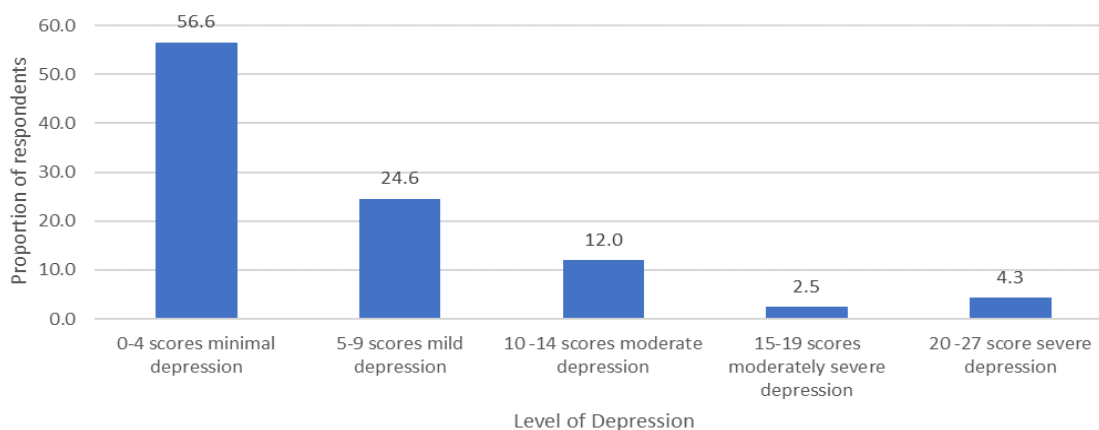


Figure 1 Prevalence of Depression (N= 325)

Table 1 Demographics and Clinical Characteristics (n=325)

Variable	Categories	N (%)	Variable	Categories	N (%)
<b>Sex</b>	Male	186 (57.2)	<b>Knowledge of HIV (score)</b>	Low 0 - 4	62 (19.1)
	Female	139 (42.8)		Moderate 5-6	121 (37.2)
<b>Age (years)</b>	19 -25	40 (12.3)		High 7 - 8	142 (43.7)
	26-39	128(39.4)	<b>Duration Since Diagnosed</b>	≤ 1	42 (12.9)
	≥40	157 (48.3)		2-5	144 (44.3)
<b>Mean (SD)=38.65 (9.72), min =19, max=60</b>				6-9	56 (17.2)



Variable	Categories	N (%)	Variable	Categories	N (%)
<b>Marital Status</b>	Divorced/widowed	27 (8.3)	<b>with HIV</b> (years)	$\geq 10$	83 (25.5)
	Single	63 (19.4)		<b>CD 4 Count</b>	Correct answer
	Married	235 (72.3)	Incorrected		0
<b>Occupation</b>	Unemployment	48(14.8)	<b>Duration on</b> <b>ART (years)</b>		Unknown
	Employment	277(85.2)		$\leq 1$	51(15.7)
<b>Education</b>	Illiterate	79 (24.3)	<b>Duration on</b> <b>ART in this</b> <b>Clinic (years)</b>	2-3	81(24.9)
	Primary	91 (28.0)		> 3	193(59.4)
	Secondary	93 (28.6)		$\leq 1$	59 (18.2)
	Higher	35 (10.8)	2-3	78 (24.0)	
	University level or above	27 (8.3)	> 3	188 57.8)	
<b>Residence</b>	Inside Kathmandu	266 (81.8)	<b>Missed any</b> <b>ARV Doses</b>	Last four days	6 (1.8)
	Outside	59 (18.2)		Last 7 days	17 (5.2)
<b>HIV disclosure</b> Mean=14, SD=1.9	Lowest	26(8.0)	<b>Experienced</b> <b>Stigma</b>	Never	302 (92.9)
	Low	187(57.5)		Never	225(69.2)
	High	108(33.2)		Once	58(17.8)
Highest	4(1.2)	A few Times		33(10.2)	
<b>Safer Sex self-efficacy</b>	Lowest	50(15.4)		<b>Experienced</b> <b>Self-stigma</b>	Often
	Low	163(50.2)	Never		176 (54.2)
	High	98(30.2)	Once		54 (16.6)
	Highest	14(4.3)	A few Times		85 (26.2)
<b>Substance use</b>	Alcohol only	27 (8.4)	<b>Amount of</b> <b>Social</b> <b>Support</b>	Often	10 (3.1)
	Tobacco only	40 (12.2)		Good	54 (16.6)
	Both	104 (32.0)		Fair	235 (72.3)
	Never	154 (47.4)		Poor	36 (11.1)

As indicated in Table 1, the average age of the participants was 38.6 years ( $\pm$ standard deviation 9.72), and the majority were married, employed, resided inside the Katmandu region, and had high school or less education. Just under half (47.4%) of the participants had never used addictive substances such as alcohol and tobacco, while one-third (32.0%) had ever used both substances. Fully 85.5% did not know whether their CD4 count at the last visit was normal or not, and 57.2% had been diagnosed with HIV within the past five years. More than half (57.8%) had been on ART for >3 years (i.e., medications and/or counseling). HIV-related stigma (perceived and internalized stigma) was found among 30.8% and 45.8% of PLHIV, respectively.

Table 2 Factors Associated with Depression among PLHIV at Sukraraj Tropical and Infectious Diseases Hospital, Kathmandu, Nepal, 2020 (n = 325)

Factors	Categories	PHQ9 $\geq$ 10	PHQ9 < 10	Crude OR (95% CI)	Adjusted OR (95% CI)
		N (%)	N (%)		
<b>Sex</b>	Male	30(16.1)	156(83.9)	1	
	Female	31(22.3)	108(77.7)	<b>2.493 (1.854-2.610)</b>	<b>1.920(1.864-5.571)</b>
<b>Age (years)</b>	19–39	26(15.5)	142 (84.5)	1	
	$\geq$ 40	35(22.3)	122 (77.7)	1.567 (0.893-2.749)	
<b>Education</b>	Unable to read and write	20(25.3)	59(74.7)	1.695 (0.923-3.113)	
	Primary or more	41(16.7)	205(83.3)	1	
<b>Occupation</b>	Employed	56(20.2)	221(79.8)	2.179 (0.825-5.757)	
	Unemployed	5(10.4)	43(89.6)	1	
<b>Marital status</b>	Divorced/widowed	2(7.4)	25(92.6)	1	
	Married	43(18.3)	192(81.7)	1.520(0.788-2.931)	
	Single	16(25.4)	47(74.6)	4.255(0.905-20.008)	
<b>Residence</b>	Inside Kathmandu	48(18.0)	218(82.0)	1	
	Outside	13(22.0)	46(78.0)	1.284 (0.644-2.560)	
<b>Knowledge on HIV</b>	Low (0-6)	40(21.9)	143(78.1)	1.612(0.901-2.882)	
	High (7-8)	21(14.8)	121(85.2)	1	
<b>Duration since Diagnosed with HIV</b>	$\leq$ 5 (years)	43(23.1)	143(76.9)	<b>2.021(1.108-3.687)</b>	
	>5 (years)	18(12.9)	121(87.1)	1	
<b>Adhering to ART</b>	Yes	12(52.2)	11(47.8)	<b>5.633(2.352-13.491)</b>	<b>4.141(1.467-11.690)</b>
	No	49(16.2)	253(83.8)	1	
<b>Duration on ART (years)</b>	$\leq$ 2	27(26.0)	77 (74.0)	<b>1.898(1.072-3.359)</b>	
	> 2	34(15.6)	184 (84.4)	1	
<b>Duration on ART in this Clinic (years)</b>	$\leq$ 2	28(25.5)	82(74.5)	<b>1.852(1.050-3.267)</b>	
	> 2	33(15.6)	179(84.4)	1	
<b>Experienced Stigma</b> Mean=17.9, SD=4.2	Yes (19-35)	31(31.0)	69 (69.0)	<b>2.920(1.648-5.175)</b>	
	No (14-18)	30(13.3)	195 (86.7)	1	
	Yes (13-24)	41(35.0)	76 (65.0)	<b>5.071(2.791-9.215)</b>	<b>4.974(2.567-9.638)</b>

Factors	Categories	PHQ9 $\geq$ 10	PHQ9 < 10	Crude OR (95% CI)	Adjusted OR (95% CI)
		N (%)	N (%)		
<b>Experienced Self-Stigma Mean=11.7, SD=4.4</b>	No (6-12)	20 (9.6)	188 (90.4)	1	
<b>HIV Disclosure</b>	low (6-14)	42(19.7)	171(80.3)	1.202 (0.661-2.186)	
	High (15-20)	19(17.0)	93(83.0)	1	
<b>Self-efficacy Mean=14.8, SD=2.3</b>	Yes (10-15)	41(19.2)	172(80.8)	1.097(0.607-1.991)	
	No (16-20)	20(17.9)	92(82.1)	1	
<b>Sexually active</b>	Yes	36 (16.8)	178 (83.2)	1	
	No	25 (22.5)	86 (77.5)	1.437 (0.812-2.545)	
<b>Tobacco use*</b>	Yes	30(20.7)	115(79.3)	1.254 (0.718-2.190)	
	No	31(17.2)	149(82.8)	1	
<b>Alcohol use*</b>	Yes	25(19.2)	105(80.8)	10.52 (0.597-1.853)	
	No	36(18.5)	159(81.5)	1	
<b>Cannabis use</b>	Yes	14(45.2)	17(54.8)	<b>4.328 (1.998-9.376)</b>	<b>5.292(2.123-13.186)</b>
	No	47(16.0)	247(84.0)	1	
<b>Satisfaction with Health Service</b>	Yes	20(26.7)	55(73.3)	<b>1.854 (1.006-3.417)</b>	<b>2.034 (1.009-4.103)</b>
	No	41(16.4)	209(83.6)	1	
<b>Unfair Health Service</b>	Yes	13(27.1)	35(72.9)	1.772 (0.872-3.599)	
	No	48(17.3)	229(82.7)	1	
<b>Improper Health Service</b>	Yes	11(31.4)	24(68.6)	<b>2.200 (1.013-4.780)</b>	
	No	50(17.2)	240(82.8)	1	
<b>Social support</b>	High	12(8.7)	126(91.3)	1	
	Low	49(26.2)	138(73.8)	<b>3.728 (1.897-7.329)</b>	<b>3.107(1.479-6.528)</b>

\*used in the past 3 months

Several psychosocial and behavioral characteristics were found to be statistically associated with depression. In the multiple logistic regression analysis, PLHIV who are female (AOR 1.92 95% CI 1.864-5.571), not adhering to the ART regimen (AOR 4.141, 95% CI 1.467-11.690), having a lower level of social support (AOR 3.107, 95% CI 1.479-6.528), using cannabis (AOR 5.292, 95% CI 2.123-13.186), reporting lower satisfaction with health care services (AOR 2.034, 95% CI 1.009-4.103), and reporting self-stigma (AOR 4.974, 95% CI 2.567-9.638) were more likely to have periods of depression, and those AOR are statistically significant ( $p > 0.05$ ) (Table 2).

## Discussion

Depression is the most common neuropsychiatric complication in PLHIV, and may occur in all phases of HIV infection. Our study found that 18.8% of the HIV+ participants experienced moderate to severe symptoms of depression, indicating a high burden of disease similar to other studies (Nanni et al; 2015) but higher than the prevalence of 13.0% reported in the Medical Monitoring Project (Do et al; 2014). The current study result is in line with other studies carried out in Tanzania (Marwick & Kaaya; 2010), Ethiopia (Beyene et al; 2019) and Conakry, Guinea (Camara et al; 2018) in which the prevalence estimates were reported to be 15.5%, 14.6%, and 16.9% respectively. On the other hand, the present study findings were lower than those found in studies done in South Africa, China, and Nigeria in which the prevalence was reported to be 25.4%, 32.9%, and 39.6%, respectively (Pappin, Wouters & Booysen; 2012; Huang et al; 2018; Adeoti, Dada & Fadare; 2018). These differences may be attributable to differences in depression screening methods or variations between a national and local sample.

Gender was considered a risk factor for depression in this study, with females being at increased risk. Most studies of PLHIV have found a higher rate of depression in women than men. For example, Ickovics et al reported chronic depressive symptoms in 42%, and intermittent depressive symptoms in 35% of a sample of 765 HIV-positive women [Ickovics et al; 2001]. In a cross-sectional study conducted in Western Europe and Canada with a sample 2,863 PLHIV, Robertson et al found a greater percentage of women compared with men who screened positive for depressive symptoms (17.9 vs. 14.3%;  $p=0.01$ ) (Robertson et al; 2014). In addition, other studies have reported a significantly higher prevalence of major depressive disorders among HIV+ women than among HIV-negative controls (Morrison et al; 2002). Generally, women are believed to be more prone to depression, and the gender-specific risk factors for common mental disorders that have been found to disproportionately affect women include gender-based violence, socioeconomic disadvantage, low income, income inequality, low or subordinate social status/rank, and unremitting responsibility for the care of others (WHO; 2017).

The lower prevalence of depression in participants with social support as compared to those without family support in this study is not surprising in view of the warmth and care those with family support receive; this support decreases the stress they face, and enables them to have better mental, economic and social stability (Nogueira and Bonolo; 2006). These findings highlight the importance of family/social support in the care of PLHIV (as it provides them with practical help and buffers the stresses of living with illness). The findings provide additional evidence in support of the association between social support and better treatment adherence, improved clinical outcomes, reduced symptomatology, and the adaptation of beneficial lifestyle activities, as found in previous studies (Miller and DiMatteo; 2013). Thus, hospitals and other HIV/AIDS care providers need to establish social support groups at their respective facilities. The results of this study indicated that social support variables were found to be important predictors of depression. Social support is a useful resource that helps minimize psychological stress. It also plays a key role in buffering the negative effects of HIV-related stigma. Research also indicates that social support is particularly important for women as they rely more on social relationships compared with men in similar situations (Hurdle; 2001). There is a well-documented inverse relationship between social support and depression in PLHIV (Catz, Gore-Felton, & McClure; 2002).

Conversely, an HIV+ diagnosis may trigger symptoms of depression (Boarts JM et al; 2009; Hand, Phillips & Dudgeon; 2006), which could, once again, lead to risky sexual behavior and the spreading of the virus. In addition, studies have shown that people suffering from depression are less likely to adhere to treatment for both mental illness and ART (Nanni MG et al; 2014; Horberg M et al; 2008). Unfortunately, more than half of the HIV+ population that suffer from depression have not received a clinical diagnosis of their condition (Asch et al; 2003). Poor adherence to the ART regimen has been found to be associated with depression among PLHIV in Nepal: There was a higher prevalence of depression among non-adherers (52.2%) compared to adherers (16.2%) in this study. Similar studies in Africa revealed that non-adherent PLHIV had a 3-fold higher risk of presenting with moderate to severe depressive symptoms in comparison to adherent PLHIV (Nel and Kagee; 2013).

The results of our analysis suggest that cannabis use and high levels of depressive symptoms are significantly associated with one another. In previous studies, recent use of crack, cocaine, and heroin was associated with less optimal patterns of health service utilization, such as not seeing the same provider consistently, and infrequent primary care visits. These findings showed that women reporting illicit drug use in the past six months were more likely to report depression at the next study visit (Cook et al; 2007) In the United States, PLHIV are affected by substance use problems at higher rates than the uninfected. Research identifying risk factors for substance use among PLHIV is needed to strengthen HIV treatment and prevention efforts (Bonn-Miller et al; 2014).

Our study had several potential limitations. The cross-sectional study design did not allow for the assessment of the temporal relationship between depression and factors. Our study recruited PLHIV from a single hospital department and, hence, we cannot generalize to the entire HIV+ population in Nepal. In summary, there was a high prevalence of depression symptoms among treatment-experienced, HIV-infected individuals. Routine screening for depressive symptoms is recommended with a proper integration of mental health services into HIV care to give comprehensive management to all PLHIV. The Nepal Ministry of Health should develop guidelines to screen and treat depression and anxiety among PLHIV. Further research on risk factors of depression should be conducted to strengthen and broaden these findings in resource-limited settings.

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## **The Usefulness of Methylation-specific Multiplex Ligation-dependent Probe Amplification for diagnosis of Prader-Willi Syndrome in Thai Patients**

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### **Abstract**

Prader-Willi syndrome (PWS) is a multisystem genetic disorder caused by the absence of normal expression of genes on the paternally inherited allele of chromosome 15q11-q13. The clinical characteristics of Prader-Willi syndrome include infantile hypotonia, obesity beginning at a young age, obsessive hyperphagia, short stature, hypogonadism, and intellectual disability. Apart from clinical diagnostic criteria, the diagnosis of Prader-Willi syndrome in suspected patients is confirmed by genetic testing. This chromosomal area, called the Prader-Willi critical region, contains imprinting genes where these genes' expression is subjected to the chromosome's parental origin. Methylation-specific multiplex ligation-dependent probe amplification (MS-MLPA) is one of the techniques used in DNA methylation study. Apart from determining DNA methylation status, MS-MLPA also enables simultaneous detection of deletion status in the same reaction. It provides both the diagnosis of Prader-Willi syndrome based on the detection of aberrant methylation and the explicit deletion of affected genes. Moreover, the most common molecular mechanism that responds to the Prader-Willi syndrome's causation can be confirmed without further investigation with another test. This study is primarily aimed to evaluate the concordance of the test results of MS-MLPA with the test results of conventional techniques of methylation-specific polymerase chain reaction (MS-PCR) or fluorescence in situ hybridization (FISH) in the diagnosis of Prader-Willi syndrome in Thai patients. Fifteen leftover specimens from routine genetic testing (MS-PCR and FISH) were used to obtain MS-MLPA test results in this study. MS-MLPA results show perfect concordance with those results from conventional techniques of MS-PCR and FISH. MS-MLPA is an accurate and cost-effective assay that can be used in confirmation of Prader-Willi syndrome diagnosis with detailed deletion of affected genes.

**Keywords:** Prader-Willi syndrome, Methylation-specific multiplex ligation-dependent probe amplification (MS-MLPA), Imprinting disorder, Methylation analysis

### **Introduction**

Prader-Willi syndrome is an imprinting disorder involving multisystem caused by the absence of expression of paternally inherited genes from chromosome 15q11-13. The maternally inherited genes from the

same chromosomal region are programmed to be transcriptionally silenced due to the epigenetic mechanism. DNA methylation is the key to this silencing.

Prader-Willi syndrome can be founded in both genders without sex preference. The estimated prevalence is 1 in 10,000 to 1 in 30,000 newborns (Cassidy et al. 2012). PWS patients have recognizable clinical findings of infantile hypotonia and feeding problems, followed by the nutritional phase change of hyperphagia leading to early onset of obesity (Holm et al. 1993, Cassidy et al. 1997, Butler et al. 2006, Butler 2011). Characteristic facial features and short stature are often observed. Growth hormone insufficiency and hypogonadism are common. Developmental delay and intellectual disability affect learning ability and academic performance. Distinctive behavioral problems of temper tantrums and stubbornness interfere with the quality of life and social life.

Excessive eating is due to the neurologic abnormality of lack of satiety. Obesity and its complications are the leading causes of morbidity and mortality in PWS patients.

The PWS region located on the long arm of chromosome 15 (15q11-q13) contains multiple genes. Because Prader-Willi syndrome is an imprinting disorder, the parental origin of a chromosome is matter. DNA methylation plays a major role in this gene expression. Normally, paternally inherited genes are active, whereas maternally inherited genes are silenced by DNA methylation. Without a functional copy of genes in this region inherited from the father, no transcriptional products can be made, thus, causes Prader-Willi syndrome.

There are three main molecular mechanisms causing loss of expression of active genes from paternally inherited allele which are de novo deletion of 15q11-13 on the paternal chromosome (about 65-75% of cases), maternal uniparental disomy of chromosome 15 (mUPD 15) (about 20-30% of cases), and imprinting defect (about 1-3% of cases) (Glen et al. 1997, Bittel and Butler 2005).

The confirmation of diagnosis remains genetic testing. Currently, there is no national guideline or standard of practice for PWS genetic testing. In Thailand, genetic diagnosis of PWS is conventionally performed by techniques of methylation-specific polymerase chain reaction (MS-PCR) or fluorescence in situ hybridization (FISH), depending on the availability.

DNA methylation analysis (including MS-PCR and MS-MLPA) is the only technique to diagnose in all molecular mechanisms and detect more than 99 percent of PWS cases (Cassidy et al. 2012). The main difference is that MS-PCR offers only methylation analysis, but MS-MLPA offers a dual analysis of both aberrant methylation and deletion detection, which is the most common molecular mechanism causing Prader-Willi syndrome.

This study is the first study that uses the MS-MLPA technique in diagnosis of Prader-Willi syndrome in Thai patients. In this study, MS-MLPA was performed on leftover specimens of suspected PWS patients routinely sent for MS-PCR or FISH to study the concordance of test result in diagnosis of Prader-Willi syndrome.

## **Materials and methods**

### **Ethics**

This study has been reviewed and approved by the Human Research Ethics Committee, Faculty of Medicine Ramathibodi Hospital, Mahidol University (No. MURA2020/1100).

### **Sample collection**

Leftover specimens from peripheral blood samples routinely sent for Prader-Willi genetic testing (MS-PCR and FISH) were collected from 15 Thai patients whose clinical presentations were suspected for Prader-Willi syndrome. These 15 samples were provided by the Division of medical genetics, Department of Pediatrics and the Human genetic laboratory, Department of Pathology, Faculty of Medicine Ramathibodi Hospital. As a control, 5 DNA samples from normal healthy individuals provided by Human genetic laboratory, Department of Pathology, Faculty of Medicine Ramathibodi Hospital were used as normal control DNA samples.

### **DNA extraction**

According to the manufacturer's protocol, genetic DNA was isolated from samples using DNeasy Blood & Tissue Kit (Qiagen, Hilden, Germany). DNA concentration and purity were evaluated using NanoDrop 2000 spectrophotometer (Thermo Fisher Scientific, Delaware, U.S.A.)

### **Methylation-specific multiplex ligation-dependent probe amplification**

MS-MLPA technique was performed using SALSA MS-MLPA Probemix ME028-C1 Prader-Willi/Angleman (MRC-Holland, Amsterdam, Netherlands). The probemix consists of 47 (MS-)MLPA probes and six of them are MS-MLPA probes containing a methylation-sensitive enzyme HhaI recognition site for aberrant methylation detection. All probes will give information of copy number changes providing the copy number evaluation of the region of chromosome 15q11-13. Eleven reference probes are included in the kit and detect genes located outside the 15q11 region.

MS-MLPA assay was performed according to the manufacturer's protocol on each DNA sample. Starting with 50-100 ng of DNA sample in 5 µl of TE buffer (10 mM Tris-Cl and 0.5 mM EDTA; pH 9.0) was heated for 5 minutes at 98°C for DNA denaturation. In the step of hybridization, 1.5 µl SALSA MLPA buffer and 1.5 µl MS-MLPA probemix were added to each tube and incubated for 1 minute at 95°C then lower the temperature to 60°C for 18 hours to allow hybridization. After that, at room temperature, 3 µl ligase buffer A and 10 µl ultrapure water were added to each reaction mixture and separated the mixture by transferring 10 µl of the whole mixture to a second tube. The first tube is for a copy number test and set as an undigested reaction, and the second tube is for a methylation test and designated as a digested reaction. Ligation and ligation-digestion reactions were carried on by heating samples to 48°C and adding Ligase-65 master mix (1.5 µl ligase buffer B, 8.25 µl ultrapure water, and 0.25 µl Ligase-65) to the first tube (undigested reaction) and adding Ligase-digestion master mix (1.5 µl ligase buffer B, 7.75 µl ultrapure water, 0.25 µl Ligase-65, and 0.5 µl HhaI enzyme) to the second tube (digested reaction) and incubating for 30 minutes at 48°C. Then, inactivate the ligase and HhaI enzymes by heating for 5 minutes at 98°C. In the step of amplification, 5 µl of polymerase master mix (1 µl PCR primer mix, 0.25 µl SALSA polymerase, and 3.75 µl ultrapure water) was added to each tube at room temperature. PCR program was set as follows; 35 cycles of 95°C for 30 seconds/ 60°C for 30 seconds/ and 72°C for 60°C with the final stage of extension step at 72°C for 20 minutes. Capillary electrophoresis was performed for fragment separation of amplicons with a 3130 Genetic Analyzer (Applied Biosystems, USA). For MS-MLPA results, Coffalyse.net software (MRC-Holland, Amsterdam, Netherlands) was used to obtain the MS-MLPA analysis result.

## Results

From 15 DNA samples of patients whose peripheral blood was sent for Prader-Willi syndrome testing, the result of MS-MLPA showed complete concordance with the result of MS-PCR and FISH (Table 1). With MS-MLPA analysis, confirmation of Prader-Willi syndrome's diagnosis can be made in 12 samples which showed aberrant hypermethylation (Figure 1&2), the methylation pattern that consistent with Prader-Willi syndrome, as previously diagnosed by MS-PCR and FISH techniques. Three samples revealed normal methylation status and no copy number change, which led to the conclusion of non-PWS. Out of 12 PWS cases, MS-MLPA detected deletion in 6 samples, consistent with the result of FISH. Detailed deletion provided by MS-MLPA assay helped classify two samples with type 1 deletion (T1D) and four samples with type 2 deletion (T2D). The remaining 3 PWS cases were tested with other techniques and proved to be caused by uniparental disomy.

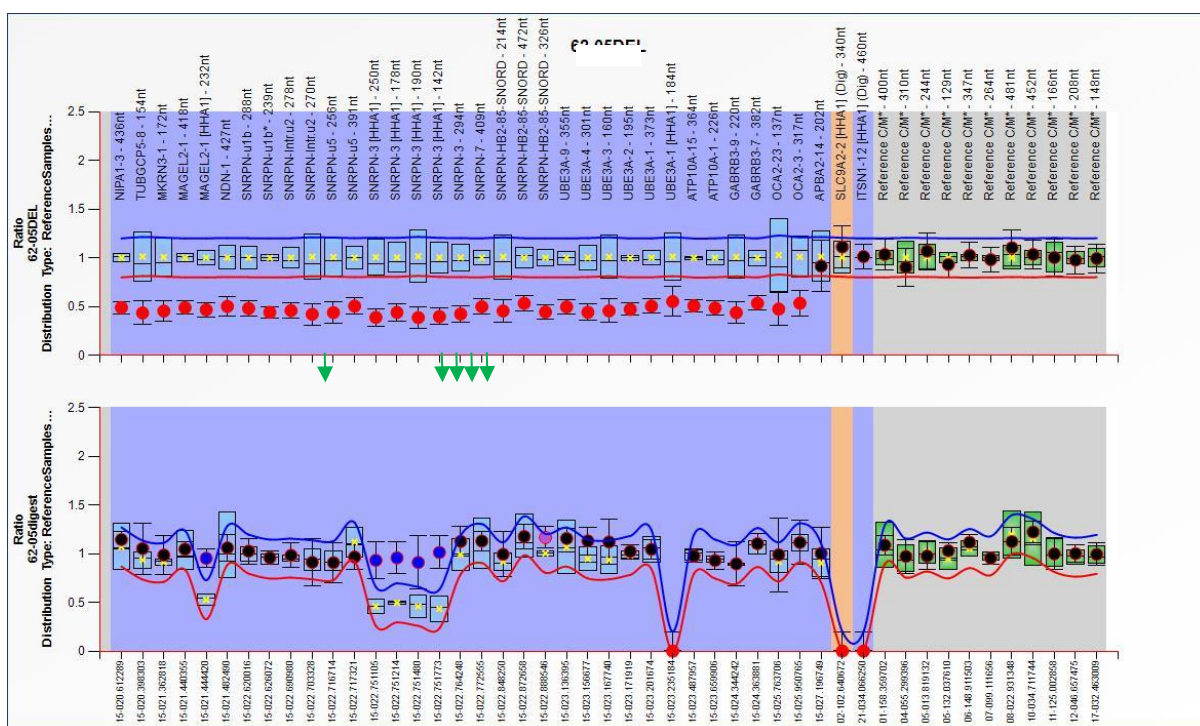


Figure 1 Aberrant hypermethylation in PWS case with type 1 deletion.

Gene dosage analysis shows a 50% reduction for probes (red dots falling from the threshold line) within the chromosomal region 15q11-q13 (from NIPA1 to OCA2, type I deletion), which indicates deletion in this case. The methylation analysis shows hypermethylation at all five methylation-specific probes (green arrows). The result confirms the diagnosis of PWS with the molecular cause of deletion within 15q11-q13 (type I deletion).

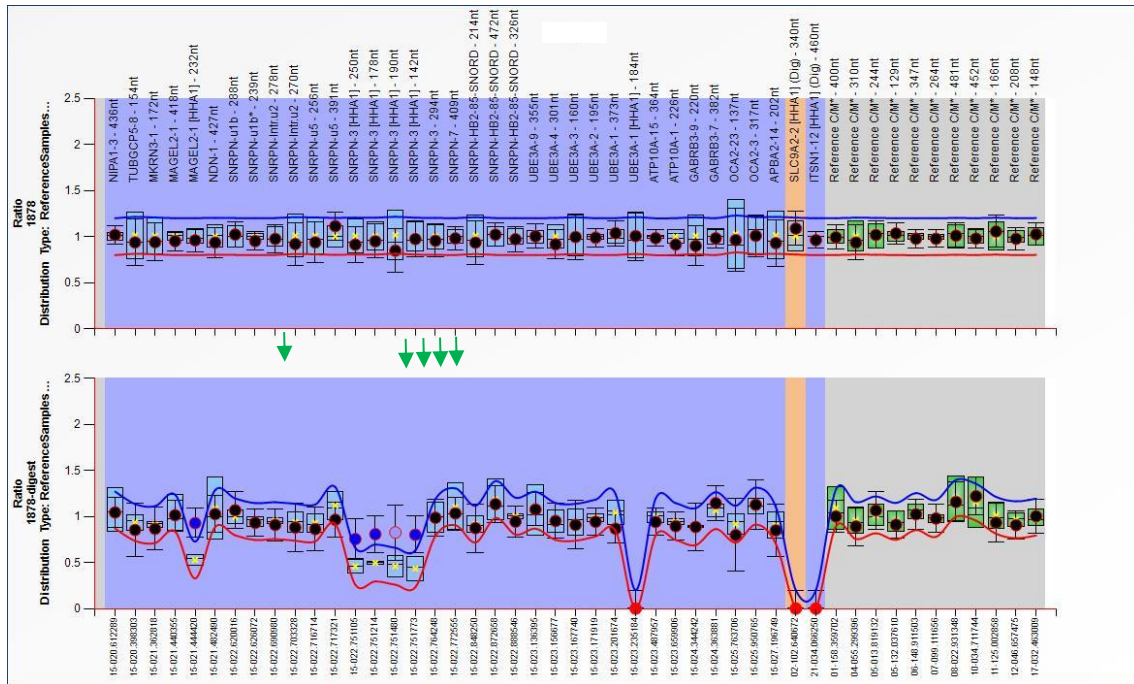


Figure 2 Aberrant hypermethylation in PWS case without deletion.

Normal gene dosage, but hypermethylation at all five methylation-specific probes (green arrows). This result confirms the diagnosis of PWS without deletion.

Table 1 Comparison of results from MS-PCR, FISH and MS-MLPA techniques.

Sample ID	MS-PCR result	FISH result	MS-MLPA result	
			Methylation analysis	Copy number analysis
1	PWS	No deletion	PWS	No deletion
2	PWS	No deletion	PWS	No deletion
3	PWS	No deletion	PWS	No deletion
4	PWS	No deletion	PWS	No deletion
5	PWS	No deletion	PWS	No deletion
6	PWS	No deletion	PWS	No deletion
7		PWS, with deletion	PWS	Deletion (T2D)
8		PWS, with deletion	PWS	Deletion (T1D)
9		PWS, with deletion	PWS	Deletion (T2D)
10		PWS, with deletion	PWS	Deletion (T1D)
11		PWS, with deletion	PWS	Deletion (T2D)
12		PWS, with deletion	PWS	Deletion (T2D)
13	-	No deletion	Normal methylation	No deletion
14	-	No deletion	Normal methylation	No deletion
15	-	No deletion	Normal methylation	No deletion

T1D, type 1 deletion; T2D, type 2 deletion

## Discussion

This study was undertaken to evaluate the concordance of the results of MS-MLPA with conventional techniques (MS-PCR and FISH) for the diagnosis of Prader-Willi syndrome in Thai patients. The MS-MLPA assay effectively demonstrates an aberrant methylation pattern indicative of PWS whether there is deletion or normal copy number, the same outcomes as seen in other studies (Nygren et al. 2005, Bittel et al. 2007, Dikow et al. 2007, Henkhaus et al. 2012, Brown et al. 2017). With its simplicity in the protocol, dual analysis of MS-MLPA offers an accurate genetic test in the diagnosis of Prader-Willi syndrome with an explicit deletion that can be used alternatively to conventional techniques like MS-PCR and FISH.

By using MS-MLPA, it is possible to determine whether there is type I or type II deletion, the two main subgroups of deletion in PWS. The difference between type I and type II deletion is the extension of the affected genes. Type I deletion is larger and involves more centromeric genes, including NIPA1, NIPA2, CYFIP1, and TUBGCP5 with approximate size of 6 Mb deletion. Type II deletion is smaller, around 5.3 Mb deletion, and not involves those genes mentioned earlier. These genes are implicated in the developmental and psychological problems because they are expressed in the central nervous system. However, further studies are still needed to see the impact of different deletion types in PWS phenotype. Butler et al. reported that PWS patients with type 1 deletion more neurological and behavioral problems than PWS patients with type II deletion (Butler et al. 2004). But Varela et al. founded no significant differences between both types of deletion (Varela et al. 2005). In Thailand, available genetic testing for Prader-Willi syndrome conventionally begins with FISH to look for a chromosome 15q deletion or MS-PCR to look for abnormal methylation consistent with Prader-Willi syndrome in terms of diagnosis. DNA methylation analysis (including MS-PCR and MS-MLPA) has a better percentage of detection of PWS cases than FISH, which only detects deletion, the most common causative molecular mechanism. Only 60-70% of PWS cases will be detected by FISH, whereas more than 99% of PWS cases will be detected by DNA methylation analysis according to test sensitivity (Cassidy et al. 2012). Therefore, if it starts with DNA methylation analysis, a higher proportion of PWS cases can be detected. However, MS-PCR cannot differentiate the disease mechanism. More than one test is needed to be performed to work this part out to further characterize the disease mechanism. A testing strategy often continues with deletion analysis to exclude deletion. If there is no deletion, UPD is the next workup step to see whether chromosome 15 is uniparental or biparental inheritance. The molecular cause is assumed to be an imprinting defect if the process of elimination has ruled out deletion and UPD.

The disease's molecular mechanism helps better understand the condition, and this information is for personalized management and counseling. The recurrence risk of PWS in the next sibling is typically less than 1% unless disease's mechanism is due to imprinting center deletion, the imprinting defect with DNA sequence change other than epimutation, which increases the recurrence risk to as high as 50%.

While MS-PCR cannot, MS-MLPA can give the information of deletion simultaneously with the analysis of methylation pattern. This information helps shorten the laboratory workup and save the investigation cost. In a resource-limited setting like in Thailand, the fewer test is required, the more cost-effective it is. Moreover, the sooner the confirmation of the diagnosis comes out, the quicker PWS patients can access appropriate management leading to better outcomes and prevention of preventable complications of Prader-Willi syndrome.

## Conclusion

DNA methylation analysis is the mainstay of the Prader-Willi syndrome diagnosis test conventionally done by MS-PCR. However, the information on the underlying molecular mechanism requires other tests to clarify. Dual analysis of the MS-MLPA test is beneficial in this aspect. It provides an accurate and less-complicated assay that can be used as a Prader-Willi syndrome diagnosis test with explicit deletion of affected genes. Deletion, the most common molecular mechanism of Prader-Willi syndrome, can be tested together with methylation status in one test, offering a robust method with more rapid results and shortening a genetic Prader-Willi syndrome workup in diagnosis confirmation and underlying molecular mechanism.

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## **An Analysis of Gendered perceptions towards English Swearing**

**Pattaraporn Sutthirat**

### **Abstract**

This study focuses on the area of exploration of profanity and gender in English language. The hypothesis was established in order to investigate the perspectives towards swearing when gender is considered. In terms of methodology, this research originally endeavors to approach quantitative data analysis. A set of questionnaire in English is established. The data was collected from university students in the UK both males and females in 2017. The survey is designed to distribute to thirty respondents in the UK by online questionnaire platform. Eventually, the results of the study show gender differences in terms of perspective towards swearing. In addition, it has been affirmed that swearing creates gender equality.

**Keywords:** profanity, gender, perspective, gender equality

### **Introduction**

Profanity, also known as swearing, cursing, bad language or foul language, can be described as a form of linguistic activity using taboo words to express the strong emotion. It is generally considered as offensive and impolite words. "Swear words serve many different functions in different social contexts," notes Janet Holmes (2013). "They may express annoyance, aggression and insult, for instance, or they may express solidarity and friendliness." However, the use of swear words sometimes creates problematic in terms of gender equality as many swear words in several languages involves in insulting female. As female reported as more conservative assessments of the appropriate when using profanity, male on the other hand reported that using profanity provides a demonstration of social acceptable and social power.

In world languages nowadays, swear words are widely being used by men and women. Swear words itself has prominent features in terms of linguistics. The function of swear words do not just only deal with only anger and frustration, they also deal with emotional states, such as surprise or happiness. This research will conduct and analyse the prominent data of swear words using in English language. The results received are expected to see participants' perception towards English swearing. It is anticipated that this research will reveal that swear words are related to gender equality. Furthermore, the usage of swear words are limited by gender as women are expected not to use bad language while men are be able to use bad language acceptably.

#### **Research aims and Objectives**

The purpose of this research is to explore and investigate perspectives towards swearing in English context. The focuses will be on swearing and gender equality in order to enhance the understanding of the relationship between swearing and gender, and to ensure that there is a double standard in swearing when gender is concerned.

## Literature Review

This part covers two main aspects which are swearing and swearing and gender.

### Swearing

Swearing, profanity, bad language or taboo words is a kind of speech used in everyday life which presented in every language. According to Ljung (2011) Swearing, also known as cursing can be described as the use of utterance containing taboo words to express strong emotion. Andersson and Trudgill (2007, pp.195-199) give the definition of swearing as the language use in which the expression : (i) refers to something taboo and defamed in the swearer's culture, (ii) can be used to produce strong attitudes and emotions, (iii) is not intended to be interpreted literally because most of the swearing words have non – literal meaning.

### The Themes

According to Ljung (2011), there are five major themes using in swearing including the religious/supernatural theme, the scatological theme, the sex organ theme, the sexual activities theme, and the mother (family) theme. In addition, there also two more classifications of swear words that are commonly found in English and other languages which are the prostitution theme and animal theme.

#### Swearing and gender

For decades, swearing has been engaged in everyday conversation by male and female. However, it has been assumed that swearing is dominant by male only. Moreover, women who swear are considered as deviant while swearing for men is normal. The roles of men and women as a result of social expectation is truly significant because most of the times men have foremost roles while women's role is to attribute, server or support men. The false assumption about male power over women still remains up to nowadays. Woman swearing seems to be a problem globally and cross-cultural as it negates the generalization that women should speak 'properly' (Holms, 2013). In addition, because men seem to have power in public domain, only men swearing is acceptable, while women are not allowed to express any kind of control because female power is exerted only on a private sphere (Knyzazyan, 2017). The inequality of gender using language is constantly problematic globally. According to Lakoff (2004), "[t]he decisive factor is less purely gender than power in the real world" Lakoff (2004), has explained that the key point of swearing and other features commonly associated with men. It does not mean that it was created to reserve for just only men originally because their genes decided to be like this. However, swearing is reserved for people who have power. So it is accidentally reserved for men as men generally are the one who exerts any kind of power in the society. Overall, this can be evidence proving that women's language is powerless and also may be the reason why swearing is not for women but it more preserves for men (Gauthier, n.d).

## Research Methods

As there is swearing in various languages, this study chose English as a delimitation. The data in the field of swearing and gender used and lightly analyzed in this study are largely from the previous research in forms of papers, books, and studies, generally, the study carried out by Timothy Jay (2008) and Ljung (2011)

### Hypothesis

To develop hypothesis, prior researches are conducted. Hypothesis has arisen from the idea regarding the fact that there is a double standard in swearing as a result of stereotype about women should being polite

when using language. However, in terms of linguistic behavior, Sherzer in *A Diversity of Voices: Men's and Women's Speech in Ethnographic Perspective* (1987) has claimed that Women seem to have more sensitivity to any linguistic norms as it is resulted in how women are more status conscious than men. Moreover, women are more likely to use correct linguistic forms than those used by men (Trudgill, 1983). In addition, in any society speech patterns manifest the traditional and social stereotypes of men and women's behavior and nature (Sherzer 1987). As a result of how society frames women, women still remain inferior when swearing.

### **Sampling**

Due to the questionnaire focuses on the experiences of the respondents regarding the use of swear words in English context, the data was collected from current University Students in the UK both males and females. The survey is designed to distribute to thirty respondents in the UK by online questionnaire survey rather than hard copy questionnaire as it is more convenient and less time consumed. After revising the questionnaire, the online survey platform was created by Google Form and carried out through the social media such as LINE application, Facebook, Facebook Messenger and WhatsApp for 2 weeks from 23rd of July to 6th of August, 2017.

### **Measurements**

#### **Questionnaire and Scale design**

The three questions are designed in order to investigate different gender respondents' perspectives towards women swearing, the tolerance of both gender towards men and women swearing, and the perspective towards six statements involving women swearing. Overall, all questions are made in order to investigate the hypothesis that there might be a double standard in gender uses of swearing.

#### **The limitations and future research**

##### **Limitations**

In the process of doing the research, generalizing the results of this study should be done carefully. Like in this research, some important dimensions were adopted. Only male and female are limited in gender options, some other factors such as occupation, social class, and education have not been investigated in this study. Moreover, in English context, participants needed to be native speakers because non-native speakers might not have the sense and the same perception as native speakers. However, it was difficult to recognize whether the respondent is a native speaker or a non – native speaker.

##### **Future Research**

Regarding the aforementioned limitations, the future research should include other significant variables that impact swearing including occupation, social class, and education of the respondents. Moreover, when talking about genders, there are apparently more than male and female. Thus, the future research should cover all genders. In addition, to investigate English swearing by native speakers, other types of methodology especially interview should be adopted.

### **Results and Discussion**

In this section, the significant findings of the results, as well as the discussion linked to the theoretical basis will be presented.

Table 1: The perspective from male and female respondents towards women swearing.

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<b>Women swear much more than men</b>	<b>Women swear more than men</b>	<b>Women swear as much as men</b>	<b>Women swear less than men</b>	<b>I don't know</b>
-	-	45	55	-

From the table, it is obviously seen that 45 % of both male and female respondents thought “women swear as much as men” while the majority of people (55%) thought “women swear less than men.”

Table 2: Tolerance of both genders towards men and women swearing.

	<b>Unacceptable</b>	<b>I don't like it</b>	<b>I don't feel comfortable</b>	<b>I don't mind</b>	<b>I like it</b>	<b>Depends on the context</b>
Men	3.3%	10%	20%	43.4%	-	23.3%
Women	6.6%	13.3%	33.3%	30%	-	16.6%

Table 2 shows the tolerance of male and female respondents towards men and women swearing. According to the table, majority of both male and female respondents don't mind if men swears (43.4%) while 10% had reported that they don't like it ,and only 3.3% of respondents reported that men swearing is unacceptable. Conversely when women swear, most male and female felt uncomfortable (33.3%), while some of them do not mind about it (30%). In addition, 6.6% of respondents had reported that women swearing is unacceptable.

Table 3: Perspectives towards statements involving women swearing.

	<b>Disagree</b>	<b>Neither agree nor disagree</b>	<b>Agree</b>
It is more acceptable to swear if you are a man.	30%	10%	60%
It is not appropriate for women to swear.	33.3%	16.7%	50%
Women swearing is not acceptable.	63.3%	16.7%	20%
People react differently when swearing and gender are concerned.	-	6.7%	93.3%
It is acceptable to swear with men rather than with women.	33.3%	23.3%	43.4%
There is a double standard as far as swearing and gender are concerned	-	20%	80%

The last table in this section illustrates perspectives towards statements involving women swearing. According to the table, it has showed that 60 % of respondents are agree that it is more acceptable to swear if the swearer are male. In addition, although 33.3% reported that they are disagree, 50 % of them are more likely to accept that it is not appropriate for women to swear. However, women swearing is still acceptable because there is only 20% of respondents that disagree with it. Moreover, most of respondents agree that when gender is concerned in swearing, people react differently. Next, when asking whether it is acceptable to swear with men rather than with women, 43.4% of respondents agree with it. Finally, 80% of respondents confirmed that there is a double standard in swearing when gender is concerned.

## Discussion

In the discussion part, the testing of hypothesis will be discussed. This will be followed by previous studies, theoretical basis and the results from the survey.

The perspective towards swearing when different gender is concerned will be observed to confirm that there is a double standard in swearing. According to the result shown in Table1 which depicts the perspective from male and female respondents towards women swearing, it is shown that the majority of respondents agree that women swear less than men (55%), while only 45% agree that women swear as much as men. In addition, the general observation from Table2 has shown the results regarding the tolerance of men and women towards swearing by both genders. From the table, it illustrates that the majority of respondents do not mind when the swearer is male, and also only small number of them feel like it is unacceptable. On the contrary, the majority of respondents do not feel comfortable when women swear. Although small number of them consider women swearing is unacceptable, some of respondents do not mind about this. According to the results presented in Table1 and Table2, it is correlation to Sherzer (1987) research that women still remain inferior in swearing as a result of the fact that women are framed to have sensitivity in linguistic norm and speech pattern. The result shows how people perceive men swearing as normal thing. Most of them do not mind when swearer is male. However, people have seen women swearing is unhealthy. Most of the respondents are not comfortable when swearer is female.

According to Lakoff (2004), the key point of swearing and other feature are originally associated to men as the matter of fact that swearing is reserved to people who exert power in the society. Therefore, swearing is accidentally reserved to men. This idea is supported by Gauthier (n.d, p.33) perspective that the role of men and women are a result of social expectation. The significant is that men always have foremost roles and have power on everything in public domain while women's role is only to support men. As a result from social expectation, swearing is more likely to be acceptable when the swearers are men. In order to confirm that there is a double standard in swearing, questionnaire presented in table 3 was designed to test hypothesis. According to the result presented in the table, it can be summarized that the majority of respondents agree that it is more acceptable if the swearers are men and it is acceptable to swear with men rather than with women. Although women swearing was considered as inappropriate, a number of respondents agreed that it is still acceptable. Moreover, most of respondents also agreed that people react differently when swearing and gender are concerned. Finally, it has been confirmed that there is a double standard in swearing. Therefore, what can be asserted with confidence is that the perception of swearing seems to be something that commonly associated

with gender. Due to the results shown in table 1, it has linked to Gauthier perspective that social expectation has set the role of men and women. Women swearing is still inferior in society because men have been being dominant in the public sphere.

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## The Influence of Classroom Interaction on Students' Innovation

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### Abstract

Innovation ability is one of the most important basic qualities that everyone should have in the knowledge explosion era. We should not only have the ability as teachers, but also cultivate students in education and teaching. Only when students have this ability can they study effectively. Students can develop their innovative consciousness into a thinking mode and promote the development of society. This paper briefly discusses the requirements of training and bringing up this kind of talents to teachers in school education, and preliminarily discusses the methods and ways of cultivating innovative ability in physics teaching.

**Keywords:** Cultivate the ability of innovation

### Introduction

In the context of the new curriculum reform, although the current classroom teaching has been greatly changed and improved, but there are still many problems in the reform of the classroom, especially in the classroom interaction, there are still many problems worthy of our attention. In our classroom, the interaction between teachers and students occurs frequently, the frequency of questioning and explanation between teachers and students is very high, and there are also discussions and demonstrations between students and students. However, in teaching, teachers pay too much attention to the transfer of knowledge, ignoring the stimulation of students' innovative spirit and the cultivation of innovative skills; they pay attention to the form of inquiry and lack of reflection on the content and process; the teaching interaction still stays at the level of behavioral interaction, involving less emotional interaction and thinking interaction; Students only respond mechanically under the control of teachers, and their thinking lacks autonomy, flexibility and creativity; the interaction between students is often trapped in form, and there is no real equal, harmonious and efficient interaction between teachers and students. Therefore, it is necessary to study the influence of university classroom interaction on students' innovation ability.

With the change of the times, the demand for talents is higher and higher. It has become a common concern of the international community and academia to strengthen the research on students' creativity, cultivate and cultivate creative talents. In the era of information economy and innovation economy, creative talents have gradually become an important infrastructure and a key factor of competitiveness for national and regional economic and social development. In today's knowledge economy society, education plays an increasingly important role in promoting social development. School education is the most important way for students' growth and development, and the teaching process is an interactive process of communication and common development between teachers and students.

In the process of teaching, teachers not only need to deal with the relationship between imparting knowledge and cultivating ability, but also need to pay attention to the cultivation of students' unique creativity.

The final results of classroom interaction will be reflected in the students' classroom learning effect, and innovation ability is the most important aspect of students' classroom learning effect. Therefore, classroom interaction is not only conducive to the improvement of classroom teaching quality, but also conducive to the harmonious development of students' body and mind and the improvement of innovation ability.

This paper believes that it is necessary to make an investigation on the current situation of classroom interaction and students' innovation ability in junior high school. By observing the situation of classroom interaction in junior high school, the problems existing in the interaction are found. By using quantitative mathematical method and qualitative case method, the correlation between classroom interaction and students' innovation ability is analyzed, so as to put forward more reasonable and effective classroom interaction strategies.

On the basis of combing and analyzing the current situation of classroom interaction and students' innovation ability in compulsory education university stage, combined with the actual situation of C University, this paper constructs the basic elements framework of this study. According to the indicators listed in the research framework, this paper investigates, summarizes and analyzes the classroom interaction and students' innovation ability of some classes in C University, and comprehensively uses the methods of mathematical and case empirical research, and finally obtains the relationship between classroom interaction and students' innovation ability in C University, aiming to explore the effective ways and advantages suitable for C University to improve students' innovation ability through classroom interaction Far mechanism.

The main contents of the thesis include reading and analyzing a large number of documents, and the actual investigation and data research, and finally completing a paper reaching the standard.

The data collection mainly comes from several aspects, first, collecting the literature through the library; the second is collecting the relevant information through the network; the third is to use the author's existing literature books.

This paper mainly focuses on the class interaction and students' innovation ability in C University from grade 6 to grade 9. The questionnaire survey randomly selects 2-3 classes according to each grade, and 1-2 teachers are randomly selected according to each grade. The specific situation of the questionnaire survey is as follows: 320 questionnaires were distributed this time; 320 questionnaires were recovered, the recovery rate was 100%; among them, 306 were effective questionnaires, and the effective rate was 95.6%.

## **Theories and Related Researches**

### **Theories**

The research of this paper is mainly based on several basic hypotheses, which show the position and attitude of this study, the scope and object involved, and the theoretical methods adopted. The details are as follows:

Hypothesis 1: the questionnaire designed in this paper is the students of C middle school. It is assumed that the survey group can reflect the basic situation of all students in the middle school about their classroom interaction and innovation ability.



Hypothesis 2: the coverage of junior high school students' innovation ability is also wide, this paper uses the quantitative evaluation method. This paper mainly quantifies the innovation ability of junior high school students from three aspects: Students' innovative consciousness, innovative skills and innovation foundation. Hypothesis 3: several modes of classroom interaction, namely, classroom explanation, classroom questioning, classroom discussion and classroom presentation, are correlated with students' innovation ability. When analyzing the correlation between the two, other factors are not considered for the moment.

### **Related Researches**

In this paper, classroom interaction as an independent variable of the first level indicators, including classroom questioning, classroom discussion, classroom explanation and classroom display four secondary indicators; students' innovation ability as the dependent variable of the first level indicators, including innovation awareness, innovation skills and innovation foundation three secondary indicators. Using the methods of literature research, investigation and empirical analysis, the questionnaire and interview outline are designed according to the index system, and some students in C middle school are taken as samples to carry out the investigation.

### **Methodology**

In this paper, classroom interaction as an independent variable of the first level indicators, including classroom questioning, classroom discussion, classroom explanation and classroom display four secondary indicators; students' innovation ability as the dependent variable of the first level indicators, including innovation awareness, innovation skills and innovation foundation three secondary indicators. Using the methods of literature research, investigation and empirical analysis, the questionnaire and interview outline are designed according to the index system, and some students in C middle school are taken as samples to carry out the investigation.

### **Research Results**

Through combing statistics and case studies, this paper analyzes the influence of classroom interaction mode on students' innovation ability, and puts forward corresponding improvement suggestions. The research work and achievements contribute to the further development of classroom interaction mode, and also provide reference for the research and practice of classroom interactive teaching in middle school.

### **Conclusion**

In short, there are methods in teaching, but there is no fixed method in teaching, and there is no end to teaching. In terms of how to cultivate students' innovative thinking, there is no mode to go. The key is to think, explore, research and summarize ourselves, so as to achieve our expected purpose and effect, and make a large number of talents with innovative thinking ability stand out, so as to make our education develop vigorously.

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## Using Problem-Based Learning Strategy to Enhance EFL Students' Speaking Fluency

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### Abstract

The objectives of this study were to investigate the effect of using PBL strategy to enhance English speaking fluency and to investigate the students' opinions toward the use of PBL in classroom learning. The study was quasi-experimental design with a quantitative data analysis. The fifteen eleventh grade participants studying in English major at Setthabutbampnen School were selected by purposive sampling. The instruments of the study included lesson plans, pre and post speaking tests, interview questions, and student learning logs. The pre-test and post-test were given at the beginning and at the end of the experimental period. The aim was to measure the students' speaking fluency by comparing the total mean score of the pre and post speaking tests which analyzed on four speaking components: speech rate (SR), pause rate (PR), disfluent syllable (DS) and mean length of run (MLR). During ten weeks of the experiment, the participants were required to submit the learning log after the class twice a week. At the end of the study, the students were interviewed individually. The interview included ten questions and they were designed on three aspects: acceptance, usefulness, and suggestion. The comparison of the average mean scores between the pre and post speaking tests showed that students' speaking fluency had developed after the use of PBL activity at the level of .05. The students also had positive opinions toward PBL activity. They were satisfied with PBL classroom activity and would like to join the activity in the future.

**Keywords:** Speaking fluency, Speaking components, PBL activity, Students' opinions

### Introduction

English language is a global lingua franca with international use across cultures (Mastin, 2011). This indicates that the expanding circle of English speaking countries such as China, Denmark, Indonesia, Iran, Korea, Sweden, including Thailand is growing up (Nordquist, 2019). In Thailand, people use English for different purposes such as studying, working, advertising, communicating on social media, talking with foreigners, giving information, giving directions, and traveling. Because of these reasons, all Thai students are required to study English at schools to get basic skills as stated in the Basic Education Core Curriculum 2008. However, many high school students are not able to communicate in English fluently (Miao, 2011). For speaking, several factors make it difficult for Thai EFL learners. Juhana (2012) found that shyness, anxiety and lack of confidence and motivation strongly contribute to difficulty in speaking English. Initially, the difficulty level for each student is different. It depends on their background knowledge and experience of using English. As supported by Noomura (2013), there are some plausible explanations for this issue. First, many Thai students do not have enough exposure with the English language. Second, they lack opportunities to practice and use English outside their

classrooms. Third, they do not have enough skills in English as they often translate from Thai to English. All of these make them afraid of making mistakes and it is not easy to develop speaking fluency.

Fear of making mistakes when speaking English is one of the problems that Thai students are facing (Boonyaparakob et al. 2015). It is a part of language anxiety occurring when students have to perform a task in a target language which they are not yet proficient (Gardner and MacIntyre, 1993). This is the result from insufficient of English exposure which decreases speaking confidence. Chinpakdee (2015) revealed that Thai students experienced apprehension when they had to speak English without preparation. They concerned about failure of their performance and classroom expectation. As supported by Akkakoson (2016), a feeling of test anxiety and fear of negative evaluation significantly affect Thai students' speaking performance. Similarly, Bangkok Post (2017) reported that many English major students from a provincial university had good records in reading and writing; nevertheless, they were shy and tried to avoid speaking in English because they feared of making mistakes (Bunyamanee, 2017). Therefore, many Thai students prefer to be quiet whenever their teachers ask them something in English.

To engage students in English speaking, especially for fluency, teaching techniques and classroom activities play important roles (Khamprated, 2012). When a teacher knows what factors affect negatively on students' speaking achievement, it is the teacher's job to decrease those factors and help the students develop their English speaking fluently. However, the teaching techniques and classroom activities that the teacher brings to a class should support the students' background and their English proficiency level. If the English proficiency is lower than a task, the students will have more anxiety. On the other hand, if the students' English proficiency is higher than the task, it is not a good challenge. The students will be bored and do not want to participate the task. The best way is to provide a fine balance between the challenge of task and the student ability. On this way, the students can naturally enjoy the challenge of task and develop both knowledge and skills in the flow because the ultimate learning focus comes from intrinsic motivation (Csikszentmihalyi, 1990). Presently, the appropriate speaking activities for high school students should be meaningful and useful for real life as the essence of teaching 21st century skills. Hanover Research (2011) examined a crosswalk of 21st century skills from six different frameworks and found that there are four certain core competencies for development: (1) collaboration and teamwork, (2) creativity and imagination, (3) critical thinking, and (4) problem solving. These four competencies are required on the Basic Education Core Curriculum of Thailand (The Ministry of Education, 2008) and also lead to the main focus of teaching in 21st century that encourages students to "learn to develop their own ideas, test and share those ideas, and take input from teachers and peers to further develop their ideas" (Prettyman et al. 2012, p. 11). This type of teaching and learning is reflected in Problem-Based Learning.

Problem-Based Learning (PBL) is a student-centered strategy that constructs new knowledge by creating an environment with authentic problems to drive learning process (Barrell, 2007, Klegeris and Hurren, 2011). This strategy was created by John Dewey, an American scholar, and was officially introduced in the 1960s at McMaster University Medical School, Canada. It is a strategy that involves collaborative, constructivist, and contextualized learning and employing real life problems to set up, motivate and boost on knowledge construction (Ribeiro, 2011). Initially, it was mainly used in medical education and subsequently expanded to other fields (Hallinger and Bridges, 2007). PBL strategy has many benefits for classroom teaching: (1) giving

students an active role, (2) minimizing an over-dominant role of teachers, (3) promoting self and peer assessment, (4) promoting students' critical and creative thinking, (5) associating learning to real world problems, (6) developing knowledge in the long term, (7) enhancing students' motivation and interpersonal skills, and (8) increasing opportunities to communicate and work freely in group (Savery, 2006, Li, 2013). All of these are strong reasons for teachers to apply PLB strategy in classrooms and discover how it work with students.

PBL has been widely used across different subjects and disciplines since it was introduced (McConnell et al. 2013). Duch, Groh, and Allen (2001) explained that PBL strategy can be adapted to any subject area. Nevertheless, the implications of this strategy in the area of English as a foreign language teaching is insufficient (Aryanti and Artini, 2017, Le, 2018). Most research on PBL in Thai educational context focused on mathematics, computer, nursing and science subjects (Phumee, 2012, Chidnayee, 2018). It is rare for language teaching. It will be beneficial to conduct a study to investigate how PBL strategy affects speaking fluency of Thai EFL students.

### **Research Objectives**

The aims of this research were as follows:

1. To investigate the effect of using PBL strategy to enhance English speaking fluency.
2. To investigate the students' opinions toward the use of PBL in classroom learning.

### **Research Questions**

1. What is the impact of PBL on the students' English speaking fluency?
2. What are the students' opinions toward PBL?

### **Literature Review**

#### **PBL and 21st Century Skills**

In language teaching, PBL environment can promote 21st century skills which are necessary for the real life situations (Christiansen et al. 2013). The main focuses for this section are critical thinking and problem solving, collaboration and teamwork, and communication.

The most important idea of PBL is to teach students to learn "how to think" critically. This idea is a concept of student-centered strategy which aims to push students develop their own knowledge and skills (Vega and Brown, 2013). This concept is deeper and more sustainable that students can transfer to new situations in their lives. According to Morrison (2015), PBL has been developed to "emphasize on higher skills like critical thinking, creativity, and problem solving which necessary for everyday life more than lower level skills like memorizing facts and repeating procedures" (p.245). This is similar to the goal of the current educational reformer. Therefore, applying PBL as a learning environment has the ability to lead students to reach that goal. Through the implementation of PBL, collaborative learning and teamwork play a great role. Students have to work in small groups of five to fifteen and new knowledge is acquired through cooperative learning (Wilkerson, 1996). Students are assigned to learn from the world's situations by helping each other. Each one has responsibility in team which they can be active and autonomous. On this way, Hill (1990) and Cooper (1997)

states that collaborative learning has a strong positive effect on learning outcomes and subject matter such as deeper understanding of subject, enjoyable learning, leadership skills and positive self-esteem.

Moreover, PBL also promotes communication skill. Collaborative learning and problem solving in team automatically foster better communication, especially in speaking. To construct knowledge or problem solution, students need their group discussion and brainstorming (Nadarajah et al. 2016). After self-directed session, each group member joins a discussion. They have a chance to share, review, negotiate, and debate among themselves on what they discover from individual problem solving. During the interaction that students take turn to deliver information, they also develop speaking and listening skill and get new vocabulary (Abraham et al. 2014).

All in all, the implementation of PBL to classroom gives an opportunity for students to develop these practical skills altogether. During the learning process, each skill are related and supports each other. Students need to activate all of them as a medium to generate new knowledge.

### **Advantages of Using PBL for Language Learning**

PBL offers many benefits for language learning achievement. First of all, PBL highly promotes collaborative, constructivist, and contextualized learning. Students work in groups and employ real-life problems to set up, motivate and boost on knowledge construction together (Tan, 2003, Ribeiro, 2011). According to Coffin (2013), PBL learning process gives opportunities to have meaningful interaction as students are focusing on real-world issues and problems. Second, a PBL classroom activates self-directed learning atmosphere among students in which each one works individually to get possible solutions before sharing the ideas to their groups. PBL also supports self-regulating learning cognitive processes for example planning and analyzing the problem, examining the solutions, modifying and reflecting the solutions. In addition, PBL also improves language skills even though it is implemented in content-based courses (Tan, 2003). Students may improve their speaking skill when they have a reason for communicating their ideas freely to solve the problem or give other classmates some information they need. Similarly, Karyuatry (2014) observes a significant improvement in fluency and accuracy of students in Malaysia which are ESL learners. They are not afraid to make mistakes and they finally reach the required level for their grade. Therefore, PBL becomes one of the useful teaching strategies to facilitate the students to speak the target language and gradually have skills of life-long learning because they are naturally pushed to involve in the real life situation.

## **Methodology**

### **Population and Participants**

The population of this study was 150 eleventh grade English major students at Setthabutbamphen School. The participants were 15 eleventh grade English major students in the first semester of academic year 2020. All of them were selected via a purposive sampling method. They are relatively at the same English proficiency level. All of them passed the Foundation English and the English for Communication courses from the seventh to tenth grade.

## **Research Instruments**

### **1. Lesson plans**

The researcher selects language functions from the Basic Educational Core English Curriculum 2008 (Ministry of Education, 2008) that are relevant to course objectives. Four lesson plans are based on the following topics: Living in the City, What do I need to do?, Going shopping and Different Jobs. In each lesson plan, PBL activities were integrated to suit each topic. Experts in English language teaching and learning were invited to examine the lesson plans in terms of the content correctness, and the content relevancy to the course objectives. Each lesson plan covered 2 periods (50 minutes in each period). The teaching process was based on six steps: (a) warming up, (b) presentation, (c) individual problem solving, (d) group brainstorming, (e) communication, and (f) application (Uarattanaraksa, 2007). The classroom activities correlated teaching speaking principles: pre-speaking, while speaking, and post speaking.

## **2. Speaking Tests**

The speaking tests include a pre-test and a post-test. They were designed to assess students' English speaking fluency. The focus is on SR, PR, DS and MLR. The pre-test took place in the first week of the course and the post-test was given at the end of the study. The tests were based on concepts adapted from Mairi (2016). Each test consists of five optional topics. Three experts in English language teaching examined the content validity of the tests using the Index of Item-Objective Congruence (IOC). The topics were revised based on their comments. All speeches were recorded. The students did the tests individually. They were not allowed to talk to their friends, use a dictionary, a mobile phone, or a textbook. The students' speeches in the pre-test and the post-test were analyzed with the wave form by using three computer software which are Cool Edit Pro Version2 (free trial), Syllable and Disfluency Counter (free application), and Microsoft Excel. Then the result from the pre-test and the post-test were scored base on the criteria adopted from Jong and Hulstijn (2009). Three qualified English teachers rechecked the scores before analyzing statistically by using matched pair T-test. The qualified teachers were selected based on English teaching experience in EFL context at least five years and certificate of English education or English major.

## **3. Interview**

At the final week of the study, all participants were interviewed with ten questions: 1) What do you like most about the class activities?, 2) What don't you like about the class activities?, 3) Do you think the assignment is too difficult for you? How?, 4) Do you prefer working in group with friends or just working alone? Why?, 5) How does your group help you in the class activities?, 6) Do you have more opportunities to speak English in class?, 7) Do you think you can speak English more fluent than last semester?, 8) How do you feel when you speak English in class?, 9) What do you actually get from speaking practice in the class?, and 10) Have you got any suggestions on the teaching technique? The questions were provided by the researcher in order to obtain information regarding students' opinions toward the use of PBL strategy in the classroom on three aspects: acceptance, usefulness, and suggestion. Content validity and the correctness of language use were assessed by three experts using the Index of Item-Objective Congruence (IOC). The experts rated each question individually to evaluate whether the questions do or do not measure specific objectives by giving the question a rating of 1 (for clearly measuring), -1 (for clearly not measuring), or 0 (for unclear measuring) for each objective (Turner et al. 2002). The acceptable questions must have a value of .50 or higher.

#### **4. Student learning log**

Daily after class, the participants were required to reflect their personal feelings independently on what they learned and how they learned. The learning log includes six questions and it has been adapted from ESOL Online (2018) as follow: 1) What did I learn in class today?, 2) What skills did I practice today?, 3) What did I find interesting?, 4) What questions do I have about what I learned?, 5) What do I need help with?, and 6) What connections did I make to previous ideas of lessons?

#### **Data Collection**

At the first week of the study, each participant took a pre-test. They were given 5 optional topics based on the Basic Educational Core English Curriculum 2008 (Ministry of Education, 2008). They were asked to choose only one topic. They had approximately 10 minutes of preparation before delivering a short talk for two minutes. Their performance were recorded. After that, the recordings were analyzed on four components; SR, PR, DS and MLR. During the second week until the ninth week, the participants were assigned to write down their feelings and other information they wanted to express on the learning logs. They were required to submit their reflection daily after class. At the final week of the study, the participants were asked to take a post-speaking test. They followed the same procedures as in the pretest. Then they were interviewed individually to get their opinions after learning through PBL. The participants' opinions were recorded to analyze qualitatively.

#### **Data analysis**

To evaluate the speaking fluency, the researcher analyzed data in three main steps. At first, the speeches in the pre-test and the post-test were analyzed with the wave form by using three computer software which are Cool Edit Pro Version2 (free trial), Syllable and Disfluency Counter (free application), and Microsoft Excel. The main focus of this step is to measure SR, PR, DS and MLR. The researcher adopted the method from Stockdale (2009) and Sawyer (2010) as follow:

**Speech Rate (SR)** The researcher divided the number of all syllables by the total time of speech in seconds and multiplied the result by 60 to calculate speech rate in syllables per minute. At the normal state, an adolescent or adult can produce 162–230 syllables per minute. It's a standard fixed by Tennessee Department of Education Fluency Resource Packet (2009:24). In this case, the pruned syllables and all disfluencies are not included.

**Pause Rate (PR)** To calculate pause rate, the researcher included all corrections, repetitions, pauses and filled pauses with non-lexical utterances such as emm, uhm, err, and eeee. All of them were divided by the number of seconds, and then multiplied by 100.

**Disfluent Syllable (DS)** Disfluent syllables include fillers, errors, and repetitions. To calculate disfluent syllables per minute, the total disfluencies is divided by the total number of syllables. Then multiplied by the total time in seconds.

**Mean Length of Run (MLR)** The purpose to measure mean length of run between pauses and other disfluencies is to estimate the average length of speech without interruption. The researcher subtracted the total number of syllables by the number of pauses longer than 0.3 seconds and other disfluencies. Then the result was divided by the normal amount of syllables per minutes. For this study, the total time of speech sample is 2 minutes.



Next, the researcher calculated mean score of four speaking fluency components which the maximum score is 100. The result from both tests were rechecked by three qualified teachers. Then, the pre-test and post-test scores were statistically analyzed and compared by using matched pair T-test in order to obtain descriptive statistics; mean and standard deviations.

After that, the interview responses and all of learning logs were analyzed by using qualitative content analysis in order to obtain the participants' opinions toward PBL activity.

## Results

The results were separated into two parts according to the two research questions.

Research Question 1: What is the impact of PBL on the students' English speaking fluency?

Table 1 and Table 2 show descriptive statistics which analyzed by SPSS program (free trial version) on four speaking components; SR, PR, DS and MLR. These two tables provide the answer for the first research question about how PBL activity impact on the students' English speaking fluency.

Table 1 Descriptive Statistics of the Pre-test and Post-test Scores of Four Components

Speaking Fluency Component	N	Mean	Std. Deviation
SR pre-test	15	50.58	15.38
SR post-test	15	53.29	16.02
PR pre-test	15	58.39	9.29
PR post-test	15	61.83	7.51
DS pre-test	15	84.24	8.09
DS post-test	15	84.97	7.76
MRL pre-test	15	64.38	13.25
MRL post-test	15	66.45	13.90

As shown in Table 1, the average mean score of the post-test on each component has increased. The highest mean score was disfluent syllable (DS) which was 84.97 (S.D. = 7.76). The second was mean length of run (MLR) which was 66.45 (S.D. = 13.90). The next was pause rate (PR) which was 61.83 (S.D. = 7.51) and the last one was speech rate (SR) which was 53.29 (S.D. = 16.02). Below is the Table 2 which presents the overall scores of the pre-test and post-test.

Table 2 Descriptive Statistics of the Pre-test and Post-test Scores (Overall)

Speaking Test	N	Mean	Std. Deviation
Pre-test	15	64.40	9.85
Post-test	15	66.64	9.90

As shown in Table 2, the average mean score of the pre-test was 64.40 (S.D. = 9.85) and the post-test was 66.64 (S.D. = 9.90). The result presents that the average mean score of the students' speaking fluency

has increased. Below, the average mean score of pre-test and post-test were statistically compared by using the match paired t-test.

Table 3 The Comparison of Paired Differences via T-test

Paired Differences				df.	Sig.	
Test	Mean	Std. Deviation	95% Confidence Interval of the Difference		(2-tailed)	
			Lower	Upper		
Post-test – Pre-test	2.24	1.64	1.33	3.15	14	<.001

As presented in Table 3, the analysis aimed to examine the effect of before and after the implementation of PBL strategy to enhance students' speaking fluency. The results showed that the students' speaking fluency was significantly improved after using PBL activity. This table shows a significant between the average mean scores of the pre-test and the post-test at the p value of <.001.

**Research Question 2: What are the students' opinions toward PBL?**

To answer the second research question, the individual interview with ten questions was conducted at the last week of the research. In order to avoid bias on students' opinions, the researcher invited another English teacher who teaches the same group of students to interview the participants and record their speeches. Below the interview responses from each question were analyzed on three aspects. Each response was categorized and presented with percentage.

**Acceptance on PBL Class Activities**

The results revealed positive responses on PBL classroom activities. During the study period, all participants had their favorable activities. Group activity was the most favorable thing for them (53.33%). Some of them enjoyed fun activity (13.33%), conversation (6.67%), presentation (6.67%) and also all class activities (13.33%). During the experimental period, most of the participants did not have any activity that they do not like (93.33%). Many of them also agreed that the assignment was not too difficult (73.33%). These results highly supported the acceptance on class activities.

**Usefulness of PBL on Speaking**

All participants revealed that they had more opportunities to speak English in class (100.00%). They also considered that their speaking skill has been improved to be more fluent than last semester (100.00%). However, their speaking performances are at different levels and still need to improve. The majority of participants had positive feelings when they had to speak English in class (67.67%). The feelings which they expressed in the class were good feeling, happiness, fun, and excitement. The participants stated that they could improve speaking skill (80.00%), get new vocabulary (60.00%), increase confidence (20.00%), and get new knowledge (13.33%) from speaking practice.

**Suggestions**

Some of the participants expressed their suggestions (60.00%) to ensure that they were satisfied with the class activities and wanted to have similar teaching technique again as they stated below:

S2: "I want to have group work again later."

S9: "I feel good with the activities. I hope to have more next semester."

According to the learning logs, the participants mentioned the issue that they learned in the class. The majority part was communication skill especially on speaking and listening (41.43%). Speaking was the skill that they practiced most often (46.40%). Many of them informed that group activities and group presentations were interesting. Their answers pushed up these topics to be on the top of their interests (51.52%).

However, during the class, they mainly asked about word meaning, word spelling, and pronunciation (62.30%). This is reasonable to make word pronunciation and meaning became the main things they asked for help (25.00%). At last, many participants stated that speaking skill and speaking expressions were the main issues that they could connect to their previous experiences (31.81%).

With regard to the result from student learning log, it is highly supported the result from the interview. This can be suggested that students had good opinion and meaningful experiences during the class activities.

## Summary Discussion

Research Question 1: What is the impact of PBL on the students' English speaking fluency?

According to the previous chapter, the study has revealed that the students' English speaking fluency has increased after the use of PBL activity. The results demonstrate that the mean scores and standard deviation of the students' post-test which evaluated on four speaking components; SR, PR, DS and MLR were higher than those of the pre-test. Additionally, t-test dependent indicates that the students' mean scores have increased from 64.40 at the beginning to 66.64 at the end of the study. The result presents that the students' speaking fluency is significantly increased at the level of .05.

In summary, the quantitative evidence suggests that the use of PBL activity has some positive impact on the students' speaking fluency. Such finding appears to resemble the study of Karyuatry (2014) which also found that applying PBL activity in English teaching had a positive influence on the students' speaking abilities in terms of speaking fluency. Students were more active to speak in class participation. In similar vein, Khotimah (2014) presented that the use of PBL activity in an EFL classroom helped students to improve speaking proficiency. The students' speaking fluency had increased after using PBL activity. They were also able to produce better performance in terms of vocabulary and pronunciation.

Based on the results of this study, it can be argued that PBL strategy could develop a positive impact on speaking fluency on four aspects; SR, PR, DS and MLR.

## Research Question 2: What are the students' opinions toward PBL?

The results of the second research question presents that the students had positive opinions toward PBL strategy in terms of acceptance and usefulness of PBL activities in English learning achievement according to their responses on the interview and learning log.

To further elaborate, based on the interview analysis, the overwhelming majority of students express the answers on a positive way that PBL activities really benefit them. Group activity is the type that they are most satisfied and the assignments are at the appropriate level for them. The students clearly show that they prefer working in group more than working alone. When they are engaged in collaborative learning environment, group members could support each other, boost up their confidence, work together, assist in making decision,

give positive feeling to each other, and solve problems which is the main focus of PBL strategy. For speaking practice, all of the students strongly evaluate that they have more opportunities to speak English and they feel that their speaking ability becomes more fluent than the previous semester. This makes most of the students feel positive when they speak English in class. Furthermore, the students reveal that they get speaking improvement, new vocabulary, new knowledge and more confident in themselves.

Based on the student's learning log analysis, in terms of the usefulness, the students also reveal to support the results on the interview. They can develop communication skill especially on speaking and listening, get new vocabulary and grammar, acquire new knowledge during the class, and also relate to their previous experiences. PBL activity gives them opportunities to practice communication skills, computer skill, critical thinking, collaborative learning and team work which are the main focuses of PBL and 21st century skills. In terms of acceptance, the students ensure that PBL activity includes group activities, group presentations, individual tasks, knowledge, and speaking practice are interesting for them. With regard to the results of this study, it can be argued that the students have positive opinions toward the use of PBL activity.

The results appear to reflect the statement made by Vega and Brown (2013), who state that PBL is the idea to teach students to learn "how to think" critically and aims to encourage students develop their own knowledge and skills. Through PBL learning process, collaborative learning and teamwork play a great role. Students have to work in small groups of five to fifteen and acquire new knowledge through cooperative learning (Wilkerson, 1996). Based on this learning environment, Hill (1990) and Cooper (1997) state that collaborative learning like a group activity has a strong positive effect on learning outcomes and subject matter such as deeper understanding of subject, enjoyable learning, and positive self-esteem. In addition, it is also supported by Nadarajah, et al. (2016) who mention that collaborative learning and problem solving in team automatically foster better communication, especially in speaking. Building on the evidence, a study conducted by Khotimah (2014) found that enjoyed PBL activities. The finding of this study is similar to those of Karyuatry (2014), Aryanti and Artini (2017). The researchers did the studies on high school students' speaking ability and students' views toward PBL. They found that the students had positive views because PBL activities could help them to create collaborative learning environment to develop speaking skill and acquire knowledge.

All in all, reflect to the analysis of this study, it can be concluded that PBL activity has positive impact in a speaking classroom. Students are able to develop their speaking fluency during the learning process. Furthermore, the students have positive opinions toward the use of PBL activity.

#### **Limitations of the Research and Suggestions for Further Studies**

Similar to all other research, this study is open for the improvement in several ways. Here are some of those considerable aspects:

First, this study is mainly focus to investigate the effect of using PBL strategy to enhance English speaking fluency and students' opinions toward PBL. It is limited only one component of speaking ability. Further studies could also analyze on some other aspects. For example, it can be include both speaking fluency and accuracy.

Second, the participants of the study were limited to 15 eleventh graders and there was only one group because the researcher designed to analyze results from three instruments which are per-and post-test, in-depth interview, and student learning log. It is quite complex to analyze. Due to the small number of the

participants involved in the study, it might be inaccurate to claim the results in order to generalize other populations outside. The results of this study still need to be substantiated with a wider range of participants. Further studies could possibly involve more than one group of participants at the same level, they are from different majors. On the other hand, the studies can be conducted to compare the results on different levels of participants such as primary, secondary, or college level to confirm the effect of PBL activity. In addition, it is possible to change research instruments or provide more such as observation form and questionnaire.

Next, the descriptive data analysis focuses on the comparison of pre-test and post-test scores. Instead of focusing only at the beginning and the end of data collection, the ongoing process of measurement including classroom participation, unit quiz or classroom activities should be taken into account for further studies to evaluate the students' development during the semester.

Last, the length of the data collection was only 10 weeks. Actually, it was not a long period to measure speaking ability. Further studies should extend the length of data collection to thirty weeks (the period of an academic year) or more to confirm the result of the study.

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## Extraction and Evaluation of Anti-inflammatory Effect of Aloe Gel Extract

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### Abstract

Photodamage is caused by ultraviolet (UV) exposure that promotes an expression of cytokines such as interleukin 1 (IL1), epidermal growth factor (EGF), and tumor necrosis factor alpha (TNF- $\alpha$ ). Recently, Aloe vera has been reported to suppress the level of TNF- $\alpha$ . Thus, the preparation of aloe gel extract (AGE) and its anti-inflammation have been performed in this study. An extraction showed that AGE provided approximately 0.6% of yield. Aloe-emodin content in AGE was calculated to be  $17.0 \pm 3.6$   $\mu\text{g/g}$  of lyophilized extract using high performance liquid chromatography (HPLC). Cell viability of AGE upon raw 264.7 cell was studied by colorimetric assay with no cytotoxicity up to 200  $\mu\text{g/mL}$ . The anti-inflammatory activity was then evaluated by enzyme-linked immunosorbent assay (ELISA) at a concentration of 200  $\mu\text{g/mL}$  and demonstrated anti-inflammation through the inhibition of TNF- $\alpha$  in LPS-induced raw 264.7 cell. These results suggest that AGE could be an alternatively natural ingredient in anti-photoaging products.

**Keywords:** Aloe vera, Aloe-emodin, Anti-inflammation, Anti-photoaging

### Introduction

Skin aging is a degenerative process that relates with skin and the skin support systems including the bone, cartilage and subcutaneous (Draelos, 2006). Generally, there are two types of aging. Aging caused by internal physiological factors is called intrinsic aging. The other major type is known as extrinsic aging caused by environmental factors such as sunlight exposure, pollution, smoking, facial expressions, and sleeping positions that lead to premature aging (Sjerobabski-Masneć & Situm, 2010).

Premature aging or photodamage is caused by ultraviolet (UV) exposure depending on the degree of UV exposure and skin pigment. People who have outdoor lifestyles and are slightly pigmented will encounter the higher degree of premature aging (Fisher et al., 2002). UV exposure can induce huge effect to the skin involving the generation of reactive oxygen species (ROS) that include hydroxyl radicals, superoxide, peroxy, singlet oxygen and hydrogen peroxide. Normally, ROS can be destroyed by the reaction with other radicals (Silva, Michniak-Kohn, & Leonardi, 2017). Excessive ROS can cause skin aging due to activation of nuclear factor kappa-B inducing the expression of cytokines that promote photoaging such as interleukin 1 (IL1), epidermal growth factor (EGF) and tumor necrosis factor alpha (TNF- $\alpha$ ) in keratinocytes and dermal cells (Ruland & Mak, 2003; Senftleben & Karin, 2002).

TNF- $\alpha$  is an inflammatory cytokine which is expressed by various skin cells during extrinsic aging. TNF- $\alpha$  receptors are activated on the cell surface by UV resulting in the decrease of collagen expression and the increase of matrix metalloproteinases (MMPs) expression. These contribute to degradation of extracellular

matrix (ECM) which contains collagen fibrils as a major component providing the strength of the skin (Choi, Lee, & Park, 2017).

The strategies to prevent photoaging include prevention of UV penetration into skin by using physical and chemical sunscreens, scavenging and quenching of ROS by antioxidants, and prevention or reduction of inflammation using anti-inflammatory compounds (Pillai, Oresajo, & Hayward, 2005).

Aloe vera is one of the medical plants widely used in biomedical because of its biological properties (Surjushe, Vasani, & Saple, 2008). It consists of many active compounds such as water soluble minerals, vitamins, polysaccharides, organic acids, enzymes and phenolic compounds (Maan et al., 2018). Previous study found that aloe gel containing glucomannan interacts with growth factor receptors on the fibroblast via proliferation activity (Chithra, Sajithlal, & Chandrakasan, 1998). It increases collagen synthesis after administering aloe vera topical and oral routes (Chithra et al., 1998). Other studies showed the anti-inflammatory activity of aloe-emodin in murine macrophages (Harhaji et al., 2007; Park, Kwon, & Sung, 2009). The results demonstrated that aloe-emodin inhibited nitric oxide production, suppressed the level of cyclooxygenase-2 (COX-2), prostaglandin E2 (PGE2) production (Kuhn, Balkis, Chandra, Mukherjee, & Ghannoum), and TNF- $\alpha$  production (Harhaji et al., 2007).

For these reasons, we have an idea to prepare an aloe gel extract and study its anti-inflammatory effect of the extract which could be extracted to use as an ingredient for anti-photoaging product in the future. Corresponding Author's email: th.suphitchaya@gmail.com

## **Objectives**

1. To analyze the aloe-emodin content in aloe gel extract
2. To study anti-inflammatory effect of aloe gel extract

## **Research Methodology**

### **1. Preparation of aloe gel extract (AGE)**

AGE preparation was modified from the previous report (Inpanya, Faikrua, Ounaron, Sittichokechaiwut, & Viyoch, 2012). Fresh leaves of *A. vera* were collected in Phitsanulok and washed with tap water to eliminate dirt. The inner gel was collected, grounded, and centrifuged at 12,000 rpm at 4 °C for 15 min. The supernatant was then lyophilized and kept at 4 °C.

### **2. RP-HPLC analysis of aloe-emodin in AGE**

Aloe-emodin content in the extract was analyzed by RP-HPLC using a Shimadzu LC-20AT system. The separations were carried out at room temperature on HyperClone (Phenomenex) (C18, 250 x 4.6 mm, 5 $\mu$ m) column using isocratic run of acetonitrile (ACN):0.1% aqueous phosphoric acid (1:1, v/v) in ACN at a flow rate of 1 mL/min. The signal of aloe-emodin was monitored at 254 nm at a resolution of 4 nm using a photodiode array detector. Aloe-emodin content in all samples were quantified using a freshly prepared standard aloe-emodin as a standard curve. The HPLC system was controlled, data collected and integrated using LC solution software (Chiang et al., 2012).

### 3. Cell viability assay

This study followed the protocol approved by Naresuan University Institutional Biosafety Committee (NUIBC OT 62-09-39) using raw 264.7 cells passage 10-20. Raw cells were seed at a density of  $1 \times 10^4$  cells/well in 100  $\mu$ l of DMEM with 10% FBS, antibiotics (100 U/mL of penicillin and 100  $\mu$ g/mL streptomycin), and 250  $\mu$ g/mL amphotericin B at 37°C in a 5% CO<sub>2</sub> incubator for 24 h. Then the medium was replaced with serum-free DMEM with AGE at various concentrations (25, 50, 100 and 200  $\mu$ g/mL). After 24 hours of treatment, 2,3-bis (2-methoxy-4-nitro-5-sulphophenyl)-5-[(phenylamino)carbonyl]-2H-tetrazolium hydroxide (XTT) reagents were added to each well and incubated for 4 h. The absorbance was measured at 490 nm (Bancos, Tsai, Hackley, Weaver, & Tyner, 2012).

### 4. Anti-inflammatory activity of AGE

Raw 264.7 cells were seeded into 96-well plates ( $1 \times 10^4$  cells/well) for 24 h. They were treated with 1  $\mu$ g/mL LPS and then treated by AGE at concentration of 200  $\mu$ g/mL or aloe-emodin at concentration of 3.4 ng/mL. After that, the tested cells were incubated at 37°C in a 5% CO<sub>2</sub> incubator for 24 h. The supernatants were then collected and TNF- $\alpha$  content was determined using the TNF- $\alpha$  ELISA kit (Zhao et al., 2013).

## Results and discussion

### 1. Preparation of AGE

There were various methods reported for aloe gel extract preparation either with (Kumar, Yadav, Yadav, Rohilla, & Yadav, 2017) or without (Inpanya et al., 2012) using heat. However, the extraction procedure in this study was modified from the previous report to avoid using high temperature which could reduce viscosity leading to the decrease in biological activity of aloe gel extract (Chandegara, Nandasana, Kumpavat, & Varshney, 2015). The extract after lyophilization showed a cotton-like characteristic with 0.6 % yield.

### 2. Quantitative analysis of aloe-emodin content

As a simple, convenient, and popular technique for investigation of herbal products with respect to quality and quantity (Kumar et al., 2017), reverse phase high performance liquid chromatography (RP-HPLC) coupled with diode array detection (DAD) were used to quantify aloe-emodin in aloe gel extract. Because aloe-emodin does not contain easily ionizable groups, water/organic solvent mixtures were proved as possible mobile phases. Both water/acetonitrile and water/methanol mixtures were reported to be suitable for analyte elution (Mandrioli, Mercolini, Ferranti, Fanali, & Raggi, 2011). The optimum mobile phase was found to be water/acetonitrile system. The presence of acid in the mobile phase decreased the tailing effect of the peaks and obtained a better separation (Xu et al., 2012).

The HPLC separation chromatogram displayed aloe-emodin peak at approximately 8.0 min (Figure 1a-b). The linear regression of the standard curve aloe-emodin was determined with  $R^2 = 0.9927$ . The linear regression line is  $y = 54681x - 69.951$ . The calculated amount of aloe-emodin was  $17.0 \pm 3.6$   $\mu$ g/g of dried extract. The amount of aloe-emodin is less than previous study due to different factors such as extraction method, part of use, and climate (Kumar et al., 2017).

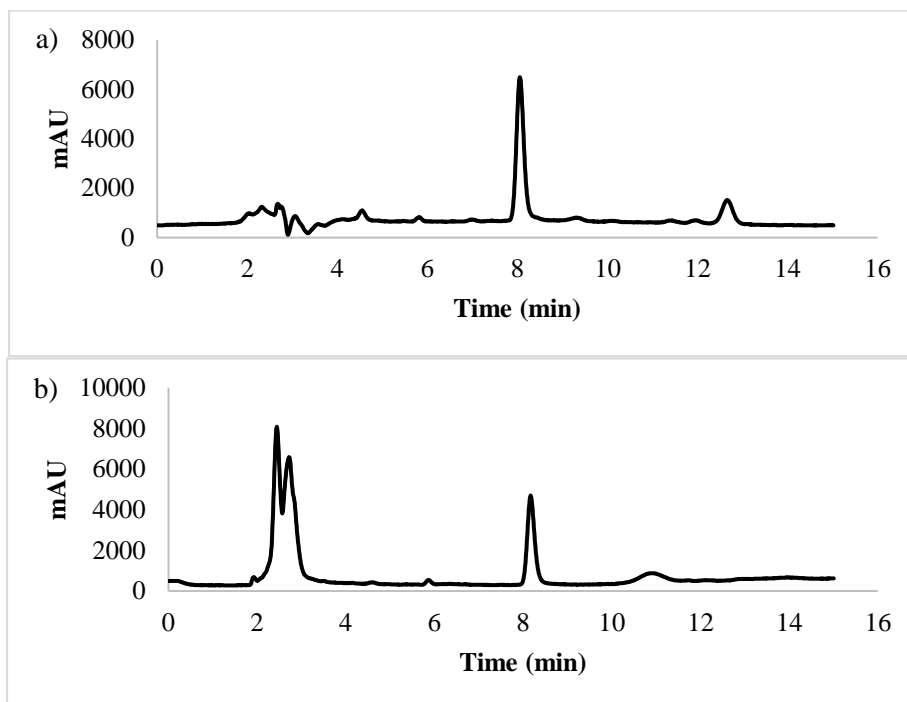


Figure 1 The HPLC chromatograms of (a) aloe-emodin standard and (b) aloe-emodin in aloe gel extract

### 3. Effect of AGE on the viability of Raw 264.7 macrophage cells

XTT cell viability test was performed to investigate cytotoxic effects of aloe gel extract upon Raw 264.7 cells. XTT was proved to be more useful and convenient than MTT method because of the water solubility of its formazan product (Kuhn et al., 2003). For the XTT assay in this study, it was shown that addition of higher dose of plant extract slightly increased the death rate of the cells, while AGE at concentration of 25-200 µg/mL showed no toxicity (Figure 2). As the highest concentration that yielded higher than 80% cell viability, 200 µg/mL of the extract was then used in an anti-inflammatory experiment.

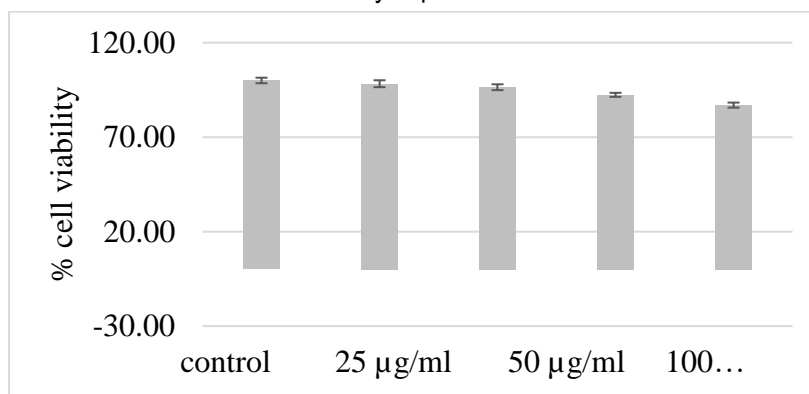


Figure 2 Effect of aloe gel extract on the cell viability of Raw 264.7 macrophage cells

### 4. Anti-inflammatory activity of the AGE

In an LPS-stimulated Raw 264.7 cells model, TNF- $\alpha$  plays a crucial role in inflammation which is produced by macrophages, monocytes, fibroblasts, and keratinocytes in the skin. UV radiation can also promote the production of TNF- $\alpha$  by dermal fibroblasts and epidermal keratinocytes leading to the increase of

inflammation. Moreover, high concentration of TNF- $\alpha$  increases the synthesis of collagenase resulting in collagen synthesis inhibition (Borg et al., 2013).

To check the functional components of the AGE on the production of TNF- $\alpha$ , the AGE was coculture with Raw 264.7 cells using aloe emodin as a marker in an equivalent amount in the extract.

For the results, the AGE could significantly reduce the production of TNF- $\alpha$  in LPS-activated Raw 264.7 cells with  $P < 0.05$  at a concentration of 200 ug/mL (Figure 3). The inhibition effect of the AGE was found to be higher than aloe-emodin at an equivalent amount of aloe-emodin (the AGE at 200 ug/mL equivalent to 3.4 ng/mL).

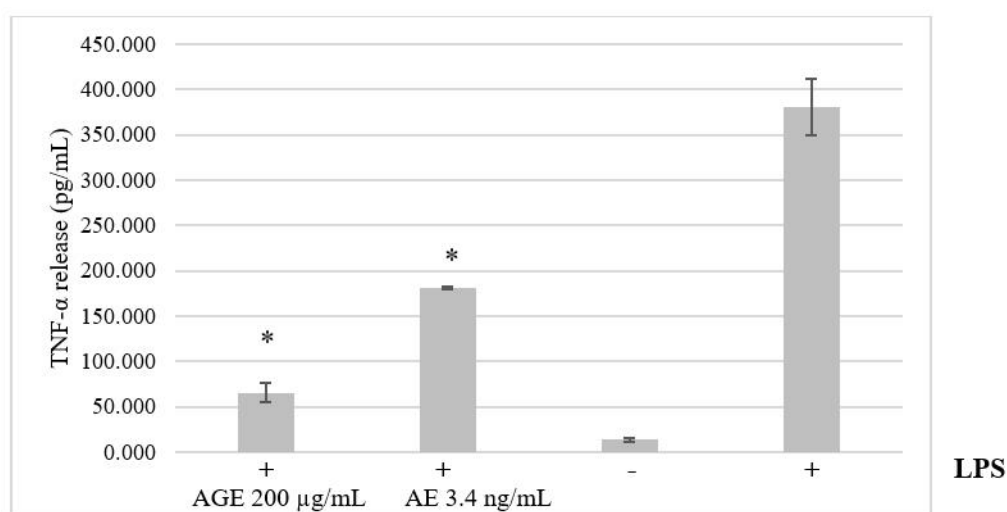


Figure 3 The effect of aloe gel extract (AGE) and aloe-emodin on the production of TNF- $\alpha$  in Raw 264.7 macrophage cells. The data were represented as mean  $\pm$  SD. The mean mark with \* are significantly different ( $P < 0.05$ ) from the cells treated with only LPS.

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## Education reform of the People's Republic of China

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### Abstract

The fundamental changes in politics and economy have re-integrated the contemporary society, and the lifelong learning policy has emerged as the times require. This paper attempts to position teaching career in this context. The document emphasizes that the demand for highly educated, well-trained, responsible and efficient teachers has never been stronger. Starting from the important links that affect teacher education and teaching career, the paper examines the problems, looks forward to the development trend, and finally puts forward the action guide to ensure that systematic and coherent policies are generally implemented, so as to support the teaching career towards the future.

**Keywords:** Lifelong learning, Teaching career, Teacher education

### Introduction

At present, the scope of school reform in developed countries is very wide and consistent with the view of lifelong learning. Their satisfactory achievement will be an important dimension of lifelong learning movement. In order to achieve these reform goals, the valuable efforts of school leaders and teachers will benefit from the understanding and support of thousands of politicians. -It is imperative to strengthen the public image of teaching career. This is a multi-faceted process, but in the era of rapid changes in the career path, it is extremely important for society to show trust in the significance of teachers' work. In order to implement the lifelong learning policy, teachers must attract high-quality talents. Under the current conditions, more attention should be paid to the generation gap within the teaching profession, and the government needs to expand its tentative plans to deal with this problem. (1) the concept of "teacher training syllogism" - pre service, induction and in-service teacher education - should be fully adopted as an established policy. This is the core of a lifelong learning strategy. Compared with other groups, teachers should become lifelong learners. Teacher education institutions should be supported to assume more diverse functions. Therefore, their pre service education should be supplemented by induction and various forms of in-service education. It is the inherent responsibility of teacher education institutions to promote the application of educational research. In keeping with the focus of lifelong learning, it is very important to establish partnerships with decision makers and relevant stakeholders. Teacher educators need to form close ties with those working in primary and secondary schools and in the field of adult and community education. As pointed out earlier in the paper, a lot of creative work appears in the teacher education curriculum. This needs to be sustained. In particular, the focus should be on the group's empirical activities. Further exchange of best practice research should be encouraged. Information and communication technology is of great significance to the learning society, so we need to make unremitting efforts. Efforts should be made to ensure that all teachers can effectively use these technologies in their teaching. Creative use of ICT in the classroom is important. Of course, ICT offers the possibility of learning in all environments, not just in schools. On the one hand, it calls for lifelong learning policy, on the other hand, it



provides an important tool for the implementation of the policy. In terms of teacher training, teacher education institutions and Relations need to be further developed.

## **Theories and Related Researches**

### **Theories**

With the advent of the new millennium and the new century, many international organizations and governments regard lifelong learning as an educational policy to stimulate vitality in the new era. Many analyses of social development and change have come to the conclusion that traditional education planning needs to change its paradigm in order to ensure that lifelong learning policy can meet the challenges of the era of rapid changes in civilization.

The essence of lifelong learning motion is a people-oriented movement, which profoundly reflects humanistic care: learning is a continuous experience from cradle to grave. Lifelong learning reinterprets the different stages of life and further emphasizes that man is an animal of lifelong learning. The emerging knowledge society needs intelligence, adaptability, flexibility, creativity and various social and professional abilities.

It is a historic challenge to turn lifelong learning into reality. This requires sustained attention, inspiring leadership and appropriate resource allocation; it also requires major adjustments in understanding, policy priorities, implementation strategies and communications; and it also needs to change the traditional and habitual procedural model.

Open the door of innovation and form new partnership. In contrast, education and training need to be at the forefront of social change. Because they can make people form the knowledge, attitude and skills needed by learning society.

If the lifelong learning policy is fully implemented in the next few years, it will be one of the most desirable things for teachers. This not only challenges teachers, but also calls for new methods. Lifelong learning recognizes the important role of teachers in society, and provides the following bright prospects: re stimulate the vitality of teaching career, open up innovative career path and support teachers to become lifelong learners. Although it is only recently that the international community has reached a consensus on lifelong learning, many potential trends have already emerged. The adoption and use of lifelong learning policy provides a welcome coherence to the seemingly fragmented and confused social development in the past. In the classroom, teachers are faced with various pressures and requirements from the rapidly changing society; they try to eliminate various pressures and meet various requirements, but they feel that the government and society do not fully realize and do not fully understand their new role. Lifelong learning helps to focus on these issues and provides a constructive framework for more conscious complementary action.

### **What kind of teacher is needed for lifelong learning**

Teachers need to have a deep understanding of themselves and the nature of their work. They need to develop a wide range of professional skills in teaching, planning, assessment and interpersonal relationships. They need to be flexible and able to self renew and lifelong learning. Of course, the teacher needs to be competent in the discipline and ready to work together as a team member. Teachers need a whole set of teaching skills, including taking care of the emotions of students who are alienated or have learning difficulties.

He should learn to apply ICT. They should be aware of the social, cultural and political factors that affect their work. Teachers should have a better understanding of the intellectual and emotional development of young people and sympathize with their culture and problems. Teachers need to have effective communication skills with their parents and other educational partners. There is a growing need for teachers' expertise within the teaching profession, especially in school life, such as behavior correction counseling, guidance and consultation, management and leadership. Within the framework of lifelong learning guidance, school life needs to be re-planned. Teachers should establish extensive contact with various forms of early childhood education and post primary and secondary education with an open attitude. Only those wise, skillful, imaginative, caring and well-educated teachers can successfully respond to the demands of the developed society on the education system. If the society is concerned about improving the quality of education and cultivating young people who are creative, enterprising and self-reliant, and have the ability and motivation to continue to develop, then this can not be achieved unless the teachers themselves are lifelong learners with the spirit of challenge and innovation. It is necessary for us to examine the teaching career in a rapidly changing society in a systematic way. It is also necessary to understand the internal factors of teaching career, including pre-service education, employment, entry and in-service development, working conditions, promotion and specialization, and research dimensions.

#### **On the job teacher education**

In the modern environment, it is generally acknowledged that the initial professional training is not enough for a career lasting 40 years, especially for teaching career. In order to effectively guide the large number of young people they meet, teachers need to keep pace with the development of knowledge and teaching methods. In order to help and promote students to become lifelong learners, teachers need to demonstrate the characteristics of lifelong learning with their own behaviors and attitudes. In order to realize the potential education reform, teachers should pay attention to the continuous renewal of teaching profession. It is because of this that the government has increased the investment in the education of in-service teachers. The on-the-job education courses have shifted from long-term courses to short-term courses, sandwich courses and summer courses. Contemporary in-service education focuses on the following areas: primary and secondary school management and leadership, curriculum innovation, the introduction of new curriculum materials such as civic education, social and health education, behavior correction counseling, guidance and consultation in primary and secondary schools, teaching reform, and relationship with parents / communities. In recent years, with more attention and support from the thousand government, information and communication technology in the education system has been developed. The ideal in-service teacher education should include two dimensions: inside and outside the school. Teachers should play a greater role in setting the schedule. In this process, teachers' active input and the use of experimental technology should be supported. In many countries, through training and assistance, teachers work with peers as group leaders. This can build up a sense of empowerment, and thus create a strong sense of self-confidence. Cooperation and interaction are more popular than lectures with many people. Another important trend is the development of inter-school relations or groups: teachers from many primary and secondary schools work together around new curriculum or new teaching methods. It is neither a "top-down" nor a "bottom-up" approach; the OECD calls it "cross-border". As pointed out in the OECD report, external assistance plays an important role in this process, such as the support of

higher education institutions, education centers and regional or professional collaboration groups. As a result, more and more international school teachers are encouraged to develop to the maximum extent.

### **Related Researches**

In recent years, although the research on teacher education is still insufficient, more attention is focused on the role of teacher education at all levels. In the past, the positive impact of Educational Research on normal students and teachers has been constrained by many obstacles, including irrelevant statements, problems of discourse patterns, difficulties in publicity, lack of preparation for utilization and experience of investment. These obstacles can be removed in many ways. The method of action research has proved particularly effective in this regard. Through tasks and projects, normal students are guided to apply educational research results, and normal students who are engaged in research at an appropriate level will also achieve certain results. In service teachers who are enrolled in certification courses have more access to educational research results; as part of the curriculum requirements, they have to work on projects and research papers. In addition, action research is only one of many methods, which can help teachers determine their specific areas of work and guide teachers to conduct research in a structural way consistent with their experience and environment. Teachers' more extensive participation in these activities builds a bridge between educational researchers and teachers. Researchers will also be further aware of the significance of communicating with front-line teachers.

In the context of lifelong learning, it is important that valuable research findings and meaningful insights are used to enhance understanding of all stages of teacher education, guide action, and help improve the dimensions of the education process. The following aspects open the door to a new and dynamic world for teachers: to form critical consciousness, to understand research objectives, to develop research skills through practice, to cultivate the ability to explain research and to work hard with researchers. Guan Qian's reflection on the significance of educational research to teachers emphasizes the need to enrich the ranks of teachers with higher talents; these people understand educational research and have the ability to engage in research, which can better provide materials for educational planning and practice.

### **Methodology**

Lifelong learning needs to look at different aspects of teaching career in an internal, integrated and systematic way, so as to form a new structure and culture to meet the requirements of the new era. After analyzing the development trend, this document gives the following action guidelines: the importance of lifelong learning needs to be further clarified, highlighted and publicized. more efforts need to be made in the following areas: Teaching

### **Research Results**

Professionals and the public recognize the significance of education in lifelong learning and seize the opportunities offered by lifelong learning. Policy makers and implementers should look at educational initiatives from the perspective of lifelong learning policy, and use lifelong learning discourse to explore these initiatives. when making major educational reforms, policymakers need to be aware of the inevitable tension. The research on the implementation of these major educational reforms highlights the complexity of the process. The obvious

tendency to be tired of the resistance or incompetence of thousands of teachers is not only a hypocritical response, but also a reaction against effectiveness

## **Conclusion**

The role of instructors should also be strengthened. In promoting lifelong learning, the key is to form a partnership between stakeholders inside and outside school. In the process of self-improvement, teachers should be self-motivated and self-motivated. In the context of lifelong learning, it is important for thousands of teachers to invest in high-quality induction and in-service education. (1) educational research, especially applied and action research, should obtain information on all stages of teacher education. Teachers should be helped in the following aspects: participate in appropriate research projects in their schools and use the research results to promote school development. national governments need to ensure that teachers' salaries and working conditions are maintained at a certain level. This level makes teaching work attractive and enables teachers to effectively teach the whole class. In the process of policy formulation, teaching professionals should be regarded as partners who influence the implementation of the plan through dialogue and consultation.

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## Implementation of Thesis Citation System of Lipa City Colleges

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### Abstract

One of the major requirements in completing a degree in a Higher Education institution is to write a research or thesis based on the specialization of the student's degree. It is also one of the major roles of libraries to maintain the institution's thesis collection, which the faculty and students' proof of research can be found. These theses are stored in the library and serve as a guide and additional references to future researchers. The institution's drive towards the continuous growth of its research outputs has led the researchers to develop and implement an in-house library database called as "LCC Thesis Citation System." It houses all the bibliographic records of both students and faculty research collection being house at the Learning Resource Center. This study helped assessed the quality of studies made by the faculty and the students. It enables the academic department to produce more quality researches, feasible research topics, and easy bibliographic access. The study showed the most and least cited thesis, which will help the academic departments decide what the future researchers should do research agenda. Discussions and post-implementation activities include evaluation and recommendations to improve the system's efficiency by identifying the factors that need to be added/deleted from the pilot design of the Thesis Citation System.

**Keywords:** Thesis, Citation, Research, Bibliographic access

### Introduction

The enormous growth of data has led everyone, especially academic institutions, to open more extensive opportunities in increasing their research capability or performance in producing quality-wise research outputs. Nowadays, research data can be found anywhere, whether in identified databases or in the ubiquitous presence of search engines where every information can be accessed in just one click. It is easier for everyone to contribute to the everyday growth of new knowledge, milestone, or innovation. These changes, therefore, perfectly apply to every academic institution like the Lipa City Colleges.

The Lipa City Colleges-Learning Resource Center provides a vast collection of thesis and institutional researches available to both faculty and students. The group has grown over the years through the submission of library copies by different academic departments and the research department itself for the utilization of the future researchers as a reference for new topics of thesis/research. The continuous growth and enrichment of the research collection, however, has led to Learning Resource Center itself to cater to the research needs of not only the stakeholders of the institution but also to the off-campus researched from nearby colleges in the province most notably in the areas of Business, Education, Criminology and Nursing.

It provided not only an opportunity to showcase the quality of the researches that the institution has but also creates an avenue to contribute to the research development of the institution. The topics or subjects have already been extensively used and cited by researchers, the impact or influence of these research papers, the efficiency of the usage of the existing collections, and the relative impact to future researchers.

Thus, these core reasons have led the researchers to put a lens on identifying and analyzing the collection, usage, and what can be done in the Learning Resource Center. This is to improve its services in terms of the Thesis Collection through the use of citation systems. This research would help create the citation system in collaboration with Lipa City Colleges' Library Department and Management Information System Department to create the program. The study is important to the academic departments for quality student research production, feasible research topics, and easy bibliography access. This is also a great help to the Research Department Office for the research agenda revision and dissemination of citation. This will also be a stepping stone in publishing faculty and student research in different local and international journals.

The evaluation of the research performance has a vital role in the strategic decisions about what areas of research to support or build. It is also essential to know the institution's position relative to global and domestic research production standards. It would help determine how much research is conducted, what is the impact of each study, are there any faculty members' articles that have been published in first-class journals and is the number of research increasing or decreasing.

## **Research Design**

The study employed qualitative research using descriptive analysis as what was mentioned in the book written by Bueno (2016), Lancy (1993) points out qualitative research is typically thought of a method with a set of procedures for conducting research.

Likewise, the study also adapted the process of development which follows the Plan-Do-Check-Act (PDCA) Cycle developed by William Edwards Deming in the 50's. This is a management process for continually improving process, products or services, and for resolving problems. It involves systematically testing possible solutions, assessing the results and implementing the ones that are shown to work. (Moen and Norman, 2009) The four phases are PLAN which product design or the planning phase of management; DO is the implementation part or doing-making or working on the product that was designed; CHECK is the phase which evaluates the implementation of the deigned product that will tell the satisfaction of the users; ACT is the improvement that has to be done as a result of the check phase to be able to improve the product or services designed.

The study was conducted at Lipa City Colleges Learning Resource Center. With the help and assistance of the MIS department, this research was created to be institutional program software. This study covers all the research works of students and employees of Lipa City Colleges. The researchers identified all the research titles covering the thesis done within the last five years. There are 957 undergraduate thesis, 510 graduate thesis and 188 institutional research included in this study. The study covered the thesis conducted within the last five years or the thesis dated Year 2014 until Year 2018.

The citation system was planned to help in getting the number of citations that a research had and identify which research are mostly cited by other researchers. Also, to know which topic is frequently used by the student and faculty researchers. The study was participated by LRC personnel who manually selected the thesis included in the study. It also involved the Head of the Management Information System who created the system. The study used the research conducted by undergraduate students and graduate school students

including the institutional researches conducted by the faculty and staff of Lipa City Colleges. It included studies conducted from year 2014 up to year 2018 which covers the last five years of the researches of the institution. The study is composed of three phases; the first phase is the creation of the system in coordination with the MIS Department Head of Lipa City Colleges who created the system pattern after our desired system. The citation system is a new system solely for the researchers made by students and faculty of Lipa City Colleges. The second phase is the importing of the bibliographies from each thesis provided by the research department that gives the data needed for this study. The third phase is the making of the standard design as part of the evaluation of the system created.

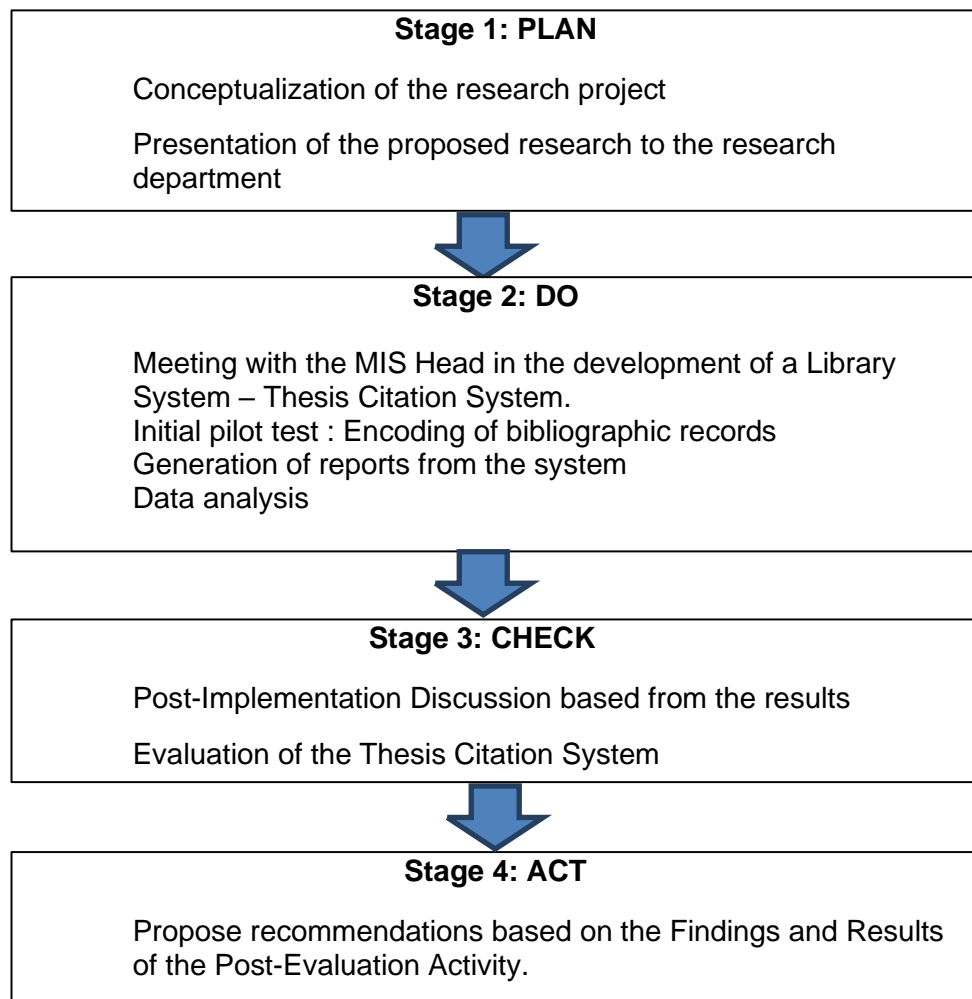


Figure 1 The researchers used the PDCA process of development.

Below is the detailed schedule and process done by the researchers.

**Stage 1 : Plan**

. For the initial plan, the researchers decided to evaluate the performance of the undergraduate thesis, graduate thesis and the institutional research. The researchers sought the help of the technology which will provide the system for this research. Meanwhile, the head of the Management Information System (MIS) Department, Mr. Enrique Guavez, extended his help by creating the software that will be used for the citation

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system. After the initial planning done by the researchers, consultation with the MIS head followed. It is where the researchers discuss with the system creator the plans and the desired output of the system.

### Stage 2 : Do

Below is the detailed schedule of all the activities for this research endeavor, with its project duration beginning March 2019. Here are the specific details of each activity from the preparation up to the post implementation activities.

Table 1 Activity Schedule

ACTIVITY	DATE OF SCHEDULE	REMARKS
Planning and discussion Stage	January 2019	Done
Needs analysis	February 2019	Done
Research proposal	March 20, 2019	Done
Development of the Library Management System - Thesis Collection	March – September 2019	Done
Pilot test for LMS created	September 2019	Done
Generation of initial report	October 3, 2019	Done
Data analysis of the initial report	October – November 2019	Done
Initial Evaluation of the System	December 2019	Done

After the agreement between the MIS Head and the researchers on identifying the highest number of citation, they created a team that helped in doing the data gathering. This team is the LRC-College Librarians and Library Clerks, and the MIS Head created the system.

Meanwhile, the research/thesis included are those study which was done from 2014-2018 from undergraduate thesis, graduate thesis including the institutional research conducted by the faculty and staff of Lipa City Colleges. The MIS head then, created a system while the researchers and the library staff are doing the identification process of the citation made by each research..

On the other hand, the researchers scrutinized each thesis to know the title that has the most citations used by other researchers in the campus and checked all the thesis' bibliography inclusive in the last 5 years coverage then recording the number of thesis usage against the citation. After creating the system, the researchers named the system as the "Thesis Citation System".

Since there is no research publish internationally yet, the researchers decided to evaluate first the researches made by the students, faculty and staff of Lipa City Colleges to know also the reason why there is no published paper yet outside the campus. The Thesis Citation System also helps to identify the mostly used topics at the same time, the least used topics across all disciplines.

Below is the sample of the system.



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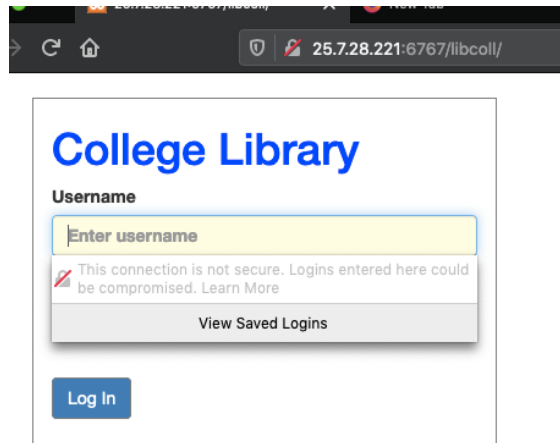


Figure 2 Log-in Box

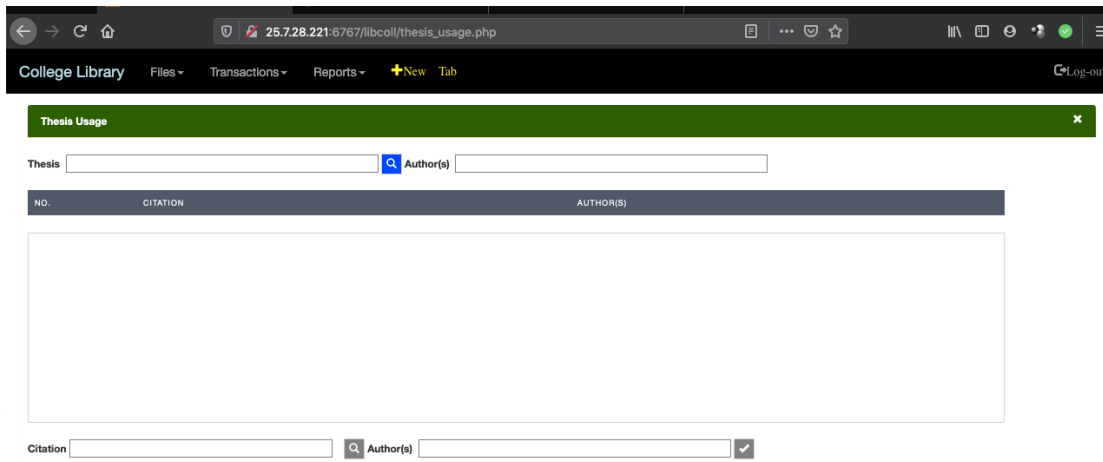


Figure 3 Transaction

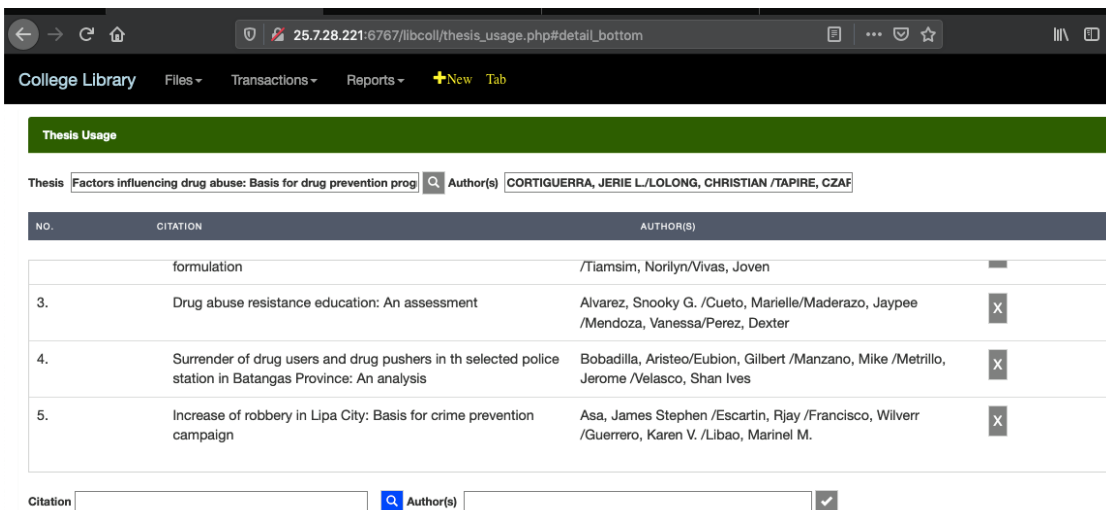


Figure 4 Citation

NO.	Title	Researcher(s)	Usage	Citations	Title
	actors influencing drug abuse: Basis for drug prevention program	CORTIGERRA, JERIE L. LOZONG, CRISTIAN TAPPE, CORBIN V. MALL, DONATHAN JAY VING, LYRAMMOZ	170	5	Drug abuse and its implication to family: Basis for pro
3.					Drug abuse resistance education: An assess
4.					Increase of robbery in Lipa City: Basis for crime prev
5.					Surrender of drug users and drug pushers in th selected police station in Balar
					Walk of shame: It's impact to drug abusers and drug cases in Tar

Figure 5 Report

After the Thesis Citation System has been done, Mr. Guavez instructed the researchers on how to use the system. Password and username were provided including the generating of reports of the thesis cited. After learning how to input the data in the system, the researchers, with the help of the library staff inputted in the system the citation made in the bibliography from the hardcopy of each research/thesis.

Since all the list of thesis was exported from the existing Library System, the system can easily search each title of thesis and will be manually marked if the title is cited by other researchers. The inputting part is done manually by browsing the bibliography from the hardcopy of the research/thesis. (Please see the User's Guide of the Thesis Citation System in the Appendix).

There was also a Pilot Testing Done before doing the actual inputting of the data. The researchers tried ten (10) theses in the pilot testing. After seeing the output of the pilot test and having no problem encountered during the pilot testing, the researcher together with the team of the library staff started the data inputs of the theses.

**Stage 3 : Check**

The Post – Implementation activity included the discussions on the processes of implementing and using the Thesis Citation System and the advantages and challenges encountered upon using. Looking upon, one of the advantages of the system is it is user-friendly and easy to navigate.

**Stage 4: Act**

After identifying the things to be included/deleted from the initial Thesis Citation System, these recommendations shall be forwarded and discussed to the MIS Department for access and updating. Routine evaluation of the system shall be made for further improvement.

**Results and Discussion**

Generally the objective is to know the impact of the thesis/research conducted by the faculty and students of Lipa City Colleges. Below is the result of the data analysis done.

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To complete the specific objectives cited at the beginning of the study below are the results.

1. To be able to create / develop a Thesis Citation System / Citation System”) that will be used in the upkeep of all the bibliographic records and usage data of the LCC – LRC Thesis / Research Collection.

The Thesis Citation System was created with the help of the institution's MIS Department to automatically record all the bibliographic records and data usage of the LRC Research Collections. It includes provisions on the Title of Holdings, Authorship details, Usage Counter and a Citation Frequency Index. The Citation Frequency Index plays a great role in determining which among the existing collections are frequently cited. Likewise, the Usage Counter report also identifies the actual number of times a particular collection was checked out from the shelf for research use.

2. Initial Pilot Test in the Usage of the LCC – LRC Thesis / Research Collection

A pilot test of the Thesis Citation System started last September 9, 2019 with the help of the institution's MIS Department.

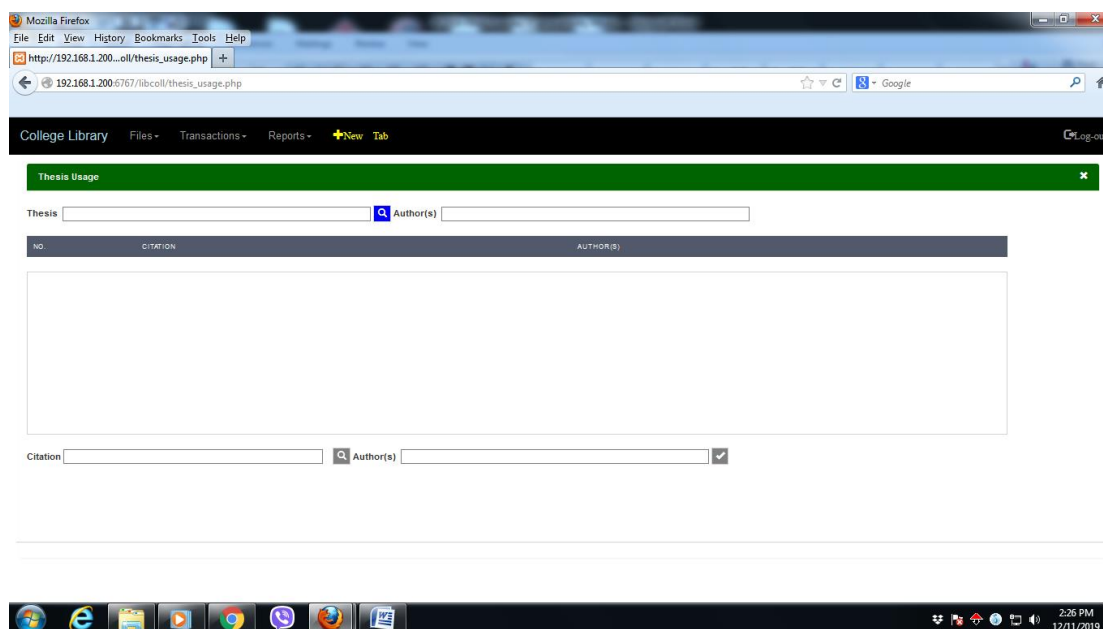


Figure 6 Transaction box

3. Citation Counter Report of Data from Library Management System.

A citation frequency report was created to identify the number of times a research material actually used in the body of literature by another researcher and is properly cite in its Bibliography. The data shows that there are 317 titles of undergraduate thesis, 123 graduate thesis and 48 institutional researches in the library dated 2014 up to 2018, and from the table shown below there is only 87 titles which was cited by different researchers.

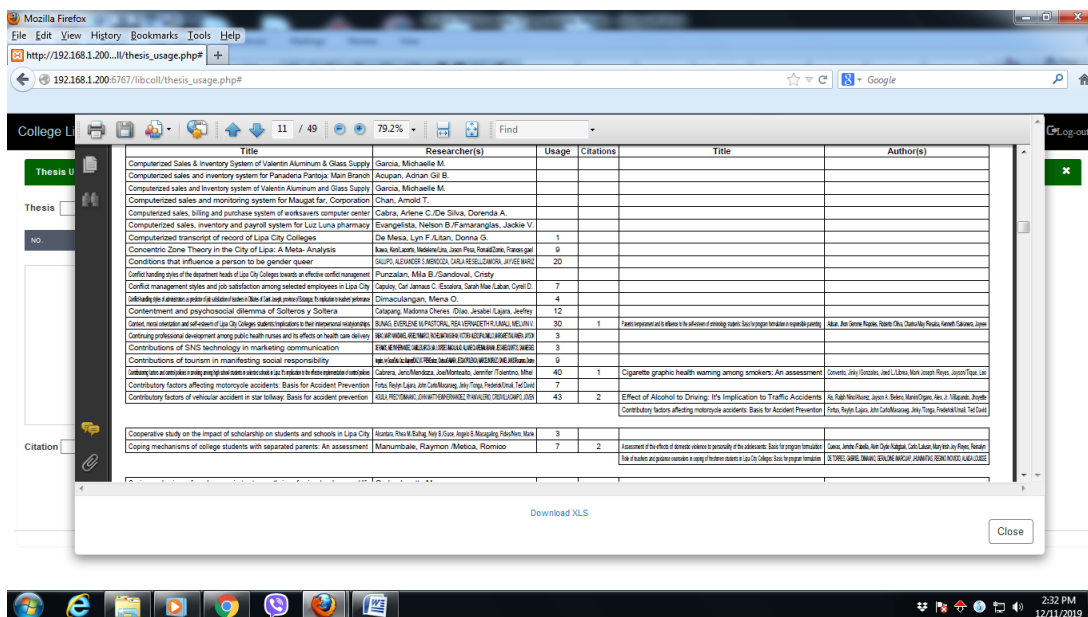


Figure 7 Citation Report

3. Most Cited Research Area

The title that got the highest number of citations is the research entitled “Factors Influencing Drug Abuse: Basis for Drug Prevention Program” by Cortiguerra, Jerie L.; Lolong, Christian; Tapire, Czar Ben; Umali, Jonathan Jay; Vivas, Lyra Nikka from College of Criminology. This is followed by the titles that got 4 citations which are entitled “Implementation of Crime Prevention Strategies .in Lipa and Batangas City: A Comparative Study” from College of Criminology and the other one entitled “Personality and Challenges of Adolescents with Dysfunctional Family” from College of Liberal Arts. The mentioned titles above are considered with high impact since many researchers used it on their own research. They have the same topics but different respondents and some with different settings. It can also be noted that since the College of Criminology has more students there are more researchers that would look for problems related to drugs because it is also timely that one of the biggest issue of our country is about drugs or drug related crimes committed by drug users. It can also be noted that the study about personality and challenges of adolescents with dysfunctional family can lead to crime since it is also cited by students conducting a study about crimes.

4. Evaluation of the Thesis Citation System

Upon initially evaluating the system, it is recommended to include in the system the subject index that would help for easy access using the subject and not the whole title of the thesis/research. Also, it could help in identifying the weakest subject used in research. Another recommendation is that the date of the thesis to be included in the system so that it would be easier to identify the recency of the thesis or research. In addition, academic departments should focus on the least cited subject to be able to balance the research and redirect the focus to new subjects that was not given attention but needs more research to address the problem that might have occurred.

The Thesis Citation System can still be improved though, it is good enough but still continuous improvement could be done based on the needs of the platform and the researches to be inputted in the system.

## Conclusions

The researchers concluded that the most cited research is the research which deals with crimes followed by psychology subject. Topics about health and education followed also with only one or two citations respectively. Through the help of the Thesis Citation System, the researchers were able to analyze the data. It is also concluded that the students and faculty focused more on the same subject neglecting the other subject that could have needed more attention in terms of research. The impact of the researches done by students and faculty could be identified by the number of citations in and out of campus.

Overall, the created database system is something new to the learning community, serving its main purpose to quantitatively identify the impact of the existing research collections.

## Acknowledgement

The researcher would like to express her sincerest debt of gratitude to those who contributed a lot in finishing this study. Without them, this work would never be done.

To Lipa City Colleges Administration for the support in this undertaking;

To LRC family, for serving as inspiration in conducting this study;

And most especially, to GOD ALMIGHTY, for without him, this study will never materialize.

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## How to Improve the Teaching Syllabus and Teaching Development of Zhengzhou Vocational College of Tourism

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### Abstract

The curriculum syllabus integrates teachers' teaching ideas, teaching contents and teaching methods, is a "bridge" for communication between teachers and students, a reference for students to learn, and an important basis for teaching evaluation. In the context of improving the quality of education in an all-round way, the Ministry of Education has made it clear that it is necessary to continuously deepen the reform of undergraduate teaching and strengthen the cultivation of college students' quality and ability in an all-round way, in order to provide a clear direction for the improvement of the implementation of the curriculum and teaching outline, this study begins with the curriculum and teaching outline, which is an important part of undergraduate teaching, using the method of questionnaire and interview, this paper investigates the undergraduates' cognition of the curriculum syllabus from five dimensions, INCLUDING: students' cognition and attitude towards the syllabus, students' understanding of the contents of the syllabus, students' implementation of the syllabus, students' actual utility from the syllabus and teachers' implementation of the syllabus. The present situation of the implementation of the curriculum syllabus is as follows: (1) the introduction of the curriculum syllabus by the teachers is relatively simple and infrequent, most of which only appear at the beginning of the curriculum; (2) the implementation of the curriculum syllabus. There are differences among teachers and most of them can not follow the syllabus completely; (3) students generally recognize the importance of the syllabus and the need to implement it, however, a few of them have cognitive bias: (4) most of the students understand the information on the syllabus, and it is not ideal in the self-executing part. The results show that there are some problems, such as the teachers' introduction to the syllabus is too shallow, the teaching process lacks the application of the syllabus, and the students' understanding of the syllabus is not high, the solution is to strengthen the teachers' sense of responsibility for the syllabus, to establish the students' sense of the syllabus, and to standardize the compilation, management, implementation and evaluation of the syllabus.

**Keywords:** Syllabus, Teaching development

### Introduction

With the rapid development of science and technology and the rapid updating of knowledge, modern society is in a knowledge age with rapid changes, and a large proportion of its social value is created through "knowledge work", this work produces new knowledge through the processing of ideas or the application of ideas. So the challenge to the Individual in the knowledge age is not the amount of knowledge he has, but whether he can form new knowledge that no one else has. Therefore, the greatest requirement of the knowledge



age for school education is not to help learners acquire existing knowledge, but to help them create new knowledge by producing new ideas and applying new ideas. However, based on the situation of our country, our school education is still influenced by examination-oriented education, and there are many students in classes. This is embodied in the emphasis on teacher teaching over subjective initiative, outcome output over thought process, answer conclusion over practical significance, knowledge transfer over knowledge creation, the students' knowledge is old, the skills are single and the thinking is low, which is contrary to the knowledge creative talents required by the knowledge age. Therefore, the knowledge age has put forward a brand-new request to the school education in the teaching goal, the teaching content, the teaching method and so on, schools are required to cultivate knowledge creative talents with stronger initiative consciousness, collaborative ability and innovative thinking.

## **Theories and Related Researches**

### **Theories**

This study refers to the general thinking of the study of teaching models, that is, based on the deep exploration of the theory of knowledge construction, a universal teaching model based on the theory of knowledge construction is constructed from the various components of teaching models, and in the teaching practice tests its rationality and the validity.

### **Related Researches**

This research designs and implements a universal teaching model based on the theory of knowledge construction, and verifies its scientificity and validity preliminarily from the angle of theory and practice. On the one hand, an integrated teaching model provides practical activities for front-line teachers' knowledge construction and application teaching. On the other hand, it also provides a new idea for the reform of traditional knowledge acquisition, and contributes to the cultivation of talents with stronger initiative, cooperative ability and innovative thinking.

## **Methodology**

The theoretical exploration of the teaching mode based on the theory of knowledge construction. In-depth analysis of the characteristics and connotation of knowledge construction theory, the basic principles of knowledge construction theory, the process of knowledge construction and so on, so as to provide theoretical core for the construction of teaching model based on knowledge construction theory. (2) research on the construction of teaching model based on the theory of knowledge construction. On the basis of theoretical research, combining with the current situation of education in our country, such as the class size of college students is more, the result output is more important than the thinking process, the teaching model based on the knowledge construction theory is constructed from the constituent elements of the teaching model. (3) the practical research of the teaching mode based on the theory of knowledge construction. In order to test the rationality and validity of the teaching mode based on the theory of knowledge construction and analyze the concrete performance of the teaching effect, this paper makes an experimental study of the real classroom teaching cases.

## Research Results

This study refers to the general thinking of the study of teaching models, that is, based on the deep exploration of the theory of knowledge construction, a universal teaching model based on the theory of knowledge construction is constructed from the various components of teaching models, and in the teaching practice tests its rationality and the validity.

## Conclusion

The Modern Society is in the knowledge age which is changing with each passing day. The requirement of the knowledge age is not to look at the amount of knowledge he has, but to look at whether he can produce new ideas and apply new ideas to create new knowledge. Looking at the present situation of education in our country, due to the influence of examination-oriented education for a long time, and the limitation of many college students in class size, school Education still focuses on the knowledge acquisition teaching, which emphasizes knowledge transmission rather than subjective initiative, results output rather than thinking process.

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## **The Development of Students' Creativity and Innovation Ability Training Program of Medical School**

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### **Abstract**

The research design is adopted quantitative research, descriptive research and investigation research methods. All data were collected from the front line of medical college classroom teaching, students' clinical practice, innovation and entrepreneurship activities, and various competitions. The objects were students, teachers, hospital managers, patients, etc. The study attitude of medical students, the teaching create of innovation and entrepreneurship in medical colleges and the teaching methods of lecturers have an impact on the innovative thinking and entrepreneurial ability of medical students, which can provide reference for upgrading the teaching syllabus of medical colleges and effectively improving the innovative spirit, entrepreneurial awareness and innovation and entrepreneurship ability of college students. The research results are the relationship between independent variables (innovation and Entrepreneurship Education) and dependent variables (medical students' innovative thinking and entrepreneurial ability) was determined by analyzing the data obtained, so as to prove whether the research hypothesis is correct.

### **Introduction**

Innovation and medicine are inseparable. For thousands of years, medicine has been developing continuously. At the same time, medicine is constantly innovating. With the development of economy and the improvement of people's quality of life, there is a new demand for medical health, which forces medicine to develop creatively in order to solve this problem. The development of modern science and technology has also promoted the innovation and development of all aspects of the medical field. The new diseases facing mankind. In particular, the Corona Virus Disease 2019 has been invented by new research and creative activities, and new drugs, new treatments, new surgical instruments, new inspection reagents, new negative pressure ambulances, etc. have been invented. The increasing global medical expenditure is affected by the aging of the global population and the increase in the proportion of residents suffering from diseases, which is a rigid demand. Moreover, with the continuous improvement of people's health standards, the big health industry will continue to maintain the growth trend for a long time. In the United States, health services are the largest industry in the United States, accounting for 17.6% of the U.S. GDP as of 2009. In China, in 2012, the scale of added value of health industry was 4174.21 billion yuan, accounting for 7.72% of GDP. In 2016, the scale of added value of large health industry increased to 7259.07 billion yuan, accounting for 9.76% of GDP. The employment scale driven by the big health industry is also considerable. In 2012, the employment of the large health industry was 72.666 million, accounting for 9.5% of the total employment of the country. In 2016, the employment scale increased to 121.242 million, accounting for 15.6% of the total employment of the country.

In order to become a qualified angel in white, medical students need to undergo very strict training and have high comprehensive quality, especially certain innovative thinking and creative ability. Medical college students accept the influence of engineering thinking, weak entrepreneurial consciousness, and medicine is

related to human life and health, a medical staff in the treatment action need to strictly abide by the norms, every operation procedure and step must be accurate. Otherwise, it is very likely to cause hospital internal infection and endanger the health and life safety of medical staff, patients and their families. In terms of treatment methods and means, medical staff need to constantly innovate in order to cope with various difficulties and challenges. It is also called "bold hypothesis, careful verification".

**Research purposes:** Objective to study the training program of Medical College Students' innovation and creativity, stimulate their entrepreneurial and innovative consciousness, give full play to the potential of medical students, and cultivate medical personnel with innovative thinking and creative ability.

**The benefits of the research:** to cultivate compound medical personnel who can adapt to the future needs, have higher comprehensive quality, especially have innovative thinking and creative ability. So that they can carry out innovative work in the future, and better serve human life and health. For China at present, we are short of medical personnel, but our medical and health industry is even more short of compound talents with medical background, or talents with outstanding innovative thinking and creative ability.

**Research steps:** 1) research design: establish hypothesis, set up independent variable and dependent variable. 2) Experimental operation: data collection, scientific observation. 3) Experimental analysis: collect statistical data, scientific analysis. 4) Conclusion: according to the analysis results, make judgments, verify hypotheses and write reports.

## **Theories and Related Researches**

### **Theories**

Medical school to innovative entrepreneurship training of medical students, is the basis of modern social development demand, can not only solve the problem of students graduate employment, driving the development of social economy, more able to cultivate innovation thought and creative ability of medical staff, enabling them to work in the future, innovative work, better service for the human life and health.

But due to the traditional ideas, lack of funding resources, health, environment and personal factors, family factors, school factors, social factors, medical professional particularity of subjective and objective factors such as restriction and influence of medical colleges and universities in our country development overall innovative undertaking lags behind other types of colleges and universities, and at the same time lag behind the development of medicine and health care, medical students' innovative undertaking crisis consciousness, the innovative entrepreneurial activity and education necessity, importance and urgency of perception and strain capacity.

Medical school teachers need innovative undertaking in the teaching practice, from the education target, education method, education process, key aspects such as education, personnel training plan is being updated constantly, improve their own comprehensive teaching ability, teaching take the student as the main body, stimulate students' entrepreneurial potential, improve medical students' innovative entrepreneurial spirit, to promote the cultivation of the innovative thinking and entrepreneurial ability.

### **Related Researches**

In CNKI alone, there are more than 60000 research papers on innovation and entrepreneurship education. 2020 novel coronavirus pneumonia was threatening and spreading rapidly during the Spring Festival.

Under the firm leadership of the Party Central Committee with Comrade Xi Jinping as its core, the people's war on epidemic prevention and control was launched nationwide. Prevention and control is a big battlefield. The novel coronavirus pneumonia epidemic prevention and control provides practical contents for medical students' innovation and entrepreneurship education.

It is of great and far-reaching significance to effectively use education carriers, innovate education approaches, revise talent training programs, cultivate medical students' innovative thinking and entrepreneurial ability, and guide medical students to follow the national level value standards, social level value norms and personal level values in the field of innovation and entrepreneurship.

## Methodology

The research design adopts quantitative research, descriptive research and investigation research methods. Data were collected from the front line of medical college classroom teaching, students' clinical practice, innovation and entrepreneurship activities, and various competitions. The objects were students, teachers, hospital managers, patients, etc.

**The hypotheses** are as follows:

1) students' attitude has a significant impact on innovative thinking and entrepreneurial ability.

1A: innovation and entrepreneurship curriculum design has a significant impact on innovative thinking and entrepreneurial ability.

1b: innovation and entrepreneurship education satisfaction has a significant impact on innovative thinking and entrepreneurial ability.

2) Innovation and entrepreneurship teaching design has a significant impact on innovative thinking and entrepreneurial ability.

2A : innovation and entrepreneurship course teaching has a significant impact on innovative thinking and entrepreneurial ability.

2B: innovation and entrepreneurship competition has a significant impact on innovative thinking and entrepreneurial ability.

2C: innovation and entrepreneurship lectures have a significant impact on innovative thinking and entrepreneurial ability.

**Variable research:**

1) number of researchers and sample group

Because this study takes medical college students as the research object. This paper selected Weifang Nursing Vocational College of Shandong Province. Weifang nursing vocational college is one of the three nursing vocational colleges in Shandong Province. It provides a good entrepreneurial platform for medical students. The college has 13000 students.

2) Variable

2A: independent variable

This study takes innovation and entrepreneurship education as independent variables. This includes two dimensions: student attitude, innovation and entrepreneurship teaching design.

2B: dependent variable

This study still takes innovative thinking and entrepreneurial ability as a single variable.

#### **Content:**

The study attitude of medical students, the teaching design of innovation and entrepreneurship in medical colleges and the teaching methods of teachers have an impact on the innovative thinking and entrepreneurial ability of medical students, which can provide reference for upgrading the teaching syllabus of medical colleges and effectively improving the innovative spirit, entrepreneurial awareness and innovation and entrepreneurship ability of college students.

#### **Research Results**

The relationship between independent variables (innovation and Entrepreneurship Education) and dependent variables (medical students' innovative thinking and entrepreneurial ability) was determined by analyzing the data obtained, so as to prove whether the research hypothesis is correct.

#### **Conclusion**

According to the research results, it provides theoretical basis and improvement direction reference for Upgrading Medical College Students' teaching syllabus and further cultivating medical students' innovative thinking and entrepreneurial ability.

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## **Procedural Knowledge and Learning Task in Vocational Education Curriculum and Teaching Theory**

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### **Abstract**

With the continuous reform of education methods, the teaching methods at all stages have changed. In vocational education, teaching theory also presents a new situation. In vocational education, procedural knowledge plays an extremely important role in cultivating students' professional ability and skills. The formulation of scientific procedural tasks can effectively promote students' mastery of procedural knowledge, and be able to Guide managers to make reasonable management plan and process. As the basis of professional ability development, procedural knowledge can guide students to complete learning tasks better and faster, and procedural tasks can also promote students to have a better overall grasp of procedural knowledge and play a role in promoting each other. This paper will analyze the procedural knowledge and learning task in vocational education curriculum and teaching theory.

### **Introduction**

You can write about 1) the economic that relates with your research, 2) you can write about the environment in the present

In the current learning task, procedural knowledge, as a course to guide students and teachers to deepen their understanding of various subjects, plays a guiding role in the students' learning process, which is equivalent to the content of methodology. It can guide students to think about relevant issues and analyze problems, rather than teach students how to operate. This way is more effective It can improve students' thinking ability and logical reasoning ability, at the same time, it can also make students think independently about problems, so that students can really make use of what they have learned, and transform the knowledge they have learned into their own understanding scope, which plays an extremely important role in the teaching process.

You can write about 1) the importance of research, which relates your research or 2) the general researches, which relate in your research.

In vocational education, although we pay more attention to students' practical ability, in the specific education process, we can not ignore the education of students' theoretical knowledge, especially the theoretical knowledge related to the subject. The learning of theoretical knowledge plays a guiding role in students' learning career, which can help students better carry out practical activities and improve their judgment ability of things, and Students' learning efficiency. Procedural knowledge can also effectively improve students' cognitive ability and practical ability, and combine practice with theory.

In addition, procedural knowledge plays a very important role in cultivating students' all-round development and runs through all stages of students' learning. First of all, when students just come into contact with a thing or a certain discipline, procedural knowledge can help students form an overall cognition of this

thing, and teachers can judge students' ability to absorb new knowledge from their first impression, so as to carry out more targeted teaching for students. Through procedural knowledge, students can first analyze the appearance of new knowledge, and then carry out a deeper discussion. This way is more in line with the order and efficiency of human learning. Related scholars in the study of human learning habits and ways to draw the conclusion that people in the acceptance of new knowledge, first of all, will have a strong interest in this knowledge, but with the increasing difficulty of learning, this interest will be replaced by the trouble of learning, so that many people will stop learning this knowledge in the face of difficulties. But if the teacher can choose the appropriate teaching method at this stage of the students, and can make the students interested in this subject again, so as to improve the learning efficiency.

You write about 1) the objective of your research, 2) the profit of your search, and 3) steps of doing the research.

The relationship between procedural learning tasks and procedural knowledge is a kind of mutual promotion relationship. Procedural learning tasks can help students better understand knowledge, and procedural knowledge can make teachers better formulate learning tasks, so as to promote the overall development of students. This section will analyze the role of procedural learning tasks in promoting procedural knowledge.

In vocational education, learning tasks are mainly formulated according to the characteristics and specific contents of vocational education. This method is more scientific among various teaching methods. It can make teaching plans according to students' learning characteristics and comply with students' dominant position. Starting from students' learning methods and characteristics, and combining with the characteristics and specific contents of the subjects studied, the teaching plan can be formulated. In addition, teachers should also increase students' practice opportunities, accumulate teaching experience from students' practice process, analyze the key and difficult points of the subject, and work out a more scientific teaching plan based on their own teaching experience.

Although procedural learning tasks are formulated according to the learning characteristics and tasks of the discipline, they also have their own unique characteristics, such as action orientation, independent construction, multiple situations and task introduction. The existence of these characteristics makes the procedural learning tasks play a better role in the teaching process and promote the teaching effect. The rate of increase. Procedural learning tasks are formulated on the basis of time and discipline characteristics, so procedural learning tasks have a strong action oriented role. In the teaching process, teachers can choose questions related to students' life to ask questions and guide them, and carry out teaching activities in combination with various teaching methods, such as the media means that have a greater impact on students, such as intelligence Mobile phones, computers, etc., and students' learning suggestions are collected to find out the shortcomings of teachers in the teaching process, so as to make targeted improvement.

In addition, the procedural learning task is based on students and learning tasks. In essence, it is a teaching method and means. However, this teaching method is different from the traditional teaching method. In teaching activities, teachers should try to restore the real learning scene, and ensure that students can get real exercise in practice, and can be controlled if necessary. Make some human accidents on the task, so as to



train students' ability to deal with emergencies, make students more adapt to the social environment, so that they can integrate into the working environment in a shorter time when they go to work.

## **Theories and Related Researches**

### **Theories**

In vocational education, although we pay more attention to students' practical ability, in the specific education process, we can not ignore the education of students' theoretical knowledge, especially the theoretical knowledge related to the subject. The learning of theoretical knowledge plays a guiding role in students' learning career, which can help students better carry out practical activities and improve their judgment ability of things, and Students' learning efficiency. Procedural knowledge can also effectively improve students' cognitive ability and practical ability, and combine practice with theory.

### **Related Researches**

The relationship between procedural learning tasks and procedural knowledge is a kind of mutual promotion relationship. Procedural learning tasks can help students better understand knowledge, and procedural knowledge can make teachers better formulate learning tasks, so as to promote the overall development of students.

## **Methodology**

Procedural knowledge and procedural learning tasks have been widely promoted and applied in major vocational colleges, and have achieved good results. This section will analyze the specific application of procedural knowledge in the teaching process.

### **Teaching mode**

When making teaching plans according to procedural knowledge, they are more inclined to practice. By restoring the practice scene, especially in the process of vocational education, it is based on practice. Basically, students are brought into the real scene to carry out practice similar to practice, so that students can truly understand and apply the knowledge they have learned to the practice process, and develop more diversified In addition, this way can also attract students' interest in learning. In the process of hands-on production, students can more intuitively observe the changes in the practice process, so as to deepen students' understanding of relevant knowledge.

In addition, we should also ensure that students actively participate in the practice process, in which teachers can act as a guide to stimulate students' Thinking on relevant issues, and put forward reasonable suggestions for students based on their own experience. At the same time, we should always pay attention to the changes in the field of this discipline. As the economic development speed is accelerating, the level of science and technology has also improved, and various disciplines have been rapidly developed When observing the new changes in this field, teachers should timely teach the changes to students, so that students can understand and use the new technology in this field, so as to improve their own level and learning ability.

### Teaching strategies

Teachers should pay attention to the strategy when making the teaching plan, combine with the characteristics of the subject, comprehensively use a variety of teaching methods to carry out teaching activities, and strengthen the analysis of disciplinary loopholes, and timely solve this part of the problem, so as to make the teaching plan more scientific and reasonable. Although most of vocational education is based on practice, the importance of theory can not be reduced in the need to explain the theory, and appropriate methods should be selected to guide students. For example, we can carry out teaching activities through multi-media teaching means, inserting charts, videos and other ways to make the classroom presentation more diverse, which not only conforms to the learning of vocational college students Learning characteristics, can also achieve teaching objectives, more conducive to the realization of teaching tasks, improve the efficiency of vocational education.

### Research Results

Procedural learning task takes students and learning tasks as the main body. In essence, it is a kind of teaching method and means, but this teaching method is different from the traditional teaching method. In teaching activities, teachers should try to restore the real learning scene, and ensure that students can get real exercise in practice, and can create some tasks when necessary In order to train students' ability to deal with emergencies, students can adapt to the social environment more, so that they can integrate into the working environment in a shorter time when they go to work.

### Conclusion

In a word, in the process of vocational education, procedural knowledge and procedural learning tasks can stimulate the enthusiasm of students to a great extent, and improve the learning efficiency of students. At the same time, it is more conducive to the unified management of students by managers. But in this way to carry out education for students, we should also pay attention to the formulation of teaching methods, and solve the problems in this way in time, so as to make this way more scientific, reasonable and effective. This paper analyzes the important role of procedural knowledge in the teaching process, and discusses the specific application of procedural knowledge in teaching theory, hoping to provide reference for vocational education managers and teaching workers.

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## **Study of Conditions and Problems of School Management of High School**

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### **Abstract**

School management has an important influence on the creation of teaching environment and the development of teaching activities, as well as students' learning and overall development. In order to ensure the realization of school management objectives, in practice, we should combine the requirements of the new curriculum standards, carry out necessary reforms on teaching philosophy, teaching methods and so on, and actively promote the overall improvement of teaching quality. School management can effectively connect the relationship between school and teachers, parents and students, which is conducive to improving the quality of classroom teaching, harmonious relationship between teachers and students, and conducive to creating a harmonious and pleasant campus atmosphere. Schools should further emancipate the mind, improve the level of school management work.

**Keywords:** School management, Current situation, Measures, Analysis

### **Introduction**

School teaching management is an important part of modern school management, aiming at improving teaching quality through teaching management. And its teaching level and teaching quality are directly related to the success or failure of the school. In the school education reform into the 21st century, school teaching management has become a topic of concern. To deepen the teaching practice, I think it is necessary to make a comprehensive analysis of the current situation and problems of school teaching management.

China's education has been affected by exam-oriented education for a long time, causing problems in the management of primary schools in many aspects: the quality-oriented education advocated nowadays cannot be really implemented; There is a deep generation gap between teachers and students, can not communicate in a timely manner; The class culture construction work is not perfect and so on. These problems directly affect the teaching quality of schools. In order to improve the teaching quality of schools, schools need to do a good job in campus management, which has become an important issue for primary schools and even the entire education industry to consider.

### **Methodology**

After decades of education development in China, the status quo of teaching management is still traditional, always around the preparation, teaching, auxiliary, batch, test all aspects of the process management, to strengthen the management system, to check for implementation. Although it has played a role in the development of teaching, there are many problems such as too dead, too old, too formalized and so on.

School management has an important influence on the creation of teaching environment and the development of teaching activities, as well as students' learning and overall development. In order to ensure the realization of school management objectives, in practice, we should combine the requirements of the new curriculum standards, carry out necessary reforms on teaching philosophy, teaching methods and so on, and actively promote the overall improvement of teaching quality. The overall management of teachers and students for teaching. Teachers create a good teaching environment, but also provide students with a relaxed atmosphere for learning and growth, encourage teachers to carry out teaching and class management innovation, so that through the improvement of teaching methods to promote students' comprehensive quality. With the improvement of teaching quality as the core, it injects vitality and vitality into the management of primary schools through the change of teaching ideas and the innovation of teaching methods. And put teachers and students on the same footing, actively create a harmonious teacher-student relationship, to provide guarantee for the improvement of management level.

## **Research Results**

### **1. Attach more importance to student management than teacher management**

Students and teachers are the two most important cores in education and teaching activities, which determine the quality of the whole education and teaching. However, from the current situation of primary school management in China, schools are relatively strict in student management, but seldom implement systematic management on teachers. Under the background of quality-oriented education, teachers play a leading role in education and teaching activities. If the management of teachers is neglected, it will affect the improvement of school teaching quality to a large extent.

### **2. Excessive attention to hardware management**

In education and teaching management, most primary schools pay too much attention to the construction of hardware facilities and regard it as the top priority in school management, but insufficient attention has been paid to the management of primary school culture, teacher-student relationship and other aspects. Some schools simply summarize school management into hardware management, teaching management, administrative management and other aspects, but do not pay enough attention to the construction of school culture and the cultivation of teachers' and students' spirit.

### **3. Failing to pay attention to the construction of teacher-student relationship**

Teacher-student relationship is one of the most important relationships in education and teaching relationship. However, in most primary schools in China, the management of teacher-student relationship has not been paid more attention to, resulting in the lack of communication between students and teachers. Heavy force control at the same time, ignore the teachers and students to the improvement of democratic consciousness, still take the instruction in the practical work of the management pattern, and the lack of effective communication between management object, causing tension between managers and by managers, make the contradiction between people and people is not conducive to building harmonious relations within the school, makes the relationship between teachers and students and the relationship between the teachers and school administrators are great negative effects.

## Conclusion

### 1. Teaching philosophy should keep pace with The Times

Any management activities or intensification process needs to be updated at the conceptual level first. In the process of implementing educational and teaching practices in the new era, advanced ideas can play a great guiding role. If we want to carry out quality education in depth, first of all, we must determine the principal position of students, teachers as "educational activities regulator" and "student service provider" role positioning must be clear, students' learning initiative to continue to deepen, so that they really become the master of learning.

### 2. Teaching methods should keep pace with The Times

The old teaching methods and old ideas must be abandoned in the process of teaching activities, and the teaching methods should be optimized constantly in the process of teaching, so as to be problem-centered and student-centered. In the course of classroom teaching, it is necessary to establish a new mode of open-divergent, discussion-inquiry, enlightening, guiding, communication-interactive, etc., so as to cope with the current situation of "heavy task, less class hours, more subjects, new teaching materials and new courses" and achieve better teaching effect.

### 3. The evaluation system should keep pace with The Times

Only blind teaching management system are not teaching evaluation system, must change the traditional ways of evaluation score only, want in the student evaluation system in the process of the establishment of a comprehensive considering multiple factors, such as the social evaluation of students, family evaluation and business skills, and ideological and moral qualities and so on the many kinds of measure and evaluation on the ability and effort from multiple angles side to complete

At the same time, the establishment of multiple evaluation system is also the innovation and strengthening of school management mode and teaching mode.

In short, the school teaching management is the central link of the school, plays a decisive role in the improvement of the quality of education and teaching, as well as the understanding and view of the society, and even its development. Only by completely abandoning the problems existing in the teaching management, improving the working attitude and style, realizing, managing and implementing them, emancipating the mind and seeking truth from facts can we create a new situation in the teaching work of the school.

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## Teacher in Digital Era for Local Development Based on Self-Sufficiency

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### Abstract

In the past decade, digital technology is a revolutionary innovation that has played a big role in the way of life of humans in terms of economy, society and education all over the world, with the phenomenon of disruptions, the time that changes with AI technology. Pure genius that connects the world and condensed into the palm of the smart phone with a database and news that is dynamic and everyone on this planet can access quickly and easy with WiFi Internet for both personal and open to the public independent. Of course, the reflection of technology is both creative and changing human behavior. Technology is considered to be very important in the development of the prosperity of many civilized countries and the world. This blue with intelligence, speed, accuracy and precision, many agencies have utilized to facilitate the achievement of objectives as well. Variety and effective formats especially educational organizations that have the role of integrating technology into intelligent classrooms and challenging classroom management to learners' interests, which will help develop potential and competency based on academic standards and indicators. Empirical knowledge by teachers must rely on the factors of learning resources, local wisdom and wisdom and the application of technology appropriately and creatively being aware of meaningful learning and applying the learners locally, including promoting, creating, and inheriting on a foundation of fit naturalness simplicity, peace, happiness and wisdom

**Keywords:** Teacher; Digital; Local; Self-Sufficiency

### Introduction

An Introduce with the His Majesty's educational speech to His Majesty King Bhumibol Adulyadej. "There is a way to be a good person, such as education. Previously, in education, people in Thailand have knowledge of reading. Writing a book is quite high compared to other countries. Is that there is a high percentage of read and write But less now Because people increase schools or those with fewer teaching duties Compare May be argued that these days with high technology Make it possible to do school affairs Teaching business spreads more But nothing instead of training There is nothing instead of cultivating habits. Is teaching here is divided into training Then cultivate the habit But if there is no training No one who cultivates the habit Or those who train Or those who cultivate habits A low quality person Those who are trained to cultivate habits are of low quality as well. May be even worse Even with high technology This high technology, most people now understand. That have TV, have satellite, have computers But these machines Or these are inanimate things

Looks like life. But may not be alive Have color, have color But there is no ridge. That is, the total color, it is complete and not yet complete, not yet a mind May be able to cause a weak-minded person to be transformed into a different person But to train using the most technologically advanced media is the hardest. To cultivate habits with these machines Teaching people this skill If you look at only certain aspects, it may be seen that it is consistent with the intensive development period. But if you look carefully all around Will see that focusing on teaching people to excel is the criterion May cause various bugs It is important that there is one flaw in the thoughtful and broad thinking. Because of impatience, will hasten to complete as soon It is the cause of work errors, interruptions and failures, two flaws in respect and consideration for others. Because he considered himself excellent Causing arrogance Overlook the importance of other people And often creates conflicts, destroys goodwill, friendship and unity of one another, the flaws in the thrift of being just right in all actions Because he is focused on making himself stand out, progressing, is selfish Take advantage of the four shortcomings of ethics and conscience. Because it is focused on seeking more individual benefits A cause for guilt and corruption Without feeling startled People who have such flaws Seen each other that often caught the reason Misunderstand Most of them encounter problems and mistakes. Unable to create true stable progress for oneself and the country according to their goals It is essential to train well at the same time. Our country will therefore have quality people ready. Is both good and good Become the power of the country, that is, the ability to be a factor and the power for creativity Let goodness be the factor and the power to sustain and bring talent To be in the right way that yields only desirable benefits (Royal Speech on Education, 2019: Online)

Teaching and learning management aimed at developing learners to achieve the characteristics of Thai The realization of the use of information technology for knowledge transfer is an important factor for valuable learning. And integrate local wisdom that will bring sustainable benefits by relying on the Teacher Professional Learning Community, a group of people in the teaching profession with knowledge and interest in a particular subject Exchange share They learn about the subject together to acquire new knowledge to be applied and adapted according to different environments and situations. The learning community will transform the teachers' work from the traditional working culture. Alone To work together as a team By striving to result in professional competencies for teachers and students' learning skills, transforming and creating a collaborative knowledge society. It is a base for adapting and creating new things to happen in the professional learning community. It is a community that contributes to skill improvement. Understanding attitude Encourage teachers 'and teachers' performance to develop from systematic training to self-development to the development of a learning organization (Learning Organization) to eventually become a community of Teacher-based learning encourages continuous teacher learning (Pongthip Thep Aree and Maruth Phattaphon, 2014: 286, cited in Sermsak Wisalaporn and others, 2002: 13. ) By bringing knowledge of science, technology, engineering And mathematics To develop new innovations As well as building an understanding of the learning community building process (PLC) to encourage learners to have a good attitude towards learning and to practice skills that will have the greatest effect on the learners. Truly meet the education world in the Thailand 4.0 era Learning by doing and Active Learning (Dewey, 1959: 66) provide an environment conducive to learning (Bruner, 1983 Chapter 3) that makes learning meaningful for children. They can be used in everyday life (Ausbel, 1968: 551) and learners can develop their learning skills on their own until they find knowledge to further develop (Bruner, 1969: 19). Teachers must have camphor. Integrate learning resources for learners to interact with peers and share social

experiences with awareness and appreciation (Vygotsky, 1978: 56). Problem solving skills in society and in everyday life. Starting from home Learn to observe, think and analyze until you find the best solution (Jones, 1986: 80), which is a constructive and productive solution to everyday problems (Shaklee, 1986: 65). Learners must be able to learn and solve problems from What is closest to you easily. To the complex (Leonard, 1963: 396).

## **Objectives**

Teacher in Digital Era for Local Development Based on Self-Sufficiency in a case study: learning in a Instruction and Environment Management subject.

## **Scope of research**

### **Population**

The population were 30 students of the general science section of Faculty of eaducation of Bansomdejchaopraya Rajabhat University who were selected by purposive sampling method and were taking the Instruction and Environment subject during their second semester in academic year of 2020.

### **Content**

The instruction of learning science in Instruction and Environment Management subject. There is a learning management model, assigning students to take action, taking video, taking 1 month.

### **Instrument**

The evaluation of a case study: learning in a Instruction and Environment Management subject.

### **Evaluation**

The evaluation of a case study: learning in a Instruction and Environment Management subject. There are 5 rating scale of evaluations (Exellence=5, Good=4, Fair=3, Improvement=2 and Poor=1) with 20 items

## **Methodology**

### **Population**

The population were 30 students of the general science section of Faculty of eaducation of Bansomdejchaopraya Rajabhat University who were selected by purposive sampling method and were taking the Instruction and Environment subject during their second semester in academic year of 2020.

## **Research instruments**

The researcher has studied theories, concepts and research papers related to the learning of Teacher in Digital Era for Local Development Based on Self-Sufficiency. Prepare an assessment form for 3 qualified inspectors for the instruments quality and carry out the construction and quality inspection of the instruments with the following steps as:

1) Implementation of the assessment for the experts to check the content validity by using the conformity index technique between the criterion and the objective (Item Objective Congruence Index) by using 3 experts, each of which has an IOC value. Value greater than 0.60-0.85.



2) Improve the evaluation form in the assessment according to the suggestions of experts.

3) Conduct an analysis of the data from the evaluation form and make the assessment as an estimate using likert 5 rating scale consist of excellence=5, good=4, fair=3, improvement=2 and poor=1 by allowing a qualified experts to examine content validity with item objective congruence index or IOC. Value greater than 0.60 or more.

In analyzing the data for the quality of the cloud Assessment object. It was shown that the overall confidence with a reliability was at .87.

#### **Data collection**

Data collection as follows:

- 1) Provide learning objectives to students on Instruction and Environment Management subject.
- 2) Conducting learning activities and training on science Activities.
- 3) Learning action of the preparation process in Science Activities consist of: Step 1 Introduction, Step 2 Determine the science activities, Step 3 presentation.
- 4) Data collection from all 30 evaluation instruction in Instruction and Environment Management subject and check the score according to the specified criteria for statistical analysis.
- 5) The score obtained from all 30 evaluation was used by the researchers to analyze.

#### **Result**

Bansomdejchaopraya Rajabhat University brings success to local development with the science of the King of the education of goodness consist of:

1) principle

The organization of the event must have objectives and objectives that suggest outcomes related to the knowledge, skills and attitudes that must be integrated with the local community. Using learning resources and technology via Webpage information in conjunction with the Application

2) purpose

The project's activity model aims to encourage learners to develop their ability and cooperation. Teamwork, sacrifice, patience and sharing of experience.

3) Characteristics of the project experience guidelines consist of 4 processes, respectively, as follows:

3.1 Planning stage

3.1.1 Appointment of the operating committee

3.1.2 Comprehensive meeting and planning

3.1.3 Coordination and improvement of processes from time to time

3.2 Procedures

3.2.1 Exhibition It is integrated according to the principle of modesty, that is, it is appropriate, useful and feasible. It consists of the following important steps

Step 1 Learning management by integrating with local wisdom.

Step 2 Build understanding and awareness by organizing a knowledge exchange forum

Step 3: Learners ask questions, plan, integrate, analyze, describe and interpret.

3.2.2 Reflection step By integrating rationality, that is, reasonable and relational. It consists of the following important steps

Step 1: Presentation of solutions to problems and the application of technology to creative and innovative learning management.

Step 2 Reasoning for sustainable learning

Step 3 Exchange of opinions with each other.

3.2.3 Procedure for proposing guidelines There is a good integration of the immune system, that is, planning, analyzing the affected effects and finding ways to study sustainable development. It consists of the following important steps

Step 1: Presentation of your work in relation to the local community.

Step 2 Discussion and answer questions

Step 3: Presentation of local innovation solutions for integrated learning.

Step 4: Selecting an approach to apply the royal initiative in education to apply that is appropriate to the local environment.

Step 5 Discussion of Pros and Cons of choosing a solution with sustainable benefits in mind.

Step 6: Dissemination, public relations and exchange of knowledge using Webpage in conjunction with the application of that agency.

3.2.4 Experience enhancement level With a good immune system integration It consists of the following important steps

Step 1 Study Visit

Step 2 Learning Center for Local Wisdom Community

Step 3 Traditions, customs, culture, communities

### 3.3 Summary

3.3.1 Learners jointly summarize guidelines, principles and self-knowledge creation.

3.3.2 The teacher summarizes additional information in order to generate correct concepts and principles.

3.4 Evaluation stage

3.4.1 Cognitive aspects

3.4.2 in range skills

3.4.3 Psychomotor

3.4.4 Self-assessment

## Discussion

The five domains of learning (5 domains of learning), based on the core principles of the National Framework for Higher Education Qualifications, consist of 1) ethics, 2) knowledge, 3) intellectual skills, 4) interpersonal and interpersonal skills. Responsible for 5) numerical analysis skills Communication and use of information technology Standards of learning outcomes are defined as results that are intended for learners to develop from the five areas of learning that are developed during their studies. By studying and participating in activities provided by the higher education institution, both in and out of the curriculum, and reliably

demonstrating the knowledge, understanding and competence from those learnings upon completion of the course or course. T A standard of learning outcomes, which contain at least five of the areas above. This is the standard for learning outcomes of all graduates at all levels of qualifications. With each side having an increased level of complexity When the qualification level is higher Skills and knowledge will be accumulated from a lower qualification level to a higher level. The standard of learning outcomes for any qualification level also includes the standard of learning outcomes in the same field / field of the lower level of qualification. Standards of learning outcomes on morality and ethics apply to all students. Although some fields / fields of study are required for students to develop specific, such as the ethics of doctors, accountants and lawyers, etc. Standards of knowledge learning outcomes And intellectual skills Will be directly related to the field / field of study studied The knowledge and skills of the field / field appropriate for the level of qualification must be specified in the course description. And course details Standards of learning outcomes in interpersonal skills and responsibilities Aims for all students regardless of the level of qualifications and fields / fields of study. Must achieve the standard of learning outcomes in these areas Standards of learning outcomes in numerical analysis, communication and information technology skills. Aims for all students, regardless of the level of qualifications, fields / fields of study Must achieve this standard of learning outcomes However, for students studying in a field / field directly related to this standard of learning outcomes will need to focus on being more proficient than students in other fields / disciplines such as students studying information technology. Must have the skills and skills in accordance with the standards of knowledge and intellectual skills related to information technology that will shape the desirable characteristics of graduates, including: 1) initiative in problem solving; And arguments both in personal and group situations By demonstrating leadership in seeking new, appropriate and practical alternatives, 2) able to apply a solid understanding of the theories and research methodologies in their disciplines to use in solving problems and arguments. 3) be able to consider seeking and suggest solutions to academic or professional problems. By accepting the limitations of the nature of knowledge in their field of study, 4) participate in the monitoring of developments in their science to date. And always increase their knowledge and understanding; and 5) have high ethics and responsibility in both academic contexts. In the profession and community regularly The success factors needed to develop a standard of learning outcomes in each area. The learning of each area of learning standard takes place in a number of ways, so the achievement of each area of the learning outcomes standard is different. Teaching requires teaching strategies suitable for different formats. Of learning Including continual evaluation of the effectiveness of that teaching strategy These factors will be a significant portion of the institute's internal quality assurance. To ensure that these success factors are understood by the faculty concerned. And applied in teaching and learning Moral and ethical development This area of development involves a combination of knowledge of appropriate behavior and to behave appropriately, attitudes and maturity in decision making. The strategies used in development include good role models. Analyzing and reflecting one's own behavior and that of others in different situations A group discussion of simple and more complex conflicts of thought. Will help students to see their values more clearly And came up with the idea using the general principles that What they believe should be a guideline for determining their behavior. The principle of transmission of learning is to discuss possible situations. This includes situations that students will face in their future life and in their work. Although the learning outcomes in this area may be categorized as a specific subject. But every opportunity should be used to enhance moral development. Ethics

in all courses taught, including organizing activities for moral development, which the Faculty of Education University of Bansomdejchaopraya Rajabhat University There is an event planning for graduate identity development, consisting of 1) acquiring knowledge. The key factor is the general overview. About the structure and content of teaching in advance And as new information is added it should be linked to the content provided. And connect with the students' prior knowledge To make it easy to understand and use. Using mnemonic tools and periodically reviewing important material will help ensure that information will remain in memory over the long term. 2) Development of cognitive skills. The factor for success is the development of the concept. Including the principles of theory and practice Situation analysis and problem solving is in a planned sequence of steps and requires practice in many situations. Including those that are similar to situations that can be expected in the future to assist in the transfer of knowledge and to apply them in various situations as appropriate. The development of the ability to define and apply cognitive skills.

## **Conclusion**

Bansomdejchaopraya Rajabhat University brings success to local development with the King of Sapling of Goodness, teacher production for local development and student development activities with continuous practice is the transmission of knowledge and experience in which the learners will receive knowledge, concepts, guidelines and teaching management skills aimed at developing learner. To create the characteristics of being Thai The realization of the use of information technology for knowledge transfer is an important factor for valuable learning. And integrate with local wisdom that will bring about sustainable benefits through a professional learning community (Professional Learning Community) is a group of professional people who have knowledge and interest in a particular subject to share and share. They learn about the subject together to acquire new knowledge to be applied and adapted according to different environments and situations. The learning community will transform the teachers' work from the traditional working culture. Alone To work together as a team By striving to result in professional competencies for teachers and students' learning skills, it transforms and creates a collaborative knowledge society that adapts and creates new things. Go up a professional teacher learning community It is a community that contributes to skill improvement. Understanding attitude Encourage teacher and group performance to develop through systematic training by being able to apply knowledge and local wisdom which appears in the community in the form of individuals, note-taking and cultural traditions to apply in teaching and learning management. Efficiently and meaningfully Teaching and learning at the basic education level have been developed to the international standard. With a focus on blended (Blended Based Learning) science and technology. The use of communicating information through Webpage and Application together with community participation in promoting the strength of development of quality of life and continuous learning that can generate knowledge by itself. (Constructivist Learning) has a process to develop learning management that elevates learners to keep up with the changes in the future world through objective-based learner planning and learning management plan for learners gain experience. Along with the skills seeking knowledge that leads to creative utilization and a happy society

Being a teacher is not difficult. But teaching good is very difficult Because it requires art and science With kindness in the heart On the path of the rainbow bridge that leads students to the stars. Although the dream side is how long The teacher aims and helps to help the students to persevere as a public person with

the spirit of a teacher. Which the teacher would have nothing to give to the disciple other than the sweat, blood, and the fields of life with the ideology of planting the seeds of the land to flourish on the sheets of Siam in the destination of eternal light of wisdom.

### **Acknowledgements**

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## A Density Functional Investigation of the Push-Pull Effect in Some Poly-2,7',1',6''-[3]calicenes: Towards Novel Molecular Wires

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### Abstract

Polycalicenes are an intriguing region of chemical space because of their non-benzenoid aromatic nature and the rich structural diversity of macromolecular families possible by changing the bonding motif. The poly-2,7',1',6''-[N]calicene family, where N equals the number of calicene monomers, are especially interesting as they are linear and their electronic properties are easily tunable. These molecules are potential molecular wires and might have applications in sensors, organic solar cells, and single-molecule electronics. The push-pull effect on the electronic properties of nine derivatives of poly-2,7',1',6''-[3]calicene 1 was investigated. The electron donor (push) on the terminal three-membered ring was NH<sub>2</sub> and the electron acceptors (pull) on the terminal five-membered ring were BH<sub>2</sub>, C≡N, NO<sub>2</sub>, and F. All geometries, vibrational frequencies, and properties (dipoles, NMR, etc.) of molecules 1-10 are reported at the B3LYP/6-31+G(d,p) level of theory. Aromaticity was evaluated using Schleyer's nucleus independent chemical shift (NICS) criterion.

**Keywords:** Calicene; Polycalicene; Aromaticity; NICS; Push-Pull Effect

### Introduction

Polycalicenes are an essentially unexplored region of chemical space. These intriguing molecules, made from the calicene monomer, span a multitude of polycalicene families (Collier & Ratanadachanakin, 2009, Collier & Ratanadachanakin, 2013, Ratanadachanakin & Collier, 2014, Ratanadachanakin & Collier, 2015) made possible by changing the bonding motif between the calicene monomers. An interesting note is that calicene has never been synthesized but substituted calicenes are known (Al-Dulayymi et al., 2000, Halton, 2005). Yoshida et al (Yoshida, 1982) synthesized bicalicene and experimentally determined it to be aromatic (Yoneda et al., 1984, Oziminski et al., 2013). Polycalicenes' extended conjugation offer an opportunity to explore the effect of substituents on aromaticity, conjugation, and the push-pull effect.

Bicalicene's non-benzenoid aromatic character instigated our exploration of polycalicene chemical space, with its rich variety of possible bonding motifs, for other non-benzenoid aromatic molecules. New non-benzenoid aromatic molecules are important as aromaticity is a fundamental concept in chemistry (Balaban, 1980, Lloyd, 1996, Schleyer & Jiao, 1996). These molecules might deepen our understanding of the relationship between structure and aromaticity.

The few polycalicenes synthesized to date have been investigated for potentially unique electrical and optical properties (Yoshida, 1986). Polycalicene chemical space has the potential to yield new materials that

have tunable electrical and optical properties. In addition, these new materials could provide both new insights into and deeper understanding of physical phenomena.

Conjugated polymers have been used as molecular wires (Zang et al., 2020) and single-molecule electronic devices (Su et al., 2016, Xi et al., 2019). The push-pull effect [where electron donors (push) and electron acceptors (pull)] can be used to tune the properties of conjugated systems, a necessary feature to rationally design conjugated oligomers with specific optical and electrical properties useful for new materials applications (Meier, 2005, Lo, et al., 2016). A fuller understanding how the push-pull effect can tune the aromaticity and other properties of non-benzenoid aromatic molecules can help achieve one of the Grand Challenges of Materials Science, easily tuned molecular properties (Hemminger et al., 2007).

## Materials and Methods

This research investigated the push-pull effect on the aromaticity of nine derivatives 2-10 (see Figure 1 and Table 1) of poly-2,7',1',6''-[3]calicene 1. We used NH<sub>2</sub> as an electron donor (push) and BH<sub>2</sub>, C≡N, NO<sub>2</sub>, and F as electron acceptors (pull).

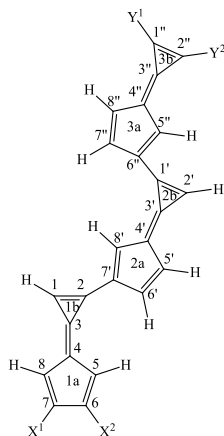


Figure 1 Structure and numbering system of poly-2,7',1',6''-[3]calicene 1 and derivatives 2-10.

All systems were fully optimized using the B3LYP functional (Lee et al., 1988, Becke, 1993) and 6-31+G(d,p) basis set (Clark et al., 1983). Harmonic vibrational frequency calculations at the same level of theory confirmed minima.

Table 1 Location of donor and acceptor groups on derivatives 2-10 of poly-2,7',1',6''-[3]calicene 1.

Molecule	X1	X2	Y1	Y2
1	H	H	H	H
2	NO <sub>2</sub>	NO <sub>2</sub>	H	H
3	CN	CN	H	H
4	BH <sub>2</sub>	BH <sub>2</sub>	H	H
5	F	F	H	H

6	H	H	NH <sub>2</sub>	NH <sub>2</sub>
7	NO <sub>2</sub>	NO <sub>2</sub>	NH <sub>2</sub>	NH <sub>2</sub>
8	CN	CN	NH <sub>2</sub>	NH <sub>2</sub>
9	BH <sub>2</sub>	BH <sub>2</sub>	NH <sub>2</sub>	NH <sub>2</sub>
10	F	F	NH <sub>2</sub>	NH <sub>2</sub>

Nucleus independent chemical shifts (NICS), defined as the negative of the calculated isotropic shielding (Schleyer et al., 1996), were evaluated at selected points (illustrated in Figure 2). The NICS(0) values ( $z=0$ ) were calculated at points located at the center (nonweighted average of ring atom coordinates) and in the plane of the three-membered rings (1b and 2b) and five-membered rings (1a and 2a). The NICS(1) values ( $z=1$ ) were calculated at 1 Å above their respective NICS(0) point.

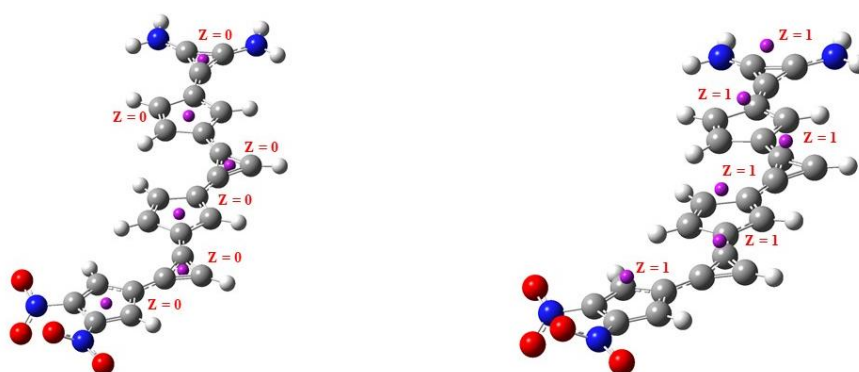


Figure 2 Location of NICS points,  $z=0$  and  $z=1$ , illustrated using poly-2,7',1',6''-[3]calicene derivative 7.

Dipole moments are reported in Debyes (D), bond lengths in angstroms (Å), and NICS values in ppm. All calculations were carried out using the Gaussian 16 suite of quantum mechanical programs (Frisch et al., 2016).

## Results and Discussion

Poly-2,7',1',6''-[3]calicene 1 is naturally polar as it consists of three highly polar calicene monomers aligned in the same general direction. Donor and acceptor substituents can either enhance or suppress charge separation, depending on their location. As illustrated in Figure 3 for derivatives 7-10, the push group (NH<sub>2</sub>)

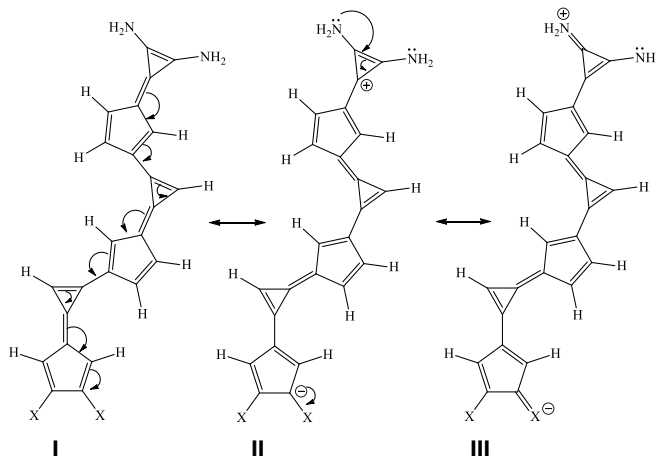




Figure 3 Resonance structures of push-pull derivatives 7-10 ( X = BH<sub>2</sub>, C≡N, NO<sub>2</sub>, and F).

and the pull groups ( X = BH<sub>2</sub>, C≡N, NO<sub>2</sub>, and F) are placed to enhance charge separation as illustrated by resonance structures I-III. The nine poly-2,7',1',6''-[3]calicene derivatives 2-10 discussed here all have donor and acceptor substituents located to enhance charge separation.

The results of this study (bond lengths, dipole moments, and aromaticity evaluated using nucleus independent chemical shifts (NICS)) will be discussed and related to the ability to tune the properties of poly-2,7',1',6''-[3]calicene derivatives.

### Bond Lengths

Bond lengths of the most significant bonds in molecules 1-10 (Table 2) are discussed and compared; (1) C2-C7' single bond, (2) C3-C4 double bond, (3) C3'-C4' double bond, (4) C1-C6'' single bond, and (5) C3''-C4'' double bond.

Both the C2-C7' and C1'-C6'' bonds should shorten as their double bond character increases as illustrated by resonance structures II and III in Figure 3. Looking first at derivatives 2-6 with only push or pull substituents, molecule 2 with NO<sub>2</sub> has the shortest C2-C7' and C1'-C6'' bonds at 1.410 Å and 1.418 Å compared to 1 at 1.421 Å. Likewise, among the derivatives 7-10 with both push and pull substituents, molecule 7 with NO<sub>2</sub> has the shortest C2-C7' and C1'-C6'' bonds at 1.406 Å and 1.408 Å compared to 1 at 1.421 Å. These results are consistent with the C2-C7' and C1'-C6'' single bonds between the calicene monomers shortening as its double bond character increases due to enhanced conjugation between the calicene units (see Figure 3). The NO<sub>2</sub> group with both strong inductive and resonance effects gives the largest increase in conjugation between the calicene units compared to the other acceptor (pull) groups examined.

The C3-C4, C3'-C4' and C3''-C4'' bonds should lengthen as their single bond character increases as illustrated by resonance structures II and III in Figure 3. Unlike the C3'-C4' bond that is equidistance from both the push and pull substituents, the pull substituents are closer to C3-C4 while the push substituent is closer to C3''-C4''. The distance from the pull substituents (X1, X2) varies in the order C3-C4 < C3'-C4' < C3''-C4'' bonds, respectively while the distance from the push substituent (Y1, Y2) varies in the order C3-C4 > C3'-C4' > C3''-C4'', respectively.

Among the derivatives 2-6 with only push or pull substituents, molecule 6 with NH<sub>2</sub> has the longest bond length among the C3-C4/C3'-C4'/C3''-C4'' bonds with a C3''-C4'' bond length of 1.395 Å. NO<sub>2</sub> substituted 2 is second with a C3-C4 bond length of 1.388 Å. Comparing derivatives 7-10 that have both push and pull substituents, molecule 7 has the longest bond length among the C3-C4/C3'-C4'/C3''-C4'' bonds with a C3''-C4'' bond length of 1.398 Å. Molecule 7 also has the longest bond lengths overall among the C3-C4/C3'-C4'/C3''-C4'' bonds of molecules 2-10 with bond lengths of 1.390 Å, 1.390 Å, and 1.398 Å, respectively.

### Dipole Moments

The dipole moments of all derivatives 2-10 are larger than that of poly-2,7',1',6''-[3]calicene 1 at 23.63 D (see Table 3). These results are consistent with the placement of the push-pull groups to enhance charge separation. Also, the data indicates how easily the dipole moment of poly-2,7',1',6''-[3]calicene derivatives can be tuned across a wide range (26.89 D for 5 to 44.47 D for 7).

Table 2 Bond lengths (Å) and dipole moments (Debye; D) of 1-10 at B3LYP/6-31+G(d,p).

Molecule	C2-C7'	C1'-C6''	C3-C4	C3'-C4'	C3''-C4''	Dipole Moment
1	1.421	1.421	1.369	1.377	1.367	23.63
2	1.410	1.418	1.388	1.384	1.369	37.31
3	1.412	1.419	1.385	1.383	1.369	36.49
4	1.415	1.420	1.384	1.381	1.368	30.92
5	1.420	1.421	1.368	1.378	1.367	26.89
6	1.419	1.413	1.371	1.382	1.395	30.28
7	1.406	1.408	1.390	1.390	1.398	44.47
8	1.409	1.409	1.387	1.389	1.398	43.60
9	1.412	1.410	1.386	1.387	1.397	37.96
10	1.417	1.412	1.369	1.383	1.395	33.62

## Nucleus Independent Chemical Shifts (NICS)

NICS(0) and NICS(1) values, considered together, are a reliable and simple method of assessing aromaticity. While qualitative assignment of aromaticity is simple using NICS values, quantitatively assessing aromaticity is more complicated because ring size and electron density play a major role in aromaticity. Reference molecules that are similar to the molecules under evaluation are critical to accurately assessing aromaticity. In this study, the NICS(0) and NICS(1) values of reference molecule poly-2,7',1',6''-[3]calicene 1 are compared to those of push-pull derivatives 2-10 (see Tables 3 and 4).

Table 3 NICS(0) values (ppm) of poly-2,7',1',6''-[3]calicene 1 and derivatives 2-10 at B3LYP/6-31+G(d,p).

Molecule	1a NICS(0)	1b NICS(0)	2a NICS(0)	2b NICS(0)	3a NICS(0)	3b NICS(0)
1	-6.2	-23.3	-5.8	-23.4	-4.8	-21.5
2	-10.2	-24.6	-6.0	-23.8	-5.0	-21.7
3	-9.7	-24.5	-6.1	-23.8	-5.0	-21.7
4	-3.8	-23.7	-5.9	-23.7	-4.9	-21.6
5	-12.1	-23.9	-5.9	-23.5	-4.9	-21.6
6	-6.4	-23.5	-6.2	-24.1	-7.9	-32.3
7	-10.3	-24.7	-6.3	-24.3	-7.8	-32.3
8	-9.9	-24.6	-6.4	-24.3	-7.9	-32.3
9	-4.0	-23.9	-6.2	-24.2	-7.9	-32.3
10	-12.4	-24.1	-6.3	-24.1	-7.9	-32.3

Table 4 NICS(1) values (ppm) of poly-2,7',1',6''-[3]calicene 1 and derivatives 2-10 at B3LYP/6-31+G(d,p).

Molecule	1a NICS(1)	1b NICS(1)	2a NICS(1)	2b NICS(1)	3a NICS(1)	3b NICS(1)
1	-6.3	-7.5	-6.4	-8.1	-5.8	-8.3
2	-6.9	-9.0	-6.6	-8.8	-5.9	-8.6
3	-7.8	-8.8	-6.7	-8.6	-5.9	-8.6
4	-6.9	-8.4	-6.5	-8.5	-5.9	-8.5
5	-6.6	-7.7	-6.5	-8.2	-5.8	-8.4
6	-6.4	-7.5	-6.7	-8.3	-7.6	-8.5
7	-7.0	-8.9	-6.9	-8.8	-7.5	-8.6
8	-7.9	-8.7	-6.9	-8.7	-7.6	-8.6
9	-7.0	-8.5	-6.8	-8.6	-7.6	-8.6
10	-6.8	-7.8	-6.8	-8.4	-7.6	-8.6

The NICS(0) values for derivatives 2-6 with only push or pull substituents all show overall enhanced aromaticity except for BH<sub>2</sub> substituted molecule 4 where the 1a ring that BH<sub>2</sub> is bonded to actually has a higher NICS value compared to 1, -3.8 ppm and -6.2 ppm, respectively.

This anomaly is consistent with NICS(0) values known sensitivity to  $\sigma$  electron density. A similar anomaly is revealed for F substituted 5 where the 1a ring that F is bonded to has a much lower NICS value compared to NO<sub>2</sub> substituted 2, -12.1 ppm and -10.2 ppm, respectively. In contrast, the NICS(0) values for rings 1b, 2a, and 2b of both 4 and 5, where resonance effects predominate and inductive effects are negligible, are similar to the other derivatives with only push or pull substituents. Overall, the NICS(0) data for derivatives 2-6 show slightly enhanced aromaticity. As noted earlier, quantitative assessment of aromaticity is difficult, but among derivatives 2-6 the NH<sub>2</sub> substituted 6 shows the largest enhanced aromaticity followed closely by NO<sub>2</sub> substituted 2.

The NICS(0) values for push-pull derivatives 7-10 all show overall significantly enhanced aromaticity except for BH<sub>2</sub> substituted molecule 9. Once again the 1a ring that BH<sub>2</sub> is bonded to actually has a higher NICS value compared to 1, -4.0 ppm and -6.2 ppm, respectively. Also, ring 1a of F substituted 10 has a much lower NICS value compared to 7, -12.4 ppm and -10.3 ppm, respectively. These anomalies again emphasize the sensitivity of NICS(0) values to  $\sigma$  electron density. Away from inductive effects, the NICS(0) values for rings 1b, 2a, and 2b of both 9 and 10 show similar NICS(0) values compared to the other derivatives. The NICS(0) data indicates that the push-pull derivatives 7-10 all have significantly enhanced aromaticity compared to poly-2,7',1',6''-[3]calicene 1.

The NICS(1) values for derivatives 2-6 with only push or pull substituents all show overall enhanced aromaticity. There are no anomalous NICS(1) values for 4 and 5 because NICS(1) values are calculated 1 Å above the respective NICS(0) value and are not sensitive to  $\sigma$  electron density. The NO<sub>2</sub> substituted 2 and C≡N substituted 3 have the largest enhanced aromaticities with similar NICS(1) values overall.

The NICS(1) values for push-pull derivatives 7-10 all show overall enhanced aromaticity with no anomalous NICS(1) values for either 9 or 10. While overall the NICS(1) values of 7-10 are all similar, NO<sub>2</sub> substituted 7 and C≡N substituted 8 have slightly enhanced aromaticity compared to 9 and 10.

## Conclusions

NICS results indicates that all poly-2,7',1',6''-[3]calicene derivatives 2-10 are aromatic. More importantly, the push-pull effect enhanced the aromaticity of all substituted poly-2,7',1',6''-[3]calicenes 2-10. The push-pull effect can also be used to easily tune the dipole moment of substituted poly-2,7',1',6''-[3]calicenes 2-10 over a wide range (26.89 D for 5 to 44.47 D for 7).

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