BOOK OF PROCEEDINGS

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TITLED **MULTIDISCIPLINARY** RESEARCH TOWARDS A **SUSTAINABLE SOCIETY**

Book of Proceedings

The 5th TICC International Conference 2020

titled Multidisciplinary Research Towards a Sustainable Society

Thailand International College Consortium (TICC)

Khon Kaen University International College

Naresuan University International College

Burapha University International College

Prince of Songkla University International College

Faculty of International Studies, Prince Songkla University

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Co-hosted by:

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WELCOME MESSAGE FROM THE THAILAND INTERNATIONAL COLLEGE CONSORTIUM (TICC)

Welcome to the 5th TICC International Conference titled "Multidisciplinary Research Towards a Sustainable Society." The Thailand International College Consortium (TICC) is sponsoring the 5th International Conference in Khon Kaen province, the commercial and educational center of Northeastern Thailand. The TICC International Conference is an innovative forum for individual scholars, researchers, and students across the globe to share experiences and exchange views on contemporary issues regarding international studies, business and management, tourism and hospitality, media and communications, and sciences and technology. Following the success of the previous TICC conferences, Khon Kaen University International College (KKUIC) is pleased to announce the Call for Papers for the 5th TICC International Conference titled "Multidisciplinary Research Towards a Sustainable Society." This two-day event is co-hosted by Naresuan University International College, Burapha University International College, Prince of Songkla University International College (Hat Yai Campus), and Faculty of International Studies, Prince Songkla University (Phuket Campus). The conference will be held from Thursday 26 - Friday 27 November 2020.

The TICC International Conference aims to provide a unique opportunity for academics, scholars, researchers, industry stakeholders, local and regional bodies, governmental agencies, and students to gather and create a space for interdisciplinary discussion on ideas, practices, implications, and applications regarding sustainability issues locally and globally. This conference also aims to establish itself as a key event for understanding the threats and risks of globalizing societies by exploring future opportunities in order to put the principles of sustainability into action.

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The Thailand International College Consortium (TICC) International Conference is co-hosted by 5 International colleges consisting of Khon Kaen University International College, Burapha University International College, Naresuan University International College, Prince of Songkla University International College, Hat Yai Campus and Faculty of International Studies, Prince of Songkla University, Phuket Campus. These international colleges established the Thailand International College Consortium (TICC) in 2018 to enhance academic collaborations among the partner universities. TICC has the following goals.

1. To exchange Thai and international students at both undergraduate and graduate levels among partner universities
2. To exchange lecturers among partner universities
3. To conduct collaborative research projects.
4. TICC would like to welcome all international colleges in Thailand to become a member and enjoy several benefits that TICC could offer.

ACKNOWLEDGEMENTS

A COMPARISON OF ELECTRICITY BILL PAYERS' SATISFACTION LEVELS TOWARD MARKETING MIX FACTORS (7PS): A TWO-SCENARIO STUDY IN CHONBURI

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Abstract: Customer satisfaction is one of the best key predictors of future organization in informing loyalty and willingness of distributing positive publicity. To increase higher brand values through customers, business basically need an improvement of all critical activities. This paper aimed to assess and compare the bill payers' satisfaction levels toward marketing mix factors (7Ps) in paying electricity bills at PEA and other payment service counters in Chonburi. Data were collected from 411 respondents who have been serviced by both Provincial Electricity Authority (PEA) and other service counters, with 822 returned surveys distributed every city in Chonburi. By using descriptive and frequency statistics, the findings presented most of the respondents perceived that they were more satisfied when receiving services with other service counters rather than at PEA counters. To advice PEA services to increase of its business opportunities, and improve managerial implications, PEA counters could develop the services to employ their optimal performance, for example, the information announcement which could help giving the information in terms of firm's products and services and advices of a paying process. For the international service marketing implications, satisfaction could represent distinctive or competitive advantages for its services.

Keywords: Marketing mix (7Ps), PEA, Satisfaction, Service marketing

1. Introduction

In Thailand, Provincial Electricity Authority (PEA) is considered as utilities and maintained as a state enterprise organization. Provincial Electricity Authority considers the well-being of the people is significant. However, the operation should be profitable enough to feed themselves and can extend the business to people who have not used electricity also. PEA restructured its organizational strategies and structures line with updated situations. The goals of PEA were to

rearrange and develop its firm as the Electric Utility of the future by applying innovation development. Several academic papers studied on traditional marketing mix (4Ps) for decades, then attempting to emerge to service marketing mix (7Ps). Marketing strategies take an important role for service industries in order to gain cost efficiency, risk sharing and competitive advantages. Although PEA is the only electricity producers for many provinces including Chonburi, PEA is ultimately responsible to the satisfaction of the public. To fulfill the responsibility, developing its services is needed to allow the public to assure itself that PEA exercises its services with the public's better satisfaction. Consequently, this study would like to apply the concept of service marketing mix (7Ps) along with the adaptation for service marketing by distributing the surveys through people who were receiving payment services between at PEA counters and at payment service agency.

2. Research Objectives

(1) To compare the customers' satisfaction level through service marketing mix (7Ps) factors in paying electricity bills at PEA counters and at other payment service counters, and
(2) To suggest PEA and other service counters' opportunities and managerial implications. The benefits of this study are to help PEA and other payment service counters employ their optimal performance.

3. Literature Review

3.1 Marketing Mix of Supply of Electricity Payment Services

McCarthy's 4Ps mix has increasingly come under attack with the result that different marketing mixes have been put forward for different marketing contexts. Services marketing theorists have taken great pains to distinguish services marketing from product marketing. A major portion of this effort has focused on rethinking the marketing mix and showing how it is different for services. By demonstrating that the marketing of services requires different decisions than goods marketing requires, these thinkers present services marketing as a unique and distinct type of marketing. The services marketing mix differs chiefly from the 4Ps by the addition of three new decision responsibilities that must be integrated to form a coherent and effective services marketing mix. By adding people, physical assets, and process to the marketing mix forming the 7Ps services.

Marketing theorists staked out a new field of management theory and practice separate from the marketing of tangible goods (Goldsmith, 1999; Lovelock, 1996). This conceptual advance has, in turn, caused a re-evaluation of traditional marketing management thought by obscuring the boundary between goods and services, forcing the realization that many products consist of elements of both tangible goods and intangible services (Goldsmith, 1999). It contends that the numerous and ad hoc conceptualizations undermine the concept of the marketing mix and proposes that Booms and Bitner's (1981) 7Ps mix for services be extended to other areas of marketing. Mohammed and Pervaiz (1995) show how the 7Ps framework can be applied to

consumer goods and reports the results of a survey of UK and European marketing academics which suggest that there is a high degree of dissatisfaction with 4Ps. It also suggests that the 7Ps framework has already achieved a high degree of acceptance as a generic

According to Booms and Bitner (1981) describe that marketing management is the concept of the marketing mix. The marketing mix is not a theory of management that has been derived from scientific analysis, but a conceptual framework which highlights the principal decisions that marketing managers make in configuring their offerings to suit customers' needs. Booms and Bitner (1981) defined 7Ps of the marketing mix as follow: Product, Price, Place, Promotion, People, Process, and Physical Evidence.

However, the concept of 7Cs in marketing mix is better explained the decision making of behavior of services' customers in the markets (Moharana, 2013), while 7Ps concept is applied to explain the decision making by the service providers or producers (Rafiq and Ahmed, 1995). Therefore, the knowledge from service recipients and users is crucial as it can shape the combination of 7Ps applied and used by service providers or producers.

Product and Customers' Wants/Needs

Product can be tangible or intangible things that are offered to the market consumption (Kotler, 2000), while customers' wants and needs explain the service producers can sell what someone wants to buy the service (7Cs). Provincial Electricity Authority (PEA) decided what to offer people first, and then hope to find a market for it afterwards. The success of PEA was to find out what customers need or want and then develop the right product with the right level of quality to meet their expectations, both now and in the future. The product and services that PEA launched at the current time are to provide the electricity and attempt to reduce the mistakes, also the e-service including e-pay, another option for people (Provincial Electricity Authority, 2018).

Price and Cost

Provincial Electricity Authority (2018) claimed that a product is only worth what customers are prepared to pay for, while the price includes time and energy to find the right service which is the cost of customers (7Cs). The price needs to be competitive, but this does not mean PEA has to be the cheapest in your market, even PEA is the only one market player. When considering the price of electricity, it's important to look at it from the customer's perspective.

Place and Convenience

Hashim and Hamzah (2014) cited about the place and time of service distribution of physical and non-physical channels that people can connect to the organizations, whereas convenience is recognizing customers' options to pay in ways of convenience to them. According to this

study of satisfaction levels toward how the respondents pay for the electricity through different sites, this factor is emphasized on the organization activities, especially for bill payments.

Promotion and Communication

Santouridis and Kyritsi (2014) suggested for the service industry that it could not be possible to success if the organization uses the conventional promotion tools because of a heavy promotional budget (Aaker and Jacobson, 1994) to communicate with customers to receive feedback and other communications (7Cs). Therefore, the promotional activities such as event management, corporate identity programs, or public relations should be added effectively and potentially.

People and Competence Courtesy

The performance of the service firms whether it is good can be relied on their people (Kushwaha and Agrawal, 2015) to influence the customers' perceptions by customers' consideration and reflecting their requirements on the service producers (7Cs). Many researches have been considered personal interactions which could be the main driver among the service dimensions of service quality items (Sheorey, Joshi and Kulkarni, 2014). Grönroos and Helle (2012) suggested that the employees of customer-oriented services are considered to how strong of customer-employee relationship, which are focused on interpersonal care, willingness to help, personal attention, and etc.

Process and Coordination Continuity

Amin, Yahya, Ismayatim, Nasharuddin and Kassim (2013) cited that processes can be described as an architecture of services. For a high-contact service industry, customers are an intimate part of the operation, then the process can become customers' experiences (Helm and Gritsch, 2014). However, businesses have moved forward from offline to online through an electronic channel. So many of them applied their business to 'e-' in terms of services such as e-banking, e-logistics, and so on. For 7Cs in marketing mix, the coordination continuity can define the levels of service delivery in changing market conditions.

Physical evidence and Comfortable Circumstance

Physical evidence can be called as servicescape which is referred to an appearance of the service surrounding or style of service (Klaus and Maklan, 2012). Physical evidence should be well-managed by the organizations because it might affect consumers' impressions and attitudes (Kranias and Bourlessa, 2013). It delivers any tangible goods facilitating the service performance and communication, while comfortable circumstance decision made by customers is essential (7Cs).

4. Research Methodology

Based on the objectives of study in comparing people's satisfaction levels toward their electricity bill payment between at Provincial Electricity Authority branches and other payment service counters. The samples were the people who paid electricity bills as usual at both PEA counters and payment service counters. The study was conducted at selected counters distributed in every city in Chonburi. All respondents were carefully asked to ensure that all for this study were who had the experiences in paying electricity bills at PEA counters and other service counters. A purposive sampling was adopted to select sampling unit. Questionnaires were used to collect data. Method of distributing questionnaires was a convenient population selection. The 411 samplings were selected with 822 questionnaires returned because each person needed to answer 2 questionnaires with different contents.

The instrument used to collect data for this research is a questionnaire with questions of closed-ended forms by divided structure of the questionnaire into 2 parts. The first part was asking the personal information of the respondents include gender, age, marital status, education level, occupation, in come per month by questions of closed-ended form. The second part was asking people's satisfaction levels toward marketing mix (7Ps) of service at PEA counters. Another survey was similar but changing at part 2 into people's satisfaction levels toward marketing mix (7Ps) of service at other service counters. In part 2, the respondents were asked to complete the questionnaire by rating on their satisfaction levels toward marketing mix factors (7Ps) of service at a 5-point scale Likert scale ranging from "Excellence" to "Improvement" where "Excellence" is 5 and "Improvement" is 1.

5. Research Hypothesis

This paper has been done by distributing satisfaction survey on 822 data points from 411 respondents consisting of 411 paying electricity bills at PEA counters (PEA) and 411 paying bills at service counters (SER). The main objectives are to compare the services provided by PEA and other service counters and suggest the service providers to develop their offerings. The study was categorized in 7 categories from 7Ps in marketing mix:

A = The satisfaction level toward product and service
B = The satisfaction level toward price and service charge
C = The satisfaction level toward place of service provided
D = The satisfaction level toward promotion and public relation toward services
E = The satisfaction level toward people (employee provider) when receiving services
F = The satisfaction level toward process of service while receiving services
G = The satisfaction level toward physical evidence of services received

The aims are to find aspects that are significantly different between PEA and SER. Since the data was collected in terms of 5-point Likert scale, a study was tested by a non-parametric test that is accurate with ordinal data to validate the hypothesis by using the descriptive sign-test.

H_0 = No difference in median of the signed differences.
H_1 = Median of the signed differences is greater than zero.

6. Results

Data were analyzed by using SPSS with a significant level at 0.05. Descriptive statistics of frequency and percent were described demographic profile. Questions on demographic aspects such as gender, age, marital status, educational background, occupation, income, experience in the Internet use, and frequency of the Internet use were asked at the first section. The demographic data was shown in Table 1.

Table 1 Sample description (N=411)

Variables		N (411)	Percent
Gender	Male	187	45.50
	Female	224	54.50
Age	20 and below	29	7.10
	21-30	145	35.30
	31-40	130	31.60
	41-50	79	19.20
	51 and over	28	6.80
Marital Status	Married	168	40.90
	Unmarried	243	59.10
Educational Background	High school	32	7.80
	Undergraduate	256	62.30
	Postgraduate	123	29.90
Occupation	Student/college student	106	25.80
	Government/state-enterprise officer	83	20.20
	Company employee	101	24.60
	Business owner	94	22.90
	Others	27	6.60
Income/month (Baht)	Below 10,000	85	20.70
	10,001-20,000	84	20.40
	20,001-30,000	112	27.30
	30,001-40,000	76	18.50
	40,001 and over	54	13.10

From 411 samplings with 822 returned questionnaires, results of demographic data showed in Table 1 that 411 valid responses were used for empirical analysis. The respondents were primarily female (54.50 percent), age of between 21-30 years old was the majority (35.30 percent), mostly unmarried (59.10 percent), undergraduate (62.30 percent), mostly student or college students (25.80 percent), and income between 20,001 and 30,000 Baht per month (27.30 percent).

A survey was designed into 2 parts of (1) personal profile, (2) satisfaction level toward marketing mix factors when they paid electricity bills at PEA counters and at payment service counters. In part 2, survey was conducted a multi-item approach, by each construct measured by several items under that construct. The reliability of each construct was tested by applying Cronbach's alpha. The result of reliability from 62 items presented in the questionnaire yielded a Cronbach's alpha of 0.971 which is higher than 0.70 suggested by Hair et al. (1998).

Table 2 The attributes of each construct

Attribute		Description
The satisfaction level toward product and service (A)	A1	Service process is appropriate.
	A2	Service provided is appropriate before and after getting service.
	A3	Speed of service is appropriate.
	A4	Facilitating the service is appropriate.
	A5	Duration of receiving service is appropriate.
	A6	Equipment / office supplies are enough.
	A7	It is easy to use service form.
	A8	Quality of product and service sold is appropriate.
The satisfaction level toward price and service charge (B)	B1	Service charge is appropriate.
	B2	Rates of financial services is appropriate.
	B3	Products service have reasonable price.
The satisfaction level of place of service provided (C)	C1	The property is located in a place that is easy to find.
	C2	The property is clean and tidy.
	C3	The place of waiting for the service is enough.
	C4	Sign or message service points are clear.
	C5	The place has facilities enough.
	C6	The place has parking lots enough.
The satisfaction level toward promotion and public relation toward services (D)	D1	Public relation is benefits for payers.
	D2	Brochure is useful for service.
	D3	Staff advise payers how to use service.
	D4	Signs for process of service is clear.
	D5	The information of various service is provided.
	E1	Employees are welcoming people as well.

Attribute		Description
The satisfaction level toward people (employee provider) when receiving services (E)	E2	Employees are willing to serve people.
	E3	Employees are polite.
The satisfaction level toward process of service while receiving services (F)	F1	Speed of service is appropriate.
	F2	Steps of service is appropriate.
	F3	Advice is given when people have inquiries about the parcel shipping.
The satisfaction level toward physical evidence of services received (G)	G1	Service area is clean.
	G2	Facilities such as pens and desks are provided in a good condition.
	G3	Waiting area for the service is comfortable.

Table 2 presented the attributes' description for each construct of marketing Mix (7Ps). The satisfaction level of product and service was represented by A with 8 items showed by A1-A8. The satisfaction level of price and service charge was represented by B with 3 items showed by B1-B3. The satisfaction level of place of service provided was represented by C with showed by 6 items showed by C1-C6. The satisfaction level of promotion and public relation toward services was represented by D with 5 items showed by D1-D5. The satisfaction level of people (employee provider) when receiving services was represented by E with 3 items showed by E1-E3. The satisfaction level of process of service while receiving services represented by F with 3 items showed by F1-F3, and the satisfaction level of physical evidence of services received was represented by G with 3 items showed by G1-G3. Moreover, the reliability analysis of individual factor was summarized in Table 3.

Table 3 The reliability analysis of each construct

Factor	Reliability value	
	PEA counters	Other service counters
The satisfaction level toward product and service (A)	0.88	0.86
The satisfaction level toward price and service charge (B)	0.79	0.76
The satisfaction level of place of service provided (C)	0.85	0.84
The satisfaction level toward promotion and public relation toward services (D)	0.86	0.81
The satisfaction level toward people (employee provider) when receiving services (E)	0.86	0.76
The satisfaction level toward process of service while receiving services (F)	0.78	0.71

Factor	Reliability value	
	PEA counters	**Other service counters**
The satisfaction level toward physical evidence of services received (G)	0.81	0.77

Table 4 Mean and Standard Deviation values of satisfaction levels of marketing-mix items between PEA VS Service counter (N= 411, with 822 returned surveys)

Attribute	PEA counters		Other service counters	
	mean	**S.D.**	**Mean**	**S.D.**
A1	3.77	0.926	3.93	0.775
A2	3.82	0.977	3.96	0.839
A3	3.69	0.927	3.84	0.881
A4	3.72	0.959	3.87	0.872
A5	3.59	0.972	3.83	0.848
A6	3.67	0.949	3.80	0.835
A7	3.68	0.929	3.84	0.822
A8	3.85	0.947	3.93	0.860
The satisfaction level toward product and service	3.72	0.95	3.88	0.84
B1	3.62	0.954	3.76	0.813
B2	3.66	0.945	3.75	0.839
B3	3.58	0.978	3.75	0.859
The satisfaction level toward price and service charge	3.62	0.96	3.75	0.83
C1	3.66	0.922	3.85	0.878
C2	3.75	0.934	3.86	0.834
C3	3.59	0.987	3.72	0.893
C4	3.69	0.949	3.75	0.898
C5	3.61	0.972	3.74	0.919
C6	3.41	1.026	3.75	0.957
The satisfaction level of place of service provided	3.61	0.97	3.78	0.9
D1	3.68	0.964	3.93	0.773
D2	3.68	0.941	3.81	0.854
D3	3.59	1.037	3.83	0.878
D4	3.68	0.979	3.81	0.836
D5	3.58	1.015	3.75	0.924

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Attribute	PEA counters		Other service counters	
	mean	S.D.	Mean	S.D.
The satisfaction level toward promotion and public relation toward services	3.64	0.99	3.83	0.85
E1	3.66	0.942	3.86	0.860
E2	3.73	0.949	3.91	0.826
E3	3.64	0.911	3.82	0.808
The satisfaction level toward people (employee provider) when receiving services	3.68	0.93	3.86	0.83
F1	3.65	0.936	3.89	0.764
F2	3.73	0.887	3.89	0.790
F3	3.60	0.9448	3.85	0.821
The satisfaction level toward process of service while receiving services	3.66	0.92	3.88	0.79
G1	3.86	0.878	3.92	0.820
G2	3.79	0.923	3.95	0.850
G3	3.80	0.909	3.91	0.840
The satisfaction level toward physical evidence of services received	3.82	0.9	3.93	0.84

Table 4 illustrated means and standard deviation values of individual item under marketing mix (7Ps) constructs by separated into satisfactory of paying bills at PEA and service counters.

Table 5 The Comparison of the satisfaction level toward each marketing mix factor in paying electricity bills between PEA counters and other payment service counters

Attribute	Sign-test	p-value	p_flag_1tailed
A1	17.5	0.011292	TRUE
A2	16	0.017339	TRUE
A3	17	0.015382	TRUE
A4	14.5	0.036122	TRUE
A5	32	9.53E-06	TRUE
A6	17	0.014669	TRUE
A7	22.5	0.001305	TRUE
A8	8	0.14441	FALSE
B1	16	0.019048	TRUE
B2	9	0.121458	FALSE
B3	19	0.006018	TRUE
C1	24.5	0.000695	TRUE
C2	8	0.160259	FALSE
C3	14	0.036129	TRUE

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Attribute	Sign-test	p-value	p_flag_1tailed
C4	4	0.317765	FALSE
C5	16.5	0.019526	TRUE
C6	43	2.2E-08	TRUE
D1	31.5	1.04E-05	TRUE
D2	17.5	0.009518	TRUE
D3	29.5	5.07E-05	TRUE
D4	17.5	0.010688	TRUE
D5	25.5	0.000456	TRUE
E1	30	3.69E-05	TRUE
E2	24	0.000597	TRUE
E3	23.5	0.000781	TRUE
F1	31.5	5.24E-06	TRUE
F2	21.5	0.001338	TRUE
F3	33	4.62E-06	TRUE
G1	5.5	0.241429	FALSE
G2	15	0.024633	TRUE
G3	10	0.102082	FALSE

Note: The significant level was at 0.05 (two-tailed), or 0.025 (one-tailed).

The result from analysis was shown in Table 5. Items of A1 to G3 illustrated the mean- values difference of satisfaction level for individual attribute between paying bills at PEA and service counters. Most items showed that the respondents perceived significantly service counters provided better services than PEA counters did. However, there were 6 exceptional attributes out of which were 'Quality and service sold is appropriate.'; 'Rates of financial services is appropriate.'; 'The property is clean and tidy.'; 'Sign or message service points are clear.'; 'Service area is clean.'; and 'Waiting area for the service is comfortable.' Those 6 attributes explained that the respondents perceived services provided by PEA and service counters were not different.

7. Discussion and Conclusions

Regarding the results, several average values of paying bills at PEA counters were lower than satisfaction levels than paying bills at service counters. It clearly showed that PEA needs more improvements in various aspects. The improvement of duration in receiving a service should be shortened. Price of products and services should be more reasonable and adjusted. PEA counters had a problem of space while awaiting services, if compared to all aspects for a construct of places of services received. According to Khondaker and Mir (2011), the study clearly showed that the dimension of service quality was important for customers which included quality of personnel attributes such as staff whether they were prompt, knowledgeable, helpful, courteous, and understood customers' wants.

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PEA should improve the information announcement about its service providers in order to help people know the products and services belong to it. Also, PEA should train its staff's courtesy in serving service to people, including providing an advice to people when they have problems. Staff should be well-trained and have a good manner. Lastly, PEA should provide good-conditioned facilities during the service such as pens, counter desks, etc.

For payment service counters, overall, there were high average values of satisfaction levels given to payment at service counters. However, some service developments are needed to serve better service to bill payers, for example, the information of service provided is required to make payers know more promotion of its service. According to 7Ps, there was one of constructs that had lower than other aspects. That was 'waiting area for the customers. It might be suggested that many of service counters should find more space for a long queue for customers because counters are for a variety of bill payments, however, some service counters had limited spaces itself. Overall, paying bills through payment service counters can satisfy people at a higher level than paying at PEA counters, therefore, service counters should be continually improved and added other service features that make people convenient in paying bills.

8. Recommendation

In an international context, although service expectation and satisfaction on international market are difficult to predict, the impacts of marketing mix factors were on expected satisfaction and experienced satisfaction. Those service businesses build and maintain international networks to have closer customer relationships, still affect choice-selection behaviors and customer share. Regarding marketing mix for service marketing, first, product in service industry is intangible by nature. It has a similar function as product and is measured like product features. The precise decisions of pricing are well supporting to firm's trade and policy. Place can be a physical channel and identify the right service to targets to select services. Promotion is considered as an aspect of communication mix that present a favorable causal relationship between brand and customer satisfaction (Singh, 2016). International service marketing can make brand different among service offering in foreign markets. Working staff satisfaction allows all employees to develop satisfied service, because those create strategic changes into well-performed organizational perspectives (Miller, Hamilton, Scupham, Matwiejczyk, Prichard, Farrer and Yaxley, 2018), and play an important role in human resources (Kotler and Armstrong, 2010). Procedures and process refer as a flow of routine tasks facilitating customers and supplier. Physical environment could carry nice memories to customers to gain favorable service experiences.

Many service organizations view customer satisfaction as a fundamental concept acquired in modern marketing and a key driver in gaining customer loyalty and business performance. The concept of service quality is important and affects a service loyalty in service marketing organizations (Durongdumrongchai, Nitiwattana and Thongchum 2019). To understand customer satisfaction, it is important to understand customer's mind construction because service firms usually contact directly with end customers and relate how customers perceive

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the brand or service, rather than the reality. Lastly, customer satisfaction is one of essential factors driving the organizations to enhance their competitive advantages potentials in managing total quality, innovation, leadership, organizational culture, and employee engagement. Those are key variables resulting in firm's goal achievement (Chayamongkon and Panyasiri, 2019).

9. Acknowledgement

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AN ANALYSIS OF TRIPADVISOR SHOPPING MALL REVIEWS IN THAILAND

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Abstract: Shopping is an important tourism activity. However, knowledge regarding the understanding of tourist experiences at shopping malls in Thailand is limited. Currently, COVID-19 has impacted the profitability of shopping malls that also face competition from the worldwide rise of e-commerce. Factors that drive positive and negative tourist experiences at Thai shopping malls were investigated using data from online reviews, which have now become an important source of information. A total of 40,504 TripAdvisor reviews concerning 46 major shopping malls in Thailand were analysed using the latent Dirichlet allocation (LDA) machine learning algorithm. Five types of tourist shopping experiences were identified as plenitude, connectivity, food, merchandise and commercialism. A textual salience-valence analysis was also performed to investigate words that drove positive and negative tourist shopping experiences.

Keywords: shopping mall, latent Dirichlet allocation, tourist shopping experience, TripAdvisor, online review

1. Introduction

Shopping is an important tourist leisure activity (Hsieh & Chang, 2006; Lin & Lin, 2006; Meng & Xu, 2012; Rabbiosi, 2015; Turner & Reisinger, 2001) to purchase products and gifts for both, relatives and friends and for personal use (Xu & McGehee, 2012). Shopping also provides an opportunity to experience the culture of the visited areas (Meng & Xu, 2012). Shopping may not be the main motive for the visit but being at shopping locations and able to examine, feel and think about the shopping environment are still salient travelling experiences of tourists (Snepenger, Murphy, O'Connell, & Gregg, 2003). Many studies have investigated the importance of shopping for tourists (Kemperman, Borgers, & Timmermans, 2009), the motivations (Das & DiRienzo, 2009; Tauber, 1972; Dholakia, 1999; Jamal, Davies, Chudry, & Al-Marri, 2006; Sundström, Lundberg, & Giannakis, 2011) and how shopping leads to tourist satisfaction (Das & DiRienzo, 2009). However, details are lacking regarding the diverse types

of tourist experiences at shopping locations or shopping malls. A comprehensive understanding of the various aspects, characteristics and factors that drive positive and negative tourist shopping experiences would help destinations and shopping malls to attract more visitors and increase footfall, especially during these challenging times of the COVID-19 pandemic.

In 2017, international tourism was ranked as the world's third-largest export category, with an average value of 4 billion USD per day (World Tourism Organization, 2017). Thailand is highly dependent on the tourism industry. Before the COVID-19 pandemic, income generated from the Thai tourism industry increased from 1.81 trillion Baht in 2013 to 2.66 trillion Baht in 2017 (The Tourism Authority of Thailand, 2017). Thailand was globally ranked in the top ten countries for the most international tourist arrivals in 2017 (World Tourism Organization, 2017). Shopping is a salient attribute with intrinsic attractiveness for both Thai tourists and international visitors who are keen to purchase inexpensive items sold in Thailand (Henkel et al., 2006). However, negative issues still exist involving shopping such as excessive commercialism and forceful persuasion by vendors (Taecharungroj & Tansitpong, 2017).

To better understand the perception of tourists towards destinations and tourist attractions, recent extensive research has focused on online reviews as important sources of information (Taecharungroj & Mathayomchan, 2019). Online reviews are a form of electronic word-of-mouth (eWOM) content created by users to exchange and express opinions and inform others on purchase decisions (Chua, & Banerjee, 2016; Davis & Khazanchi, 2007; Lu & Stepchenkova, 2015). In the field of tourism and hospitality online reviews have been extensively analysed and examined for several aspects such as helpfulness (Chua & Banerjee, 2016), credibility (Ayeh, Au, & Law, 2013), effectiveness (Walther & Jang, 2012), impact on the willingness to pay (Gavilan, Avello, Martinez-Navarro, 2018), drivers of user-generated content (Ukpabi & Karjaluoto, 2018), trends and future directions of online reviews (Schuckert, Liu, & Law, 2015) and shopping and tourist perceptions (Meng & Xu, 2012; Xu & McGehee, 2012; Tsaur, Wang, Yen, & Liu, 2017). However, a comprehensive analysis covering online reviews of shopping malls is lacking.

2. Research Objectives

Reviews of 46 major shopping malls in Thailand on TripAdvisor.com were analysed to identify the types of shopping experiences using the latent Dirichlet allocation (LDA) topic modelling algorithm. Salience-valence analysis (Taecharungroj & Mathayomchan, 2019) was employed to identify the factors driving positive and negative experiences. Enhancing tourist shopping experiences will benefit local businesses and also promote satisfaction and loyalty towards destinations, where numbers of inbound international tourists have drastically reduced as a result of the COVID-19 pandemic. The functions, importance and impacts of online reviews and review platforms are discussed in the context of the research methodology, followed by the findings, conclusions, and managerial implications.

3. Literature Review

3.1 The shopping experience

Shopping is an important tourism activity and plays a crucial role as a major motivator for destination selection (Lehto, Cai, O'Leary, & Huan, 2004). Shopping is a crucial aspect of tourism (Li & Ryan, 2018) accounting for one third of total tourist spending (Litirell, Baizerman, Kean, Gahring, Niemeyer, Reilly, & Stout 1994). In many places, shopping has become the image of destinations that position themselves as a paradise for shoppers such as Paris and Hong Kong (Law & Au, 2000). The purpose of such positioning is to attract tourists because successful tourism is a major economic driver for destinations (Jucan & Jucan, 2013).

Numerous studies have investigated the motivation to go shopping. Tauber (1972) studied psychological needs including personal needs (e.g. learning new trends and sensory stimulation) and social needs (e.g. status of authority and communication with others). Dholakia (1999) mentioned that the motivations to go shopping were enhanced by utilities, family and social interactions. Shopping has also been identified as a leisure time activity to experience destination culture (Meng & Xu, 2012; Xu & McGehee, 2012) or a therapeutic and self-gratifying activity to relieve stress (Jamal et al., 2006). Despite varying motivations, customers expect to experience delight and satisfaction from shopping locations (Sundström et al., 2011). Being delighted is an important aspect of the shopping experience and high emphasis should be placed on shopping areas to improve tourist interaction.

The shopping experience can be considered as one part of the encompassing concept of "customer experience", which has attracted much academic research interest concerning the best ways for retailers to create a pleasant visitation (Grewal, Levy, & Kumar, 2009). The customer experience involves every point of contact and interaction between the customer and the business (Grewal et al., 2009; Andajani, 2015). Previous research has concentrated on factors including promotion, pricing, merchandising, supply chain, location, store environment and brand that impact customer experience at shopping locations such as markets and retail stores (Verhoef, Lemon, Parasuraman, Roggeveen, Tsiros, & Schlesinger, 2009; Puccinelli, Goodstein, Grewal, Price, Raghubir, & Stewart, 2009; Grewal et al., 2009). Buss (1997) proposed the term "entertailing", which he defined as the combination of entertainment and retailing since traditional methods of retailing were insufficient. The one-size-fits-all strategy was not recommended because tourists have dissimilar expectations towards different kinds of retailers (Anselmsson, 2016). Terblanche (2018) identified merchandise assortments, staff and the interior environment as crucial sales factors for supermarkets. Tourist shopping villages presenting "a unique local experience, value for money and regionally distinctive products and opportunities for entertainment and bargain hunting", were significant antecedents of customer satisfaction (Murphy, Moscardo, Benckendorff, & Pearce, 2011).

One very important type of retail environment that has been understudied is shopping malls. Here, tourist experiences at shopping malls in Thailand were analysed and evaluated. Shopping

malls are regarded as places that can satisfy social, recreational and functional tourist needs (Nsairi, 2012). With the emergence of e-commerce and more recently the COVID-19 pandemic, shopping malls as places of physical retail are struggling to attract footfall.

3.2 Challenges of physical retailers

The increasing popularity of electronic shopping (e-shopping or e-commerce) as a convenient substitute for traditional physical purchasing has revolutionalised and transformed the retail industry (Guo & Lai, 2017; Farag, Schwanen, Dijst, & Faber, 2007; Liu, Burns, & Hou, 2013). Research has demonstrated a negative relationship between the adoption of e-shopping and customers visiting physical stores (Weltevreden & Rietbergen, 2007). Internet purchasing offers superior convenience to customers (Zhang, Zhu, & Ye, 2016). Physical retailers now search for strategies to obtain competitive advantages such as customer service (Grewal, Krishnan, & Lindsey-Mullikin, 2008), loyalty rewards programmes, personalisation, customisation and brand/store community (Julian, Ahmed, Wel, & Bojei, 2015).
The emergence of e-commerce has also increased pressure on other online businesses. Market transparency and convenient price comparison (Bodur, Klein, & Arora, 2015) allow customers to easily switch to other providers, making customer retention more difficult (Wirtz & Lihotzky, 2003). Thus, this intense e-commerce competition further impacts the profitability of physical retailers. Physical retailers and shopping malls in particular must quickly analyse this situation and search for solutions. However, only a few studies have explored the needs of tourists in shopping malls and offered practical advice and suggestions. A comprehensive analysis of the tourist experience in shopping malls is required to fill this knowledge gap. Online reviews provide updated information and can be used as a suitable data source to achieve this objective.

3.3 Online reviews

Online reviews are textual and visual content publicly shared by a user to impart information to other users on an electronic platform. They generally include an overall evaluation of a purchase or a visit, post-consumption experiences, quality assessment and value for money (Ye, Li, Wang, & Law, 2012). Online reviews are generally considered to be helpful and have major influences on consumer decision-making (Chua, & Banerjee, 2016; DeAndrea, Van Der Heide, Vendemia, & Vang, 2018; Gavilan et al., 2018) because content posted by experienced consumers is recognised as more trustworthy than company adverts (Chua, & Banerjee, 2016). Online reviews are also regarded as objective and relevant to both tourists and customers (DeAndrea et al., 2018; Narangajavana, Fiol, Tena, Artola, & García 2017). Tourism products are heterogeneous, multidimensional and complex; thus, tourists read online reviews to reduce the uncertainty and risks in decision-making (Pantano & Di Pietro, 2013).

Several online review platforms such as TripAdvisor, Yelp, Citysearch and Virtualtour have gained in popularity during the past decade (Filieri, Alguezaui, & McLeay, 2015; Liu & Park, 2015). TripAdvisor, with more than 500 million reviews on restaurants, hotels and attractions

worldwide is one of the most popular review platforms for tourism and hospitality (TripAdvisor, 2019). The website allows users to post textual reviews with photos and give star ratings from 1 to 5, where 1 is terrible and 5 is excellent (Valdivia, Hrabova, Chaturvedi, Luzón, Troiano, Cambria, & Herrera, 2019).

Online review platforms have become crucial for tourists and also important sources of information for marketers and researchers (Hu, Liu, & Zhang, 2008). Online review data have been analysed to study the experiences of tourists and formulate practical improvement plans (Taecharungroj & Mathayomchan, 2019). This research utilised online reviews posted on TripAdvisor to answer two research questions as:

> RQ1 What are the types of tourist experiences at shopping malls in Thailand?
> RQ2 What are the factors that drive positive and negative tourist experiences?

4. Research Methodology

4.1 Data collection

Data were collected regarding shopping malls in Thailand from online reviews on TripAdvisor. Malls can be defined as shopping locations that provide a great variety of merchandise as stores and restaurants, accompanied by synergies between stores that utilise the available space to generate a more pleasant environment (Kesari & Atulkar, 2016; LeHew & Fairhust, 2000). A total of 40,504 online reviews in English concerning 46 selected locations were extracted from TripAdvisor in November 2019 (Table 1). Only malls with over 100 reviews were selected. The online reviews were then processed using the analytics platform KNIME 3.7.2. The software removed punctuation and converted the review text to lower case letters. Filters were applied to remove numbers and also reviews that were shorter than 3 characters. Stop words used frequently but providing little information such as "l", "she" or "the" were also removed.

Table 1 Shopping malls and numbers of reviews from TripAdvisor collected during November 2019

Shopping Mall	City	Reviews	Shopping Mall	City	Reviews
Amarin Plaza	Bangkok	137	King Power Rangnam	Bangkok	96
Bangkok Fashion Outlet	Bangkok	282	Lee Garden Plaza	Hat Yai	128
BLUPORT Hua Hin Resort Mall	Hua Hin	307	Market Village HuaHin	Hua Hin	534
Central Chidlom	Bangkok	182	Maya Lifestyle Shopping Center	Chiang Mai	365
Central Embassy	Bangkok	375	MBK Center (Ma Boon Khrong Center)	Bangkok	8551
Central Festival Samui	Samui	392	Mega Bangna	Bangkok	339
Central Phuket	Phuket	778	Mike Shopping Mall	Pattaya	137
Central Festival Chiangmai	Chiang Mai	244	Pantip Plaza	Bangkok	363

Central Festival Hatyai	Hat Yai	298	Platinum Fashion Mall	Bangkok	2653
Central Festival Pattaya Beach	Pattaya	960	Pratunam Center	Bangkok	171
Central Plaza Chiangmai Airport	Chiang Mai	234	Premium Outlet Phuket	Phuket	294
Central Plaza Grand Rama 9	Bangkok	119	River City Bangkok	Bangkok	179
Central Plaza Udonthani	Udon Thani	143	Royal Garden Plaza	Pattaya	142
Central World	Bangkok	3618	Siam Center	Bangkok	511
Emporium and EmQuartier	Bangkok	897	Siam Discovery	Bangkok	185
Fortune Town IT Mall	Bangkok	111	Siam Paragon	Bangkok	6022
Gateway Ekamai	Bangkok	122	Silom Complex	Bangkok	103
Gaysorn Shopping Centre	Bangkok	109	Terminal 21	Bangkok	3711
ICONSIAM	Bangkok	479	Terminal 21 Pattaya	Pattaya	156
Indra Square	Bangkok	505	The Mall Bangkapi	Bangkok	141
Jewelry Trade Center	Bangkok	159	The Paseo Mall	Bangkok	111
Jungceylon	Phuket	4527	Turtle Village Shops & Cuisine	Phuket	342
Kad Suan Kaew	Chiang Mai	133	Union Mall	Bangkok	159

4.2 Data analysis

A machine learning algorithm, latent Dirichlet allocation (LDA), was used to identify "topics", which were implied to be types of tourist experiences at shopping malls (Taecharungroj, Warnaby, & Parker, 2020) to answer RQ1. LDA assumes the existence of a hidden structure consisting of a set of topics in the whole corpus of online reviews from the co-occurrence of words (Blei, Ng, & Jordan, 2003; Guo, Barnes, & Jia, 2017; Tirunillai & Tellis, 2014). To perform LDA, the number of topics was specified using the elbow method (Xiang, Du, Ma, & Fan, 2017). Then, the LDA algorithm was performed with alpha and beta parameters set at 0.1 and 0.01 respectively using the sparse LDA sampling scheme and data structure (Newman, Asuncion, Smyth, & Welling, 2009; Yao, Mimno, & McCallum, 2009).

Lexical salience-valence analysis (LSVA) was adopted to answer RQ2 (Taecharungroj & Mathayomchan, 2019; Taecharungroj et al., 2020) and analyse the factors that drive positive and negative reviews of each type of experience. The analysis displayed words on two axes. The vertical axis (salience) indicated how frequently the words were found. Salience was calculated by the logarithm function of the frequency of each word in each type of experience. The horizontal axis indicated the valence of each word. Words towards the right side of the LSVA had positive valence and were more likely to be present in 5-star reviews. By contrast, words with negative valence appeared on the left side of LSVA; such words were less likely to appear in 5-star reviews. In other words, words with positive valence tended to drive positive tourist experiences (5-star reviews), whereas reviews that contained words with negative valence were less likely to have 5-star reviews. To calculate valence, the following formula was used:

$$Word\ valence = \frac{avg5Star - avgOthers}{avg5Star + avgOthers}$$

where "avg5Star" represents the average number of times the word appears in a 5-star review and "avgOthers" is the average number of times that the word is present in 1- to 4-star reviews. A highly positive valence depicts that a term is more often found in 5-star reviews than others (see Taecharungroj et al., 2020 for a detailed explanation).

5. Results

The elbow method determined five as a suitable number of topics from the corpus of online reviews (Figure A1, Appendix). LDA results presented the 40 most representative words of each topic (type of experience), ranked by the frequency of appearance (weight) (Table 2). The words are highlighted in different shades, representing the number of times that they appear in each type of experience. Words that appear in more than one type of experience are shown in darker shades, while unhighlighted words are unique terms that only appear in one experience type. The five types of experience were named after their unique words as plenitude, connectivity, food, merchandise and commercialism.

Table 2 The five types of tourist experience at shopping malls

Plenitude		Connectivity		Food		Merchandise		Commercialism	
Word	Weight	Word	Weight	Word	Weight	Word	Weight	Word	Weight
shop	63500	mall	24381	food	31007	shop	32426	time	4777
mall	40543	shop	15269	court	11403	price	19372	look	2454
good	19863	floor	13052	floor	6358	good	15411	store	2375
great	17530	BTS	6927	Thai	6274	clothes	14459	shop	2286
food	17446	state	5540	good	4960	buy	10907	real	2244
nice	13876	food	5529	great	4241	mall	10523	staff	2244
restaurant	11091	different	4897	restaurant	4177	bargain	10241	people	2232
big	10913	brand	4822	price	3182	floor	9558	free	2146
brand	9898	visit	4751	eat	3117	cheap	7961	taxi	2140
visit	9044	theme	4432	card	2839	market	7487	tourist	1941
store	8262	design	4264	shop	2741	item	6633	price	1822
central	8069	store	3888	stall	2438	electronics	5640	want	1817
huge	6733	city	3498	cheap	2335	sell	5493	Thai	1628
day	6168	access	3113	level	2210	quality	5226	visit	1628
time	5630	level	3109	local	2167	look	4976	ask	1581
cinema	5365	restaurant	2990	supermarket	1981	visit	4926	walk	1523
eat	5080	easy	2854	mall	1909	great	4839	way	1485
court	4953	location	2717	love	1861	shoes	4730	help	1468
need	4796	walk	2564	try	1856	want	4336	baht	1407
price	4605	train	2540	Japanese	1841	fashion	4314	better	1363
best	4566	luxury	2498	delicious	1664	bags	4209	need	1337

love	4377	interest	2376	market	1662	need	3839	day	1328
market	4377	every	2261	best	1633	real	3765	hotel	1327
spend	4298	court	2168	street	1600	stall	3696	experience	1260
variety	4225	connect	2127	buy	1589	thing	3437	Tuk tuk	1246
center	4209	center	2125	choice	1589	souvenir	3401	new	1242
expensive	3997	great	2122	variety	1509	phone	3282	know	1240
clean	3982	best	2023	ground	1497	best	3172	buy	1230
real	3927	unique	1984	baht	1466	time	3149	customer	1224
movie	3724	country	1938	fresh	1418	day	3105	Thailand	1218
supermarket	3527	skytrain	1886	meal	1413	product	3103	pay	1185
local	3355	good	1866	ice	1402	accessories	3072	say	1184
plenty	3208	sky	1841	lunch	1386	cheaper	2860	wait	1184
walk	3194	nice	1812	hall	1314	better	2857	try	1105
air	3162	new	1796	service	1271	store	2838	waste	1100
want	3148	toilet	1688	rice	1232	fake	2648	money	1097
large	3109	love	1600	nice	1214	level	2377	open	1048
choice	3063	local	1561	cream	1178	huge	2372	work	1040
look	2929	amazed	1558	money	1127	brand	2359	outlet	1039
enjoy	2857	decor	1543	sell	1124	bought	2200	park	1024

The reviews were then categorised into respective types based on the highest probability. For example, a review of Central World, "Lovely but expensive – The mall is very spacious with a middle-high end feel" had the following distribution of probability: 94% (plenitude), 1% (connectivity), 1% (food), 2% (merchandise) and 1% (commercialism). Thus, the review was categorised as a *plenitude* review. Another review of Central World, "Get great bargains – Got great bargains shopping there as there were a lot of sales on", had the following distribution of probability: 16% (plenitude), 1% (connectivity), 1% (food), 82% (merchandise) and 1% (commercialism) and was categorised as a *merchandise* review.

In each type of experience, an LSVA was performed to illustrate the words or factors that drove positive and negative experiences. In Figures 1-5, bubble size represented the weight of the word to each particular type of experience. Coloured bubbles symbolised words that appeared in one or two types of experience while grey bubbles denoted more common words that were present in three or more types.

5.1 The plenitude experience: "It was so large that there's something for everyone"

The plenitude experience is the perception of vast spaces, abundant activities and entertainment at shopping malls. Reviews were further categorised into two main themes: the size of the shopping malls (represented by words such as huge, big and large) and the variety of activities offered (e.g. movie, cinema, restaurant, market etc.).

Many tourists value the size of shopping malls in Thailand. One example of a plenitude review regarding the size of shopping malls is this 5-star review of Siam Paragon:

"We visited this mall for only a couple of hours in the evening. it was so large we didn't cover it all. It has lots of retail stores and restaurants. Clean, comfortable and modern ambience makes shopping in this mall truly an experience to remember, would surely love to come back here".

Reviews in the second theme of plenitude concerning the variety of activities often consisted of unique words describing the activities such as cinema, movie and supermarket. These words were used to describe the characteristics of shopping malls that contained everything that a tourist would need such as stores of various brands, many types of shops, familial activities, zones for children, restaurants and entertainment facilities. For example, a 5-star review of Terminal 21 reads, "There's something for everyone from clothing stores, cosmetics, a movie cinema, a gym, video games and all kinds of food. It's also just a great place to walk around and get out of the heat". Similarly, a tourist wrote a 5-star review for Market Village Hua Hin, "Market village has everything you need from restaurants to shops, from a food market to cinema and supermarkets. A pleasant mall under the shopping malls!"
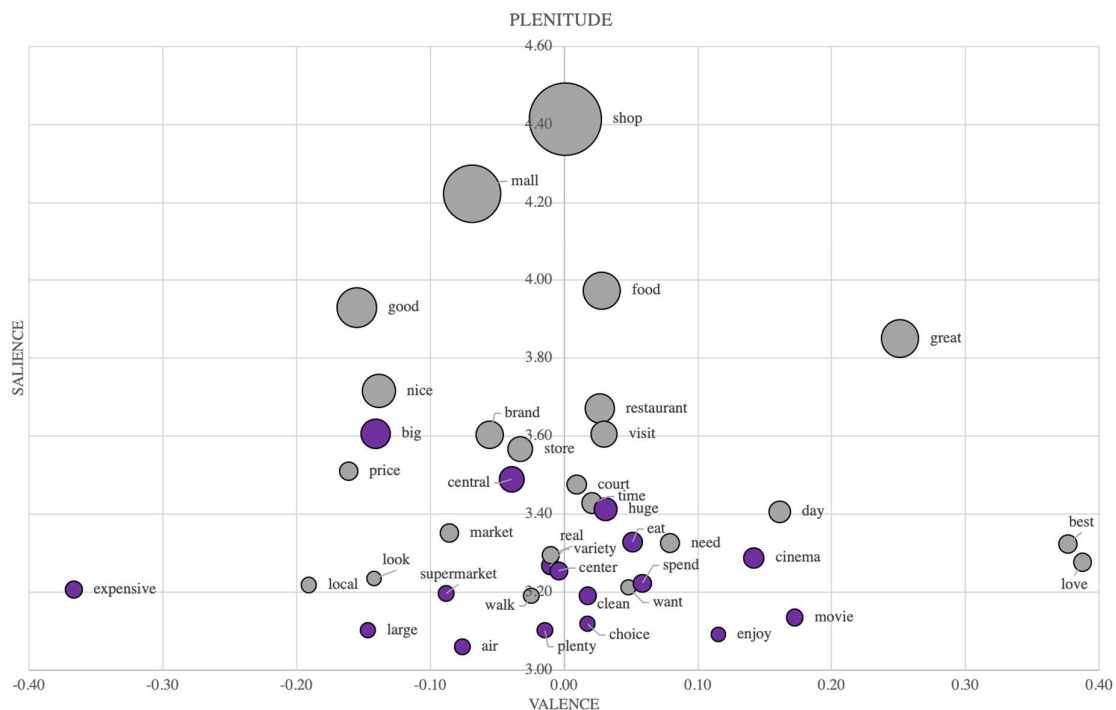

Figure 1 LSVA of plenitude

The LSVA of the plenitude experience (Figure 1) found that the word *expensive* was associated with negative reviews due to the highest negative valence (-0.366). Further, words that were expected to be positive such as *good* and *nice*, had negative valences. These words were

frequently used to describe a neutral or a marginally positive experience rather than a delightful 5-star experience; whereas, words such as *great*, *best* and *love* more often led to 5-star reviews.

Movie and *cinema* were another two words that had highly positive valence. Tourists enjoyed writing about cinemas, either as a part of the mall offering or as a leisure activity that they experienced. For example, a 5-star review of Central World reads:

> "We went to the cinema there twice which was a little on the expensive side compared to the MBK but the screens were huge and the reclining seats were very comfortable. Drinks and snacks were very reasonably priced too! Definitely worth a visit - especially on a rainy day!"

This indicated that many tourists, who may have limited time during their travels, were willing to spend time at cinemas. Reviewers were satisfied with cinemas as they complimented large screens, comfortable seats and luxurious facilities and services.

5.2 The connectivity experience: "This mall is easy to get to and is designed to keep shopping interesting"

Connectivity is a shopping experience that concerns accessibility of the malls from public transport and the flow of visitors once inside. The first theme of connectivity described the malls in conjunction with modes of transport and accessibility using words such as *access, connect, BTS, train* and *location*. Examples of reviews included, "The mall is easy to get to since it is connected with the BTS and all the upscale shops are located here..." as a 4-star review of Siam Paragon and "…What's more impressive is the place has a direct access to BTS station and the walkway bridging Central Chidlom and Central Embassy helps to increase the traffic flow significantly" as a 4-star review of Central Chidlom.

The second theme of *connectivity* was the experience of visitors when they moved around inside the malls. In this theme, reviewers often commented on the interior design and themed decorations of shopping malls. These maintained interest in their shopping experience when they walked from one place to another. For example, a 5-star review of Terminal 21 reads:

> "It looks like your average shopping centre from the outside but inside each *floor* is *designed* with a different city in mind and entrances to escalators are like airport departure gates to a new destination - nice idea to keep shopping interesting".
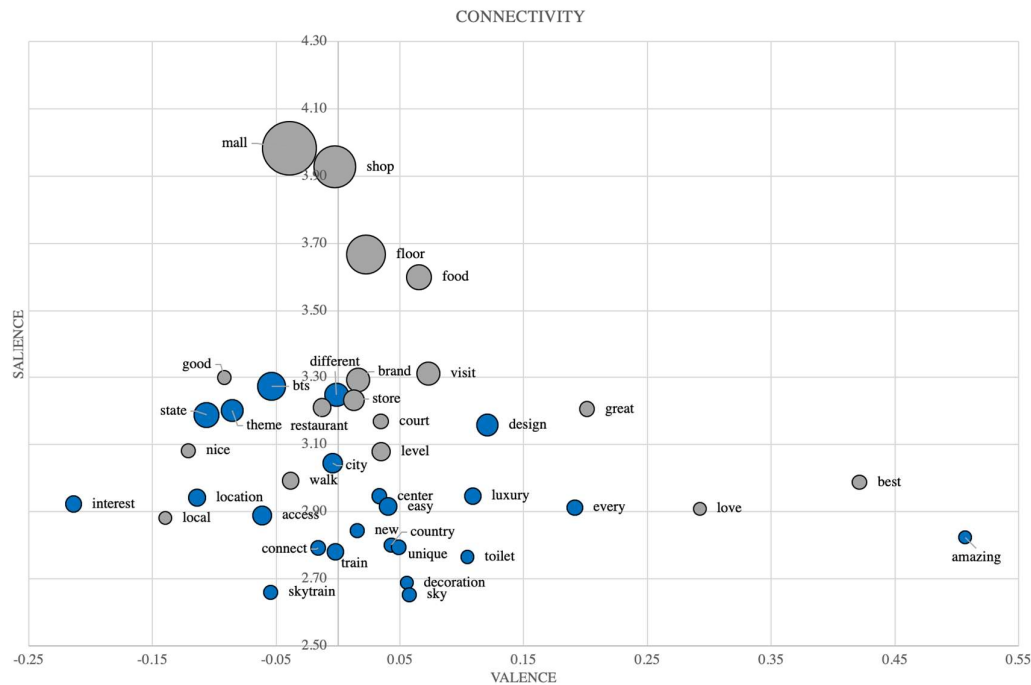
Figure 2 LSVA of connectivity

In the LSVA of connectivity (Figure 2), words that describe the ease of transport (e.g. *location, access, BTS, walk, connect, train* and *center*) appeared to have lower valence. For example, the term *location* had a negative valence (-0.114). These words describing accessibility and transportation were only used to broadly assess mall access convenience. Findings implied that tourists were generally neither surprised nor amazed by the travelling experience and accessibility. By contrast, words that described the flow of interior design and decorations such as *theme, city, country, unique* and *design* had positive valence. The analysis suggested that impressive designs and decorations of shopping malls improved the experience of tourists.

5.3 The food experience*: "We ate here many times – definitely value for money and good selection"*

The food experience covers eating and dining at restaurants, food stalls and food courts and purchasing food in supermarkets inside the shopping malls. Reviews of the food experience mainly mentioned the variety of food using words such as *rice, meal* and *lunch*. The reviews also described the quality of experience using words such as *delicious, fresh* and *service*. Similar results were recorded by Taecharungroj & Mathayomchan (2019) who determined that *food* was an underlying dimension of markets in Phuket. The following review is an example of this type of experience:

"Definitely value for money good selection of premium foods like ribs, prawn and mussel, pizza, spaghetti, lobster soup, selection of sashimi and local noodles and Japanese food. Good selection of salad, ice cream and drinks. Must try!" (a 5-star review of Central World)
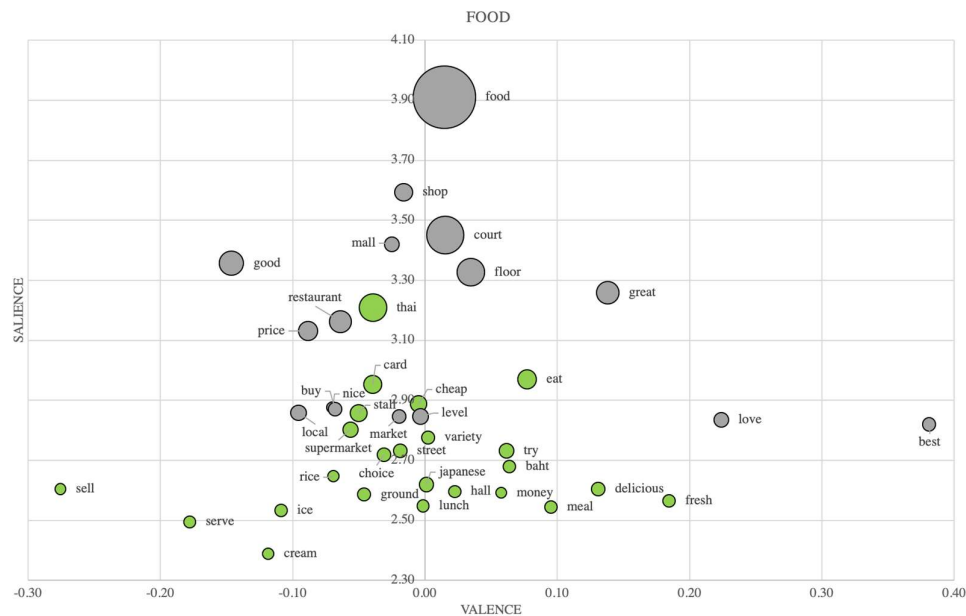
Figure 3 LSVA of food

Another notable aspect of the food experience at shopping malls was recognised as *food courts*. The LSVA of food (Figure 3) displays the significance of food courts. The word "court" was one of the most frequently mentioned words in this type of experience with salience of 3.451. Reviewers often wrote about the variety, price, authenticity and freshness of food offered at food courts or food halls. Many visitors were satisfied with the food court experience; for example, a 5-star review of Siam Paragon's food court, "...great food for a great price...". Another 5-star review provided many suggestions on food selection, service and value for money of the food court in Central Phuket:

"The two local food courts within the centre are a real taste of Thai cuisine. All meals are excellent value for tourists and utilise authentic Thai spices and flavours. We ate here many times during our stay and found good value for money. The service is something else, especially when a person of European descent asks for a spicy lunch. Everyone is friendly."

In addition to restaurants and food in supermarkets, this analysis highlighted food courts as important assets that malls should take into consideration. Shopping malls must ensure the

typical desirable qualities of food and dining since words such as *delicious* and *fresh* had highly positive valences of 0.131 and 0.184.

5.4 The merchandise experience*: "Just name it, this mall has everything for you at reasonable prices"*

The merchandise experience concerns pricing, brands and the variety of products offered at shopping malls. Unique words used in reviews of this type of experience were *clothing*, *fashion*, *electronics*, *shoes* and *bags*. The LSVA of merchandise (Figure 4) portrays positive valence for these words, indicating the importance of product variety. An example of a 5-star review of MBK described its prominent characteristics:

> "Visiting Bangkok and confused where to do shopping??? The only answer you have if you want to do budget shopping as well as get it all under one roof then visit MBK Center. A mall having everything for you at reasonable prices you just name it. This mall has everything from clothing to electronics to supermarket to restaurants at very budget-friendly prices"

From this example, product variety and price of products appeared to be highly salient. According to the LSVA, several words were related to pricing (i.e. *price*, *cheap* and *cheaper*). These words had negative valence, indicating that reviewers were not always satisfied with the pricing of products. For example, a 2-star review of Siam Paragon reads, "Not my type of shop. Very expensive and very flash looking. Plenty of shoes, clothes and handbags but out of my price range. Nice to have a look around though." Likewise, a tourist complained about the prices of products at MBK, "Massive mall selling things you think you should buy cheap but in reality, you don't need it and it's not cheap..." However, when the price is perceived to be affordable, reviewers often leave positive reviews of the mall.
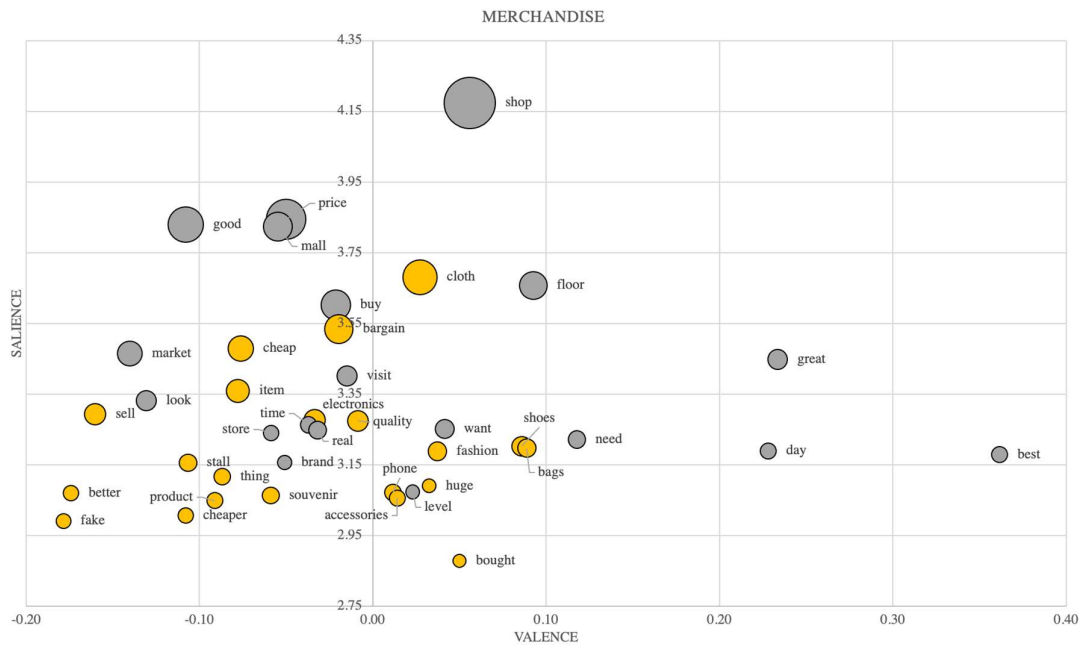
Figure 4 LSVA of merchandise

In addition to the variety and pricing of products, tourists were cautious of fake products e.g. "What a joke this place is. Everything is fake. Clothing, shoes, electronics. Everyone is out to RIP you off and charge you double the amount. We visited to see the hype but left within 10 minutes. Don't bother" (2-star review of MBK). Therefore, it is important to ensure the affordability of the products when the mall is perceived to sell cheap merchandise. Also, many tourists were not impressed by the counterfeit products sold in many malls in Thailand.

5.5 The commercialism experience*: "Be wary of a rip-off, spend your time elsewhere"*

Commercialism is experienced when tourists encounter unpleasant commercial activities. Examples of commercialism activities included being scammed, paying for overpriced products and services or being treated poorly.

Regarding scams, taxis were a common element of tourist review complaints to warn others. For example, one tourist cautioned other potential visitors to MBK, "It's a good place to get a few more 'luxurious' items but be wary of the taxi drivers. One driver locked us in his cab when we refused to pay him 1,000 Thai baht for a 10-minute journey - he originally quoted 150!".

The commercialism experience also included situations where tourists were overcharged for products and services, e.g. "…the chances are that you will think you have bartered a bargain

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only to find that you have been ripped off. Also, you have no rights to return or exchange the products and you would almost certainly get a mouthful of abuse if you tried..." (a 3-star review of MBK). Being treated poorly by staff at the malls can also lead to a bad experience:

> "We were excited to visit this shopping centre however our excitement was short lived. Staff were more interested in taking selfies or going through their phone than serving customers. When requested for assistance they were not happy. We weren't allowed to touch items as this will mess up their set up." (2-star review of Jungceylon).
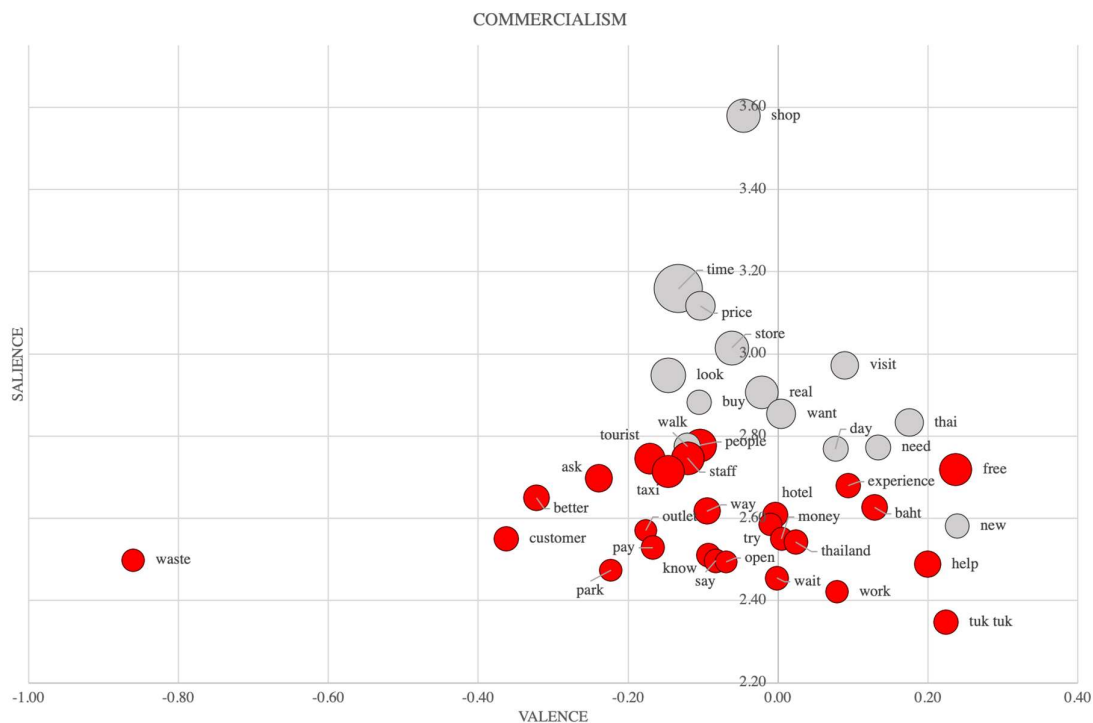
Figure 5 LSVA of commercialism

These examples suggested that shopping malls should avoid unpleasant commercialism practices. In the LSVA of commercialism (Figure 5), the word waste had the most negative valence; tourists often described the experience as a "waste of time" and stated that the mall was not worth a visit. The common reasons for this type of negative experience were overly priced products, repetitive merchandise, outdated goods, regular products that could be found elsewhere (locally and internationally), inattentive staff and deserted shopping malls. One example was this 1-star review of River City Bangkok:

> "Nothing to say other than you are better off staying in your hotel room or sitting in the local Starbucks rather than venture to this shopping centre.

> Food options are limited and poor, most of the shops are empty and those that are open are overpriced and disappointing. Spend your time and money elsewhere."

Despite the negativities, some positive factors can improve satisfaction for this type of experience. The word "*free*" had a highly positive valence (0.237). From reviews, this word often appeared in reviews that mentioned *free* shuttle bus, Wi-Fi, parking and Muay Thai shows. Free Muay Thai shows in particular often satisfied tourists visiting the mall. They mentioned how they were able to experience Muay Thai although they did not have much time. This indicated how the mall can offer *value for experience* on top of value for money.

6. Discussion and Conclusions

This study complemented the existing literature by identifying five types of tourist experience at shopping malls in Thailand extracted from 40,504 reviews in TripAdvisor using LDA. The *plenitude* experience is the tourist impression towards the size of the mall and the variety of available activities and facilities. This reinforced the notion that attributes, value and entertainment features of shopping malls such as restaurants, cinemas and conversation areas were important to customers (El-Adly, 2007; Jackson, Stoel, & Brantley, 2011). Haytko & Baker (2004) suggested that the sizes of malls and stores were important to visitors.

For *connectivity*, the ease of travel to shopping malls was important to visitors (Anselmsson, 2016; Chebat, Sirgy, & Grzeskowiak, 2010; Frasquet, Gil, & Molla, 2001; Jackson et al., 2011). Our results confirmed that ease of access and flow of visitors externally and internally were crucial factors for malls (Feldman, 2004). However, words associated with accessibility did not have positive valence. One possible explanation for this was that ease of access is expected by tourists who decided to visit malls and may not lead to a delightful experience. By contrast, the analysis determined that interior design and decorations including ambience, colour and other aesthetic elements made shopping malls more interesting for tourists.

Food was identified as one of the important factors for customers who visited malls; food can also keep customers at malls for a longer period (Zhuang, Tsang, Zhou, Li, & Nicholls, 2006; El-Adly, 2007). The importance of food courts was highlighted in shopping malls. Although restaurants were frequently mentioned, in reviews, many tourists paid attention to the variety of affordable freshly-cooked meals available at food courts.

Merchandise was mentioned in several studies (e.g. Anselmsson, 2016; Feldman, 2004; Frasquet et al., 2001; Zhuang et al., 2006). Our results indicated that the variety of fairly-priced products is very important to many tourists who shop at the malls, concurring with Zhuang et al. (2006), Anselmsson (2016), Kotler (2003) and Terblanche (2018). The *commercialism* experience symbolised unpleasant experiences for tourists at shopping malls. Nonetheless, there were some positive aspects such as highly satisfactory free Muay Thai shows.

This study is the first to utilise big data gathered from the available TripAdvisor reviews covering well-known shopping malls in Thailand to better understand the tourist experience. LDA is a highly efficient machine learning technique that can analyse large amounts of complex data, which would be challenging using traditional methods. Our findings can assist shopping malls to improve their services and attract greater footfall during these difficult times.

6.1 Managerial implications

The five types of experiences were found in all but one of the malls in this study with varying compositions (Table A1, Appendix). The *plenitude* experience was the most common at 40% of the total reviews. However, this type of experience was rare in Pantip Plaza (3%) and Fortune Town IT Mall (5%) because these two malls specialised in selling IT products. Hence, they were perceived as neither spacious nor having great variety. By contrast, the *plenitude* experience was prevalent in many "Central" malls in Udon Thani (79%), Samui (77%), Pattaya (72%), and Hatyai (71%). Malls that had a large proportion of *connectivity* reviews were either located next to busy transport hubs in Bangkok such as Central Embassy (39%), Emporium and Emquartier (38%) and Siam Center (38%) or newly built and designed in unique ways such as ICONSIAM (64%), Siam Discovery (55%) and Terminal 21 (52%). *Food* as a type of experience was found in every mall in the study. However, community malls notably had a higher proportion of food such as Turtle Village (34%) and Paseo Mall (22%). Many malls in this study had a large proportion of *merchandise* reviews, especially those that specialised in selling IT products such as Pantip Plaza (77%) and Fortune IT Mall (44%), fashion products such as Indra Square (83%), Pratunam Fashion Mall (80%) and Union Mall (53%) and also MBK (57%) that specialised in selling all kinds of merchandise. Lastly, *commercialism* or unpleasant practices were associated with some malls, namely King Power Rangnam (83%) and Premium Outlet Phuket (60%). Therefore, shopping malls must recognise their tourist experience compositions and improve these values accordingly.

Reviews detailing the *plenitude* experience indicated how shopping malls could improve the cinema experience by making this cosy, luxurious, clean and comfortable. Visitors were willing to spend time in cinemas even when on a tight schedule. The *connectivity* experience reviews emphasised that interior design and decorations often impressed tourists during their perambulations in malls. Managers should consider designs that are 'unique', 'new' and 'different'. To improve the food experience, shopping malls should pay more attention to food courts. Despite having the choice of dining at restaurants, many visitors chose to eat at food courts where taste and freshness (newly cooked food) were the most impressive factors.

However, several factors caused dissatisfaction especially in the commercialism experience including price, service and "waste of time" experiences. Pricing was a common issue across many types of experience and indicated that shopping malls should offer reasonable and affordable prices. Malls must ensure that vendors do not overcharge for food, merchandise and services. To avoid the perception of poor service, malls and vendors should also focus on employee training and education (Anselmsson, 2016).

6.2 Limitations and future research

Despite the positive contributions, this research was not without limitations. The use of online reviews from TripAdvisor only sheds light on the experiences of those who posted comments. This is referred to as a platform bias. Online review platforms have grown significantly over the past decades; however, this research did not include contributions from offline tourists and visitors. Future research should explore the shopping mall experience from other perspectives. The majority of TripAdvisor users are tourists and this research analysis did not include the experiences of locals who provide the main footfall in shopping malls. Future research should compare and contrast the experiences of different types of customers. Further, future research can analyse the experience of tourists based on their country of origin. The use of LDA and online reviews in research is still in its infancy, with potential for improvement in many areas such as specifications of the number of topics, selection of parameters and LDA modelling algorithms.

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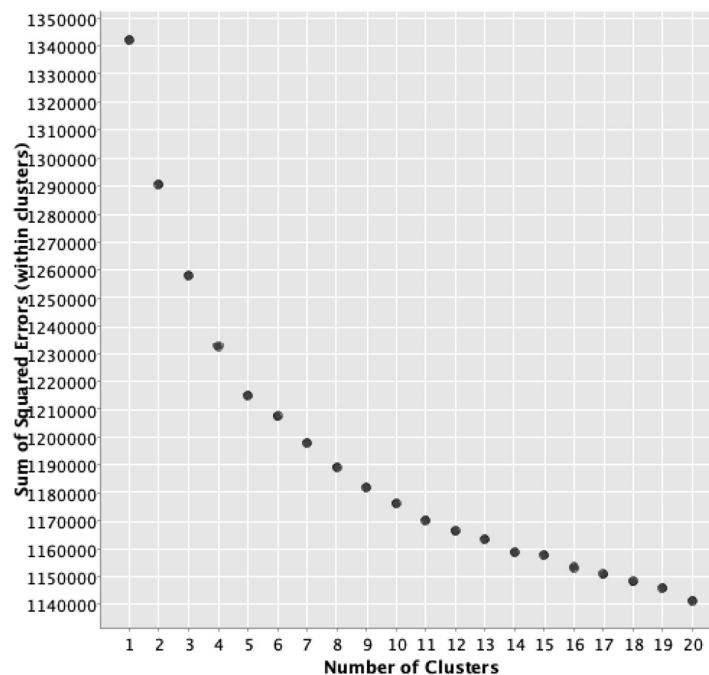
Appendix

Figure A1 Elbow method

Table A1 Count and percentage of reviews for each type of experience by mall

Mall	Plenitude		Connectivity		Food		Merchandise		Commercialism		Total
	Count	%	Count	%	Count	%	Count	%	Count	%	
Amarin Plaza	21	15%	31	23%	21	15%	31	23%	33	24%	137
Bangkok Fashion Outlet	37	13%	17	6%	4	1%	135	48%	89	32%	282
BLUPORT Huahin	215	70%	11	4%	44	14%	13	4%	24	8%	307
Central Chidlom	53	29%	43	24%	35	19%	19	10%	32	18%	182
Central Embassy	116	31%	146	39%	72	19%	2	1%	39	10%	375
Central Festival Chiangmai	165	68%	22	9%	25	10%	11	5%	21	9%	244
Central Festival Pattaya Beach	693	72%	33	3%	123	13%	50	5%	61	6%	960
Central Festival Samui	301	77%	6	2%	44	11%	21	5%	20	5%	392
Central Phuket	510	66%	37	5%	64	8%	58	7%	109	14%	778
Central Plaza Chiangmai Airport	118	50%	15	6%	35	15%	18	8%	48	21%	234
Central Plaza Grand Rama9	75	63%	19	16%	9	8%	9	8%	7	6%	119
Central Plaza Udonthani	113	79%	3	2%	18	13%	2	1%	7	5%	143
Central Festival Hatyai	211	71%	13	4%	28	9%	14	5%	32	11%	298
Central World	2190	61%	550	15%	288	8%	300	8%	290	8%	3618
Emporium and Emquartier	324	36%	342	38%	105	12%	36	4%	90	10%	897
Fortune Town IT Mall	5	5%	13	12%	1	1%	49	44%	43	39%	111
Gateway Ekkamai	35	29%	40	33%	31	25%	4	3%	12	10%	122
Gaysorn	33	30%	56	51%	5	5%	4	4%	11	10%	109
ICONSIAM	90	19%	308	64%	24	5%	5	1%	52	11%	479
Indra Square	31	6%	9	2%	13	3%	421	83%	31	6%	505
Jewelry Trade Center	12	8%	6	4%	1	1%	48	30%	92	58%	159
Jungceylon	3357	74%	59	1%	327	7%	464	10%	320	7%	4527
Kad Suan Kaew	62	47%	3	2%	33	25%	10	8%	25	19%	133
King Power Rangnam	4	4%	3	3%	5	5%	4	4%	80	83%	96
Lee Garden Plaza	54	42%	8	6%	31	24%	13	10%	22	17%	128
Market Village Huahin	337	63%	9	2%	110	21%	44	8%	34	6%	534
Maya Lifestyle	241	66%	15	4%	64	18%	12	3%	33	9%	365
MBK	1825	21%	521	6%	607	7%	4859	57%	739	9%	8551
Mega Bangna	228	67%	17	5%	10	3%	6	2%	78	23%	339
Mike Shopping Mall	52	38%	4	3%	5	4%	55	40%	21	15%	137
Pantip Plaza	11	3%	4	1%	2	1%	280	77%	66	18%	363
Platinum Fashion Mall	231	9%	64	2%	108	4%	2132	80%	118	4%	2653
Pratunam Center	21	12%	1	1%	5	3%	127	74%	17	10%	171
Premium Outlet Phuket	41	14%	1	0%	6	2%	69	23%	177	60%	294
River City Bangkok	24	13%	77	43%	4	2%	23	13%	51	28%	179

Mall	Plenitude		Connectivity		Food		Merchandise		Commercialism		Total
	Count	%	Count	%	Count	%	Count	%	Count	%	
Royal Garden Plaza	71	50%	22	15%	29	20%	3	2%	17	12%	142
Siam Center	210	41%	192	38%	28	5%	43	8%	38	7%	511
Siam Discovery	47	25%	102	55%	6	3%	10	5%	20	11%	185
Siam Paragon	3057	51%	1500	25%	762	13%	370	6%	333	6%	6022
Silom Complex	41	40%	30	29%	16	16%	6	6%	10	10%	103
Terminal 21	778	21%	1944	52%	596	16%	250	7%	143	4%	3711
Terminal 21 Pattaya	68	44%	64	41%	15	10%	0	0%	9	6%	156
The Mall Bangkapi	73	52%	30	21%	12	9%	8	6%	18	13%	141
The Paseo Mall	65	59%	4	4%	24	22%	5	5%	13	12%	111
Turtle Village	117	34%	2	1%	117	34%	13	4%	93	27%	342
Union Mall	35	22%	20	13%	7	4%	84	53%	13	8%	159
Total	16398	40%	6416	16%	3919	10%	10140	25%	3631	9%	40504

UNDERSTANDING STUDENTS' READINESS FOR ONLINE LEARNING DURING COVID-19: CASE STUDY AT BURAPHA UNIVERSITY INTERNATIONAL COLLEGE

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Abstract: It is significant to understand student's readiness towards online courses during COVID-19 outbreak. With the sudden change from the traditional education to online learning during outbreak of deadly disease called Covid-19, many education institutions have to adjust the policy of teaching and learning to facilitate the schooling of students. Burapha University International College (BUUIC) has applied online teaching and learning. However, online teaching and learning is considered as the newest way of educating. Hence, the college needs to understand student's readiness for online teaching and learning for improving teaching performance of lecturers. The study aimed to understand Burapha University International College student's readiness level of studying through online learning and exploring relationship among variables. The study was conducted by using quantitative research. Questionnaire was utilized to collect data. The questionnaire was distributed to 200 respondents through Facebook, Line and email. The data was analyzed by using descriptive statistic and correlation coefficient. The findings revealed that the majority of students concerned about their ability of using online teaching devices to work with the other people, which received the highest average score (3.97). Hypothesis testing showed that there was a strong positive relationship between Internet and computer self-efficiency and online communication self-efficiency, motivation and Internet and computer self-efficiency and motivation and online communication self-efficiency.

Keywords: Coronavirus; Covid-19; Online teaching and learning; Burapha University International College

1. Introduction

Corona Virus Disease (COVID-19) had huge impact on educational sectors. The disease enforced many education institutions to close down in order to flatten the infection curve through social distancing. The institutions had to discontinue in person teaching due to government requirement (Kufi et al., 2020, p.4). Due to this crisis, online learning is a feasible alternative to normalize the process of teaching and learning. The online communication platforms such as Google classroom, zoom, and Microsoft team were used as instruments to teach students (Mishra et al., 2020, pp. 3-4). There were several positive arguments associated with e-learning. Accessibility, affordability, flexibility, learning pedagogy, learning policies was discussed as some of arguments that associated with online teaching and learning. Online teaching and learning seemed to be accessible for those students who lived in the remote areas. It was considered to be cheaper mode of education because of low transportation cost, accommodation cost and other expenses. Additionally, online education provided flexibility which students could make their own plan for completing courses, which were available online. Students could learn anytime and anywhere which led to life-long learning (Dhawan, 2020, p. 6). However, majority of the studies highlighted on the use of online education during COVID-19 to protect and prevent number of coronavirus infection in many countries. For instance, there was a study which concentrated on online learning readiness during COVID- 19 among undergraduate level in Malaysia and the result revealed that computer and internet self-efficiency among undergraduate students was at high level (Allam et al., 2020 p. 645). Online learning played crucial role during economic crisis. After the lockdown, most of universities around the world requested academic staffs and students applied online learning. Aligarh Muslim University requested the faculty members to prepare teaching material in PPT and PDF files on University webpage or another electronic mode such as whatsapp or email. The same as Wuhan city, the government requested all education institutions such as school and universities to shut down temporary. Online learning was used as teaching facility. Voov, Superstar, Zoom cloud meeting, WeChat app were used to teach students (Raheem&Khan, 2020, p.3137). From observing, there are a few research papers that have been done on student's readiness in Thailand, especially in International college institutions where English is taught. Hence, this survey aimed at understanding level of student's readiness, which allowed faculty members for the improvement of online teaching and learning. Moreover, the study also concentrated on seeing the relationship among variables.

2. Research Objectives

The major purpose of this survey was to understand student's readiness for online classes among undergraduate students at Burapha University International College to depict the picture to full implementation. In addition, the study focused on exploring the relationship among motivation, computer and Internet self-efficiency, and online communication self-efficiency.

3. Literature Review

3.1 Definition of Online Learning

Online learning was explained as "the ability to use computer connected to a network that offers a possibility to learn from anywhere, anytime, with any means. It was also defined as a learning instrument, which can be seen as student centered, innovative and flexible (Dhawan, 2020, pp.6-7). Furthermore, E-learning can also be described as technological instrument, which is used for teaching, and learning. Computer and the other technological devices are applied to transfer knowledge and skills. The applications of e -learning can be computer based learning, web-based learning, education opportunities and digital collaboration (Raheem & Khan, 2020, p.3136).

Student's readiness towards online learning

Readiness is demonstrated as the ability of organizations and capacity of education stakeholders (management, key personal, teachers and students) to get involved in an electronic environment (Rasouli, Rahbania &Attaran, 2006, p.52). Furthermore, the students' readiness for online learning refers to the learners' preparedness for an online class process both mentally and physically (Kayaoğlu & Akbaş, 2016, p.214). Readiness for online learning could be demonstrated into three aspects. First, readiness could be seen as student's preference for the form of delivery as opposed to face-to-face classroom. Secondly, it was seen as student confidence in using electronic communication for learning especially in competence and confidence in applying Internet and computer mediated communication and last aspect of readiness was an ability to participate in autonomous learning. Understanding online learner readiness should study facets, which include computer and Internet self-efficiency, learner control, online communication efficiency, self-directed learning and learner motivation (Hung et al., 2009, p.1081). Hence, the following part of paper is discussed the dimensions which are used to measure student online learning readiness.

Computer and Internet Self-efficiency

Computer and Internet self-efficiency seems to play important role as online learning is delivered through networks. Individual perceptions and ability of using a given technology should be reviewed. Computer self-efficiency (CSE) could influence on computer use outcome, emotional reaction to computer and actual computer use. Similar found that Internet self-efficiency does not result only in performing some Internet related tasks such as uploading or downloading files. But it can also be the individual's ability to apply higher-level skills such as troubleshooting problems (Unal et al., 2014). Computer and Internet self-efficiency includes the use of computers for searching materials and ability to upload and download documents from Internet. Computer and Internet self-efficiency had an influence on readiness level of students. Students who were ready to adopt online learning had high competency in computer and Internet self-efficiency (Allam et al., 2020, p. 646).

Online communication self-efficiency

Online communication self-efficiency is considered as one aspect, which is used to understand student readiness towards online learning. It is crucial to create chances for interactions and communications between students and their instructors in Web-based learning. Using thoughtful questions can create interactions between instructors and students (Hung et al., 2009, p.1081). Similarly, to one study showed that medical students felt confident in expressing their opinions and feelings through written text and felt confidents in applying online communication tools such as e-mail and discussion (Kayaoğlu & Akbaş, 2016, p.217).

Motivation

Lastly, motivation seems to be aspect for online learning. Motivation is described as driving forces inside human, which can encourage them to behave in order to achieve goals. Motivation can impact on what we learn, how we learn and when we choose to learn. Past research on motivation to learn in online context discovered that motivation related to how learner perceive each other's presence in online courses (Chung, 2020, p.305). One study showed that students could be stimulated by extrinsic motivation, which refers to performing of behavior to obtain specific rewards. From student's perspective, extrinsic motivation can be higher grade on exam, getting rewards from their parents (Hung et al., 2009, p.1081). Using online learning during COVID-19 can support learning, teaching and knowledge distribution. To gain practical understandings, the survey goes a step further and find out what makes attend online sessions. Students may get highly motivated by academic achievement (Allam et al., 2020). One study discovered that high motivation was crucial for online learning. High motivation students were likely to have positive attitude when attending online classes (Tuntirojanawong, 2013, p.62).

The relationship between motivation and internet and computer self-efficiency

There was one research about self-efficiency found that there was no relationship between computer and Internet self-efficiency and motivation to engage in online learning (Alqurashi, 2016, p. 48). However, another paper, which collected data from 305 university students who took online courses, found that computer and Internet self-efficiency had a positive relationship with student's psychological factors, especially cognitive and motivation engagement (Pellas, 2014, p. 24).

The relationship between motivation and online communication self-efficiency

Motivation is a psychology factor, which is believed to correlate with online communication self-efficiency. One study showed that ability to use computers for communicating was related with student's motivation and satisfaction in online courses. Moreover, the study also revealed that there was a significant relationship between online communication and motivation to participate in online discussions (Tao, 2009, p.27)

The relationship between Internet and Computer self-efficiency and online communication self-efficiency

According to one research, which studied on student's online learning readiness based on their emotional intelligence, level stated that there was a relation between Internet and computer self-efficiency and online communication self-efficiency (Engine, 2017,p.36). Similarly to the study that focused on examining student perception of readiness for online learning, it presented that computer skills such as sending, receiving emails, searching and downloading information were used as indicators to see association online communication and learning. The study also pointed that high internet self-efficiency showed higher levels online communication (Martin, et al., 2020, p.43).

Hypothesis

According to objective of the study, hypotheses can be formulated as follows**:**
Ho: there is no relationship between motivation and Internet & computer self-efficiency
Ha: there is a relationship between motivation and internet & computer self-efficiency
Ho: there is no relationship between motivation and online communication self-efficiency
Ha: there is a relationship between motivation and online communication self-efficiency
Ho: there is no relationship between Internet & computer self-efficiency and online communication self-efficiency
Ha: there is a relationship between Internet & computer self-efficiency and online communication self-efficiency

4. Methodology

Conceptualization

The conceptual model below represents the relationship among variables**.** In this study, it focuses on exploring the relationship between motivation and Internet and computer self-efficiency, motivation and online communication self-efficiency and Internet and computer self-efficiency and online communication self-efficiency**.**

Figure 1 Conceptualization Model
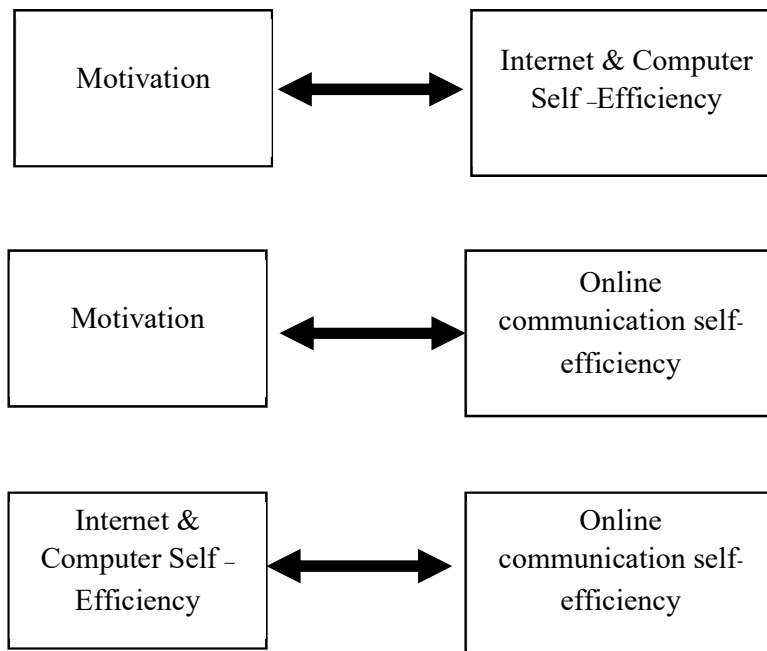

Respondents and Sample Size

Respondents were recruited from Burapha University International College (BUUIC) students. The data was collected from 200 students who are currently studying at Burapha University International College (BUUIC). Sample size of this studied was estimated by published table, which was invented by Yamane. According to published table of Yamane, the population size between 1,000 to 2,000, the suggested sample size with precision level of 7 % should be between 169 to 185 respondents (Israel, 1992, p. 3) Hence, the population of BUUIC is equal to 1,200 then appropriate sample size should be 200.

Sampling Technique and Data Collection

200 samples were selected by using convenience sampling. The respondents were approached by invitation message asking them for volunteering to complete online questionnaire, which was distributed through application platforms such as Facebook, Line and Email. Online questionnaire was utilized because it was convenient for respondents during COVID-19 situation.

Measurement

Based on literature review, the research instrument was adapted from one study that developed 13-items to measure readiness towards online learning (Hung et al., 2010). The questionnaire

consisted of three sections. First section contained demographic questions, which obtain characteristics of respondents. The second section consisted the questions that were used to measure online learning behaviour of BUUIC students. The last section contained the questions that measured internet and computer efficiency, online communication and collaborative self-efficiency and motivation towards online learning which the 5-point Likert (1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly Agree) scale was used to understand these dimensions.

Data Analysis

The collected data in this survey was analyzed by using descriptive statistic. Descriptive statistic including mean score, frequency and percentage was mainly conducted. The mean score for each items and dimensions were counted. In regard to Mean score, the level of online learning readiness was determined. In the other words, higher level of mean score reflects higher level of online learning readiness. Additionally, Pearson's correlation coefficient is designed for continuous variables. Pearson correlation coefficients (r) can take on values from -1 to +1. The sign out the front represents the positive or negative correlation. Positive correlation means that while one variable goes up, the other variable also goes up whether for negative correlation the one variable goes up but the other goes down. The size of the absolute value can be used to indicate the strength of the relationship. A perfect correlation of 1 or -1 shows that the value of one variable can be examined by knowing the value on the other variable. In contrast, a correlation of zero presents no relationship between two variables (Pallant, 2005).

5. Research Result

Demographic of Respondents

Table 1 shows the main characteristics of respondents, the first row represents gender of students. There were 127 female students (63.5 percent) and the rest were male students (36.5 percent). Second row displayed year of BUUIC students, most of students who completed survey are on third year, which accounted for 36 percent. The third row presents student major, 38.5 percentage are international business management students and lastly, majority of respondents are Thai students.

Table 1 Demographic characteristics of the study samples (N=200)

Variables	Frequency	Percent
Gender		
Male	73	36.5
Female	127	63.5
Total	**200**	**100**
Year of study at BUUIC		

Variables	Frequency	Percent
Above the 4ᵗʰ year	4	2
The 4ᵗʰ year	53	26.5
The 3ʳᵈ year	72	36
The 2ⁿᵈ year	23	11.5
The 1ˢᵗ year	48	24
Total	**200**	**100**
Major		
BBA: International Business Management (IBM)	77	38.5
BBA: Logistics Management	58	29
BBA: Finance	5	2.5
BBA: Marketing	9	4.5
BBA: International Hospitality and Tourism Management	15	7.5
BA: Communication Skill for Human Resource Development	12	6
BA: Global Business Communication	21	10.5
BFA: Communication Arts and Design	3	6
Total	**200**	**100**
Nationality		
Thai	189	94.5
Foreigner	11	5.5
Total	**200**	**100**

Student's preference towards Online Platforms and Functions

Table 2 Students' preferences of online platforms, functions

From the survey, there were 44 percent of students who felt comfortable when google classroom was used as a platform to study online during Covid-19 and 35 percent of students felt comfortable with Google meet.

Questions	Frequency	Percent
The most comfortable platforms to study online		
Google Meet	70	35
Google Classroom	88	44
Microsoft Team	14	7
Slack	2	1
BUU LMS	24	12
Zoom	2	1
Total	200	100
The preferred features of online study (Select more than 1 answer)		
Slideshows	135	67.5
Live teaching	129	64.5
Pre-recorded video	65	32.5

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Questions	Frequency	Percent
Function of taking and sharing notes	84	42
Function of multiway communication	70	35
Function that student can see what an instructor writes	80	40
Function that student can ask an instructor	86	43
Learning by telephone channel	19	9.5
Function that can record during teaching time	82	41
Function that is easy to access the lesson	83	41.5
Free-of-charge functions	67	33.5
Function that allow that private message to be sent	46	23
Total	200	100

Dimension of Student's Readiness

As aforementioned, BUUIC version of readiness towards online learning was comprised of computer and internet self-efficiency, online communication skills and motivation. In accordance with different dimensions, the findings were presented in the tables. The first table displayed mean scores regarding the dimension of computer and Internet self-efficiency.

Table 3 Internet and Computer self-efficiency

Items	Mean	SD
The fundamental use of computer or other devices	3.89	0.89
The fundamental skills toward the Internet use	3.86	0.85
The comfortability of using computer several times a day	3.54	1.10
The ability of using tools without any obstacles	3.62	0.90
Total (N=200)		

The fundamental use of computer or other devices item received the highest mean score (3.89) and the fundamental skills towards the Internet use came second with the mean score of 3.86. The mean score of third item in this section (3.54) is seemed to be lower than the other items. The mean score of the last item in this section is 3.62.

Table 4 Online Communication self-efficacy

Items	Mean	SD
The effectiveness and efficiency of communication by online	3.76	0.91
The ability of using online tools to work with other people	3.97	1
The ability of using several devices for communication at the same time	3.62	0.92
Total (N=200)		

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The table 4 showed how ready the students were in the part of communication skills by using online tools and devices. 'The ability of using online tools to work with other people' was the factor that students were ready and concerned with the average level of 3.97, followed by 'The effectiveness and efficiency of communication by online, and 'The ability of using several devices for communication at the same time' with 3.76, and 3.62 respectively.

Table 5 The students' motivation levels toward online classroom

Items	Mean	SD
I am motivated to study online	3.51	0.84
I am able to complete the given tasks by online	3.71	0.93
I can follow the instructor when she or he is teaching	3.62	0.94
I can take notes while studying online	3.60	1
Total (N=200)		

Table 5 illustrated the levels of students' motivation of participating in the online classroom. 'I am able to complete the given tasks by online' was the most concerned by the students in taking part in online study with 3.71, followed by 'I can follow the instructor when he/she is teaching' with 3.62.

Hypotheses Testing

The table 6 represents the relationship between motivation relating to Internet and computer self-efficiency, motivation relating to online communication self-efficiency and Internet and computer self-efficiency relating to online communication self-efficiency. To determine the direction of the relationship, the correlation coefficient is positive (.748) which indicates a positive correlation between Internet and computer self-efficiency and online communication self-efficiency. Furthermore, the correlation coefficient is also positive (.497) which shows a positive correlation between motivation and Internet and computer self-efficiency. In regarding to the relationship between motivation and online communication self-efficiency is also positive with the correlation coefficient (.482). According to the hypotheses that are stated earlier in this context, the null hypotheses are rejected and the alternative hypotheses are accepted which means there is a strong positive relationship between Internet and computer self-efficiency and online communication self-efficiency, motivation and Internet and computer self-efficiency and motivation and online communication self-efficiency.

Table 6 Correlation between motivation, internet and computer self-efficiency and online communication self-efficiency

		ICS	Online	Motivation
ICS	Pearson Correlation	1	.748**	.497**
	Sig. (2-tailed)		.000	.000

	N	200	200	200
	Pearson Correlation	.748**	1	.482**
Online	Sig. (2-tailed)	.000		.000
	N	200	200	200
	Pearson Correlation	.497**	.482**	1
Motivation	Sig. (2-tailed)	.000	.000	
	N	200	200	200

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

Discussion and Conclusion

The investigation was conducted in order to understand level of BUUIC student's readiness. From the total number of 200 respondents, most of the respondents had their own devices to access the Internet and online lessons, including the Internet broadband to communication with the instructors and other classmates. Students realized that they had ability to apply online tools to communicate with the other people. Similarly, to study of Chung, Noor, & Mathew (2020, p.309) discovered the similar result. The item that I feel confident in using online tools to communicate with the others received mean score of 3.92, The same as Hung, Chou, Chen, & Yuan, (2010, p.1087) showed that online learning can increase interaction between learners and the others because they feel comfortable in expressing themselves in writing. However, the average levels of each items were not high because it reached above 3 a little which meant there were still problems that needed to be solved to develop the better features and functions to service students' needs and comfortability. According to hypotheses testing which tended to understand relationship between motivation and internet and computer self-efficiency, motivation and online communication self-efficiency and computer and internet self-efficiency and online communication self-efficiency. As a result of the first hypothesis discovered correlation coefficient, which is .497. It can be interpreted that there is a positive relationship between motivation and internet and computer self-efficiency. This result is consistent with Pellas (2014, p.24), which discovered that computer and Internet self-efficiency had a positive relationship with student's psychological factors, especially cognitive and motivation engagement. According to the second hypothesis, the null hypothesis is rejected while an alternative hypothesis is accepted. This means that there is a correlation between motivation and online communication self-efficiency. This result from the hypothesis can be supported by literature, which explained that there was a significant relationship between relationship between online communication and motivation to participate in online discussions (Tao, 2009, p.27). The last hypothesis concentrated on finding the relationship between computer and internet self-efficiency and online communication self-efficiency. The correlation coefficient value is equal to .748 which mean that there is positive relationship among computer and internet self-efficiency and online communication self-efficiency. This is similar to study which showed that there was a relation between Internet and computer self-efficiency and online communication self-efficiency (Engine, 2017.p.36).

6. Research Implications

Implications of the study were derived from student's suggestions for college online learning. According to the survey, this first issue related to the poor Internet signal. Having low Internet speed and connectivity were crucial factors, which can decrease learning ability of students. Students are unable to receive intended messages from instructors when the Internet gets cut off. To solve the problem, the suggestion for this issue is to record the VIDEO of teaching. Motivation was one of issue that students concerned. Level of motivation was likely to decrease throughout semester. Online teaching allows less personal interaction between students and instructors. Students may not be motivated to learn. To stimulate students, lecturers must adapt conventional course into online courses. For instance, interaction questions should be used to encourage student's engagement. This will not make students feel isolation. Furthermore, extrinsic motivation can be applied in order to increase motivation. Students tend to be motivated if there is a reward. Giving extra score for answering questions can be stimulated students learning more. The third suggestion was that the use of variety of online platforms to teach could confuse students. From survey, it showed that Majority of BUUIC students were familiar with Google classroom and Google meet. Students have good ability on how to use these platforms to study online. For example, they know how to interact with lecturer if they have a question. Hence, the college should set the protocol of a standardized channel of teaching by using the same platform or software. In this way, it is convenient for the students to save them from the trouble of having to switch between Apps and if the students enroll many subjects, it helps them not to be confused which channels are for which subjects. The standardized channels will be easier for the students and also instructors as well that they can easily discuss the issues they faced while teaching students and together they can come up with solutions or a plan to constantly upgrade themselves. Lastly, online examination was seen as significant issue. The students were worried about the fairness of having their final exams through the online platform and how teachers would control online examination standards. The college should have standard and reliable software for the student to take an online exam. The software that blocks out student's ability to use a third-party website during exam hour, random the questions sequence and cannot go back on the previous pages. Moreover, the student should take an exam in front of the camera to make sure that they are doing the online exam on their own computer. Lastly, the instructors should try to change exam layout by setting questions in an open-ended question format, which students can answer in their own words from their opinions instead of searching from the Internet or notes.

7. Limitations and Recommendations for future research

For limitations, Firstly, this study only concerned with the Internet and computer self-efficiency, online communication and collaborative self-efficiency and motivation towards online learning dimensions. Hence, further research should cover more dimensions such as learner control, self-directed learning. Moreover, the further research should concentrate on studying demographic, socioeconomic (gender, year of study, cultural etc.) differences in students 'readiness. Secondly, sample size is relatively small. Smaller sample size gets

decreasingly representative of entire population. Furthermore, it might lead to cases of bias. For this reason, for further research, it would be better to increase number of respondents. Lastly, descriptive statistic of this study is not effective to derive insightful research findings. In the future research, parametric approaches shall be applied.

8. Acknowledgement

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FACTORS INFLUENCING THE INTENTION TO PURCHASE ON A SMALL RUNNING EVENT

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Abstract: The running event industry has generated numerous incomes for the economy of Thailand since a decade ago. This research attempts to identify the influential factors associated with the intention to purchase on a small running event. With the "intention to purchase," this research studies its relationship with five independent variables. These factors are the three psychological factors under "Event Image," which include music band, event theme, charity program, and the two behavioral factors under "Past Behavior," which are past reward collection and past exercise routine. In order to select the participants as the sampling of this study, a convenience sampling method was used. The study area was selected purposively since no studies have been conducted in Khon Kaen on this topic. Also, Khon Kaen has a running event named "KKUIC, the Insider Color Run," which is considered a small running event in the Thailand running event industry. This province and the event was selected as the study area. For the first part of the study, the researcher used descriptive statistics to analyze the nominal data. The linear regression was used to analyze the interval data obtained in the second part. The research found that five factors, including music band, past reward collection, past exercise routine, event theme, and charity program, were the significant influence factors to the intention to purchase, respectively.

Keywords: event marketing, intention to purchase, small running event, event image, past behavior

1. Introduction

One of the major motivators of tourism is the event industry, and it plays a prominent role in developing and planning the marketing plan in most tourism destinations. It also helps increasingly creating and promoting the area's social and cultural in a universal theme as a tourist attraction (Duran, 2013). With world-class hospitality and convenience facilities, and

value for spending, Thailand captivates numerous event tourists each year. Notably, over the last decade, it has been a remarkable growth in the number of sporting events in Thailand. Paul Poole (South East Asia) Co., Ltd., (2018; para. 2) stated that "running races, golf tournaments, triathlons, conventions, and the like," usually can fascinate many participants as well as pull in plenty of spectators, friends, and relatives of those participating in these events. Recently, the most widespread leisure sport activity is running. The running event industry in Thailand generates about 1.7 billion Thai baht in 2020. This industry has undergone rapid growth in the last decade and a significant increase in recent years. In 2010, there were approximately 500 running events across Thailand (Manager Online, 2018). Since then, the number has spiked to be 1,200 events in 2018, and there is an estimate of 1,800 events in 2019 (Positioning, 2019; KResearch, 2020). The industry generates a significant amount of cash for the sectors associated with the running event. The venues, hotels, running supply suppliers, photographers, and sports companies benefit from this trend (Positioning, 2019).

2. Research Objectives

Because the running event industry has generated numerous income for the Thai economy since a decade ago, an educational approach has significantly increased sports events research. Nevertheless, professional sports have been the main emphasized in studying sports events. In Thailand, studies on marketing in sporting events, such as running events, are numeral insufficient. The information about running events in Thailand is mostly derived from news and business reviews as the main resources. Furthermore, limited resources discussed the factors influencing participations' purchase decisions on a small running event in Thailand. Hence, from this perspective, the research question of this study is generated as: "What are the factors that significantly influence the intention to purchase on a small running event?" Therefore, this paper's major objective is to study factors that will influence the intention to purchase of participants to join a small running event.

3. Literature Review

3.1 Thailand Running Event Overview

With the weather in Thailand allowing running events to happen year-round, the number of running events spiked. Many factors cause the massive growth trend. First of all, the healthy lifestyle trend across the world has positively impacted this industry. In the past ten years, people started to be more conscious of their health and turned to the most accessible exercise, which is running. Second, the running trend is kept alive and lively to the runner communities (Manager Online, 2018). Runners gathered into running groups and used social media to connect with the others. Lastly, there was a massive social movement in 2016 because of the charity program by Toon Bodyslam, the Thailand rock star, which caused a 40% growth in the running industry alone that year (Manager Online, 2018; Positioning, 2019). The sizes of the running events are divided into three different types. The first one, which is considered a small running event, is organized for runners around 1,000 - 3,000 people, usually arranged in the

park. The second type shifted to 3,000 - 5,000 people running out on the streets and is considered a medium- sized event. The third type, the large size of the event, which serves about 5,000 runners or more, is organized in Thailand around 20 events a year (Positioning, 2019).

In Khon Kaen, the running event named "KKUIC the Insider Color Run" is considered a small running event in the Thailand running event industry. KKUIC is the short name of Khon Kaen University International College. The project was operated by the 4th year International Marketing Program students of KKUIC. The event is a small running event under the theme "black light, night mode," mainly decorated with neon lights to fulfill the theme. The concept of the event is unique to draw attention and differentiate itself from competitors. The promotional activities are mainly created via the Facebook fan page. The sales of the running package mostly came from two separate activities. The first activity is online selling via registration forms with RunLa and Jotform website. The second one is personal selling through roadshow activities. The event was organized as a charity project. The revenue after cost reduction was donated to Khon Kaen Hospital and Sri Sangwan school. About 1000 runners attended the event, which can be a reason to specify this event as one of the small running events (KKUIC International Marketing Program, 2019).

3.2 The Influence of Demographic Factor
Demographic Factor: Age, Gender, Occupation and Income

Participants of numerous small sport events were found sharing similar consumer characteristics. The 40 years old was the average age of runners has shown in prior research findings (Hallmann, Kaplanidou, & Breuer, 2010; Kaplanidou & Gibson, 2010; Wicker, Hallmann, & Zhang, 2012). In the gender factor, previous research indicated that most of the running participants were male (Hallmann et al., 2010; Kaplanidou & Gibson, 2010; Wicker et al., 2012). Concerning income, the prior studies also mentioned that runners' income level was found to be relatively high (Kaplanidou & Gibson, 2010; Wicker et al., 2012). The previous studies also stated that runners in different occupations had joined the event (Hallmann et al. , 2010; Wicker et al. , 2012) . Although professional runners normally participate in running events, however, the majority of participants are general runners with non-professionals (Kaplanidou & Gibson, 2010; Wicker et al., 2012).

Significantly finding in previous studies, the factor influencing the intention to purchase at sports events is the demographic factor. Possibly, demographic factors could influence purchase decisions in this research concerning small running events. Firstly, age was found to positively influence purchase decisions in prior studies, mentioning that older runners are more likely to make easier purchasing decisions than younger runners (Kaplanidou & Gibson, 2010; Wicker et al. , 2012) . Secondly, a positively correlated factor with the purchase decision is income, which means that runners with higher income tended to make easier purchase decisions than runners with lower income (Hallmann et al., 2010; Kaplanidou & Gibson, 2010;

Wicker et al., 2012). Apparently, participants with higher finances make an easier purchase decision when they buy tickets for attending running events.

3.3 The Role of Psychographic Factor and Behavioral Factor
Psychographic Factor: Event Image (Music Band, Event Theme, and Charity Program)

The event image could be determining the intention to join the sports event. It would also imply that people with a positive event image in mind would tend to decide to purchase. The event image and the destination image would influence the intention of the purchase decision (Kaplanidou & Gibson, 2010; Wicker et al. 2012). The image of the event tends to be affected by the image of a destination (Wicker et al. 2012). Kaplanidou and Gibson (2010, p.167) stated that "the positive or negative nature of the event image is related to the degree to which the event is compatible with the destination's image." From this perspective, it is essential to be informed that the event image and the destination image are highly correlated (Hallmann, 2010; Kaplanidou & Gibson, 2010; Wicker et al. 2012). Concerning the effect of the running event image on the intention to make a purchase decision, prior research demonstrated impact results which confirmed that running event image influences a purchase decision of a runner to participate in the running event (Hallmann, 2010; Wicker, Hallmann, & Zhang, 2012). According to the collected information from the last two years of KKUIC, the Insider Color Run, the information pointed to event image was included Music Band, Event Theme, and Charity Program (KKUIC International Marketing Program, 2019). Therefore, the next three hypotheses of this study are as below:

H1: Music band would have a positive influence on intention to purchase.
H2: Event theme would have a positive influence on intention to purchase.
H3: Charity Program would have a positive influence on intention to purchase.

Behavioral Factor: Past behavior (Past Exercise Routine and Past Reward Collection)

The significant role of past behavior in the "Theory of Planned Behavior" has been liberally argued (Ajzen, 1991). In general, past behavior is recognized as "actions or reactions" of an individual in response to stimuli in the past (Sommer, 2011). In meta-analytic, past behavior has also been significantly identified in previous research as an important forecaster of consumer behavior (Kaplanidou & Gibson, 2010; Wicker et al. 2012). Past behavior has been investigated in various frameworks, including behaviors in traveling, sports event attendances behaviors, and behaviors in the health-related event (Kaplanidou & Gibson, 2010). Kaplanidou and Gibson (2010, p. 167) also mentioned that "past behavior reduces the perceived risks associated with decisions related to certain products or services and consequently it can positively influence intentions to consume a service or a product again." As the previous studies stated earlier, most of them proposed that a direct predictor of the intentions and future behaviors is past behavior.

Ajzen (1991) mentioned that "it was decided because of the need to adhere to the target, action, context, and time requirements proposed in the theory of planned behavior to increase the predictive validity between attitudes and behavioral intentions." Past participation in similar

sports events was acknowledged as other predictors of past behavior (Kaplanidou & Gibson, 2010; Wicker et al. 2012). Past behavior, in the framework of this research, was operationalized as past participation in running. In relation to the collected information from the last two years, the information from KKUIC, the Insider Color Run, which pointed to past behavior, included past exercise routine and past reward collecting (KKUIC International Marketing Program, 2019). Hence, the last-two hypotheses of this study are as below:

H4: Past reward collection would have a positive influence on intention to purchase.
H5: Past exercise routine would have a positive influence on intention to purchase
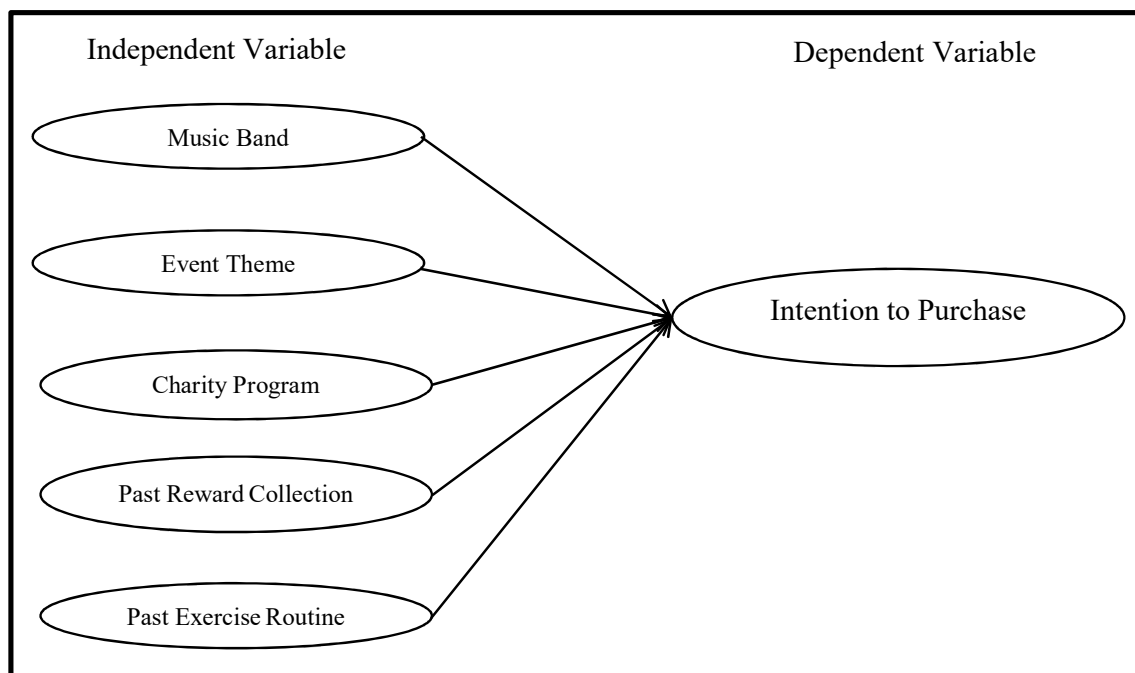The framework shown in figure 1 indicates the conceptual foundation of this study.

Figure 1
Framework of the study

4. Research Methodology

4.1 Study Area

The study area was selected purposively since no studies have been conducted in Khon Kaen on the topic of "Factors Influencing the Intention to Purchase on a Small Running Event." Also, Khon Kaen has a running event named "KKUIC, the Insider Color Run," which is considered a small running event in the Thailand running event industry. Khon Kaen province and KKUIC, the Insider Color Run, was selected as the study area.

4.2 Data Collection

To examine the relationships between independent factors and the purchase decision in small running events, male and female adults who participate in the KKUIC the Insider Facebook fan page in 2020 were delineated as the study population−in total of 7,887. In order to select the participants as the sampling of this study, a convenience sampling method was used. There were 420 questionnaires distributed, and 12 were eliminated based on incomplete information and low validity. Hence, 408 questionnaire data were analyzed. In the first part of the questionnaire, the demographic data of the 408‑responder were collected information on gender, age, occupation, and income, which are the nominal data. This nominal data could be analyzed to acknowledge which customer group should be considered a potential target group for this running event. The second part of the questionnaire was the interval data of the 408‑responder, including psychographic factors such as influencer, music band, promotions, event theme, and charity programs. Also, this part of the questionnaire was collected on the respondents' behavioristic factors, which include past exercise routine and past reward collection.

4.3 Measurement

The primary research method adopted in this study was the quantitative method. Questionnaires were used to measure on a seven‑point Likert scale ranging from "Strongly disagree" (1) to "Strongly agree" (7) and were placed online on Facebook at the "KKUIC Insider Color Run" fan page, which available from 5 January 2020 – 5 February 2020.

4.4 Data Analysis

For the first part, which was the nominal demographic data, the researcher used descriptive statistics to analyze it. The linear regression is used to analyze interval data obtained in the second part of this study.

5. Results

Table 1 shows a summary of the general characteristics of the study.

Table 1
Demographic characteristics of respondents

Characteristics	Classification	N	%
Age	10-29	264	64.7
	30-49	133	32.6
	50-60 up	11	2.7
Gender	Male	171	41.9
	Female	237	58.1

Occupation	Student	32	7.8
	University Student	147	36
	University Officer	8	2
	University Lecturer	13	3.2
	General Runner	208	51
	Professional Runner	0	0
Income (Baht)	Less than 5,000	32	7.8
	5,001-10,000	109	26.7
	10,001-15,000	31	7.6
	15,001-20,000	172	42.2
	20,001-25,000	27	6.6
	More than 25,001	37	9.1
Total		408	100

According to Table 1, nominal data was collected from the demographic characteristics consist of four factors. The first factor is age; the highest number of respondents comprises people from ages between 10 - 29 years old at 64.7 percent. Gender is the second factor that shows the respondents of 58.1 percent are female. The third one is occupation; a general runner is the most respondents that attended the event at 51 percent. Comparing the occupations among the insider Khon Kaen University such as university student, lecturer, and officer with the outsider occupation such as student and general runner, the result shows a dramatic huge gap. The outsider occupation states a bigger number than the insider one. Lastly, the table demonstrates that the income between 15,001 - 20,000 baht is the respondents' highest group.
Table 2 shows the linear regression result of the second part as the following:

Table 2
Linear Regression Result

Factors	b	Beta	t-value	P value
Music Band	.208	.367	13.895	0.000*
Event Theme	.141	.264	7.646	0.000*
Charity Program	.116	.215	6.346	0.000*
Past Exercise Routine	.151	.289	8.401	0.000*
Past Reward	.189	.303	11.443	0.000*
Collection (Constant)	1.235		8.608	0.000
R = 0.853ᵃ R² = 0.723		F = 152.563	p value <0.001	

Table 2 shows that the factors influencing the intention to purchase by runners in a small running event are Charity program, Music Band, Event Theme, Past Exercise Routine, and Past Reward Collection with a p-value less than 0.001. The result could also explain the intention to purchase at 72.3 percent from R-squared.

Predictive equations can be written in the form of raw scores as below:

Intention to Purchase = 1.235 + 0.208 (Music Band) + 0.141 (Event Theme) + 0.116 (Charity) + 0.151(Past Exercise Routine) + 0.189 (Past Reward Collection)

Predictive equations can be written in the form of standard scores as below:

$$Z_{\text{Intention to Purchase}} = 0.367\ (Z_{\text{Music Band}}) + 0.264\ (Z_{\text{Event Theme}}) + 0.215\ (Z_{\text{Charity Program}}) + 0.289\ (Z_{\text{Past Exercise Routine}}) + 0.303(Z_{\text{Past Reward Collection}})$$

Table 3
Hypotheses Results

	Hypotheses	Sig.	Result
H1	Music Band would have a positive influence on intention to purchase.	.000	**Supported**
H2	Event Theme would have a positive influence on intention to purchase.	.000	**Supported**
H3	Charity Program would have a positive influence on intention to purchase.	.000	**Supported**
H4	Past Reward Collection would have a positive influence on intention to purchase.	.000	**Supported**
H5	Past Exercise Routine would have a positive influence on intention to purchase.	.000	**Supported**

6. Discussion and Conclusion

First of all, more than half of the respondents (64.7 percent) are teenagers and adults age between 10-29 years. This is an unexpected finding because the 40 years old was the average age of runners has shown in prior research findings from Hallmann, Kaplanidou, and Breuer, (2010); Kaplanidou and Gibson, (2010); and Wicker, Hallmann, and Zhang, (2012). Secondly, in the gender factor, previous research indicated that most of the running participants were male (Hallmann et al., 2010; Kaplanidou & Gibson, 2010; Wicker et al., 2012) but this research finding shows that female was the bigger group. It might be because this event provided a shorter distance running compared to the previous studies which focused on the marathon. This information needs to find out in further studies. Thirdly, this study result mentions that moderate-income participants are the greatest group who joined the event but the prior studies mentioned that the income level of runners was found to be relatively high (Kaplanidou & Gibson, 2010; Wicker et al., 2012). Lastly, on the demographic factor, the result of this study also shows the same finding from the previous research which the majority of participants are general runners with non-professionals (Kaplanidou & Gibson, 2010; Wicker et al., 2012).

Respective in the ranking of psychographic factors and behavioral factors, the first factor is the psychographic factor; the "Music Band" turns out to be the most important factor for adopting. The result shows its effects on the intention to purchase on a small running event. Based on the collected data from the last two years of KKUIC, the Insider Color Run, "Music Band," is considered a dimension that represented the image of the event (KKUIC International Marketing Program, 2019). This study's result is similar to the prior research revealed impact results, which confirmed that running event image influences a purchase decision to participate in the small running event (Hallmann, 2010; Wicker, Hallmann, & Zhang, 2012). The "Past Reward collection" and the "Past Exercise Routine" are the second and third factors in the intention to make a purchase decision for the small running event. These two factors are behavioral factors that could explain most of the respondents' awareness of awards and practices as they have been experiencing and practicing before in most of the running events. This study shows the same finding as to the previous research that the past behavior has also been significantly identified in previous research as an important forecaster of consumer behavior (Kaplanidou & Gibson, 2010; Wicker et al. 2012).

The other significant factors as the fourth and the fifth are "Event Theme" and "Charity Program," respectively. Both are considered as the "Event Image" in psychographic factors. This study's results are similar to the earlier research results that corroborated that running event image influences an intention to purchase on the small running event (Hallmann, 2010; Wicker, Hallmann, & Zhang, 2012). These results illustrate that runners are likely to purchase if they like the event theme and want to participate in the charity program.

Based on this study result, it examined the impact of psychographic factors and behavioral factors as the factors that influence the intention to purchase runners on a small running event. This study has provided new insight concerning what influence the runners and participants to buy. All in all, marketers of the small running event need to understand all factors needed for adopting the intention to purchase by the participants to generate income for the event's sake.

7. Reccomendation and Limitation

7.1 Reccomendation

The target market of "KKUIC Insider Color Run" will base on participants as the event's potential customers. Having the right group of target market is the most important factor for promoting the event. For example, boosting advertisement will be needed to set up for a specific group of audiences to reach the most effective result. From the finding of this study, the target participants could divide into three different groups, which can be generated from the respondents' different ages.

The first target participants should be high school students. The small running event marketer may aim to promote the awareness of KKUIC to the high-school students in Khon Kaen. The target high schools may include Khon Kaen Wittayayon School, Kaen Nakorn Wittayalai

School, The Demonstration School of Khon Kaen University, Khon Kaen Vitethsuksa School, and Kanlayanawat School. The expected-participants will positively respond to the "Music Band and Event Theme," as shown in the finding of the study. Therefore, these psychographic factors should be set to fit with the needs of the target group. Nevertheless, a survey on the needs of the consumer is needed for further action.

A second target market is a group of upper-age teenagers whose ages between 19-29 years-old. This group could be university students who study at Khon Kaen University and any colleges around Khon Kaen and nearby. This target group can be considered a secondary target group to create awareness for KKUIC because they have already studied in higher education (same level as KKUIC), but they may mention KKUIC to others. This group also positively responds to "Music Band and Event Theme," as shown in the study's finding. However, a survey of consumer's needs is needed for further action in this case also.

A third group is a group of general runners, which is also considered the event's target market. This group of people ages about 30 years old and older. From the finding, this group is responding positively to "Past Reward collection," "Past Exercise Routine," and "Charity Program." As the response of "Past Reward collection," reaching this group could be done at the running events as they might be collecting their reward there. Also, focusing on who normally exercises or runs at public parks near Khon Kaen could be effectively done as the response of "Past Exercise Routine." Furthermore, approaching this group could be done through charity places or events to respond to the "Charity Program."

All in all, marketers of the small running event need to understand all factors needed for implementing the intention to purchase by the participants to generate income for the sake of event.

7.2 Limitation

The limitation of this study is lacking information on comparing a fun run event with the marathon event. This information might have a significant point on the intention to purchase. The second limitation is related to the sample of this study employed panel members obtained from the Facebook fan page of KKUIC, the Insider Color Run, only. Lastly, mixed-method should be used by adding qualitative methods, which are suggested to understand the deeper meanings of this research's findings. In-depth interviews and focus-group interviews will provide event marketers with deep information.

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THE ECONOMIC IMPACT OF GASTRONOMIC TOURISM DURING THE COVID-19 PANDEMIC IN BALI: THE UBUD FOOD FESTIVAL

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Abstract: The main objective of this paper is assessing the economic impact in Bali during the COVID-19 pandemic by proposing the case of Ubud Food Festival 2019 with input-output analysis. Due to the outbreak, most of scheduled festivals in 2020 have been cancelled, including Ubud Food Festival 2020. Local business and local visitor expenditure surveys were conducted to examine the direct effect of the festival. To compute the indirect effect generated by 54 sectors in Bali's economy, this study constructs regional output, value-added, and income multipliers. The result figured that among gastronomic tourism-related sector, Food and beverage service industry have the largest number on regional output multiplier, Recreational and sporting activities has the largest number on value-added multiplier, and Transportation support service industry has the largest number on income multiplier. Considering the backward linkage and large multiplier numbers of tourism sector, hence gastronomic tourism could be the 'key' sector to expand Bali's economic growth. This study provides an analysis of current tourism industry responses to Bali's economy during pandemic and influence regional tourism policy design in the middle of the crisis.

Keywords: economic impact; gastronomic tourism; input–output model; Ubud Food Festival; multiplier

1. Introduction

The economic impact analysis is a vast analytic method embracing the most common models for travel and tourism arrangement. The applications of economic impact study in travel and tourism determine the effects in income, expenditure, output, or jobs related to tourist destinations, events, facilities, and policies in a specified geographic area.

As one of the fastest growing sectors by contributing to Indonesian economy, the country welcomed 16.1 million international tourists in 2019, indicating almost two percent growth from

2018. Tourism sector indicates annual growth with the average of 9.33 per cent increase annually since 2013 to 2019. Tourist expenditure contributes to Indonesian economy, where the overall impacts relies on the ways in which a certain expenditure is allocated to the different tourism-related sectors (Blake et al., 2003). In 2019, foreign tourists spent around a fifth of their total spending of USD 1,183.43 per visit on food and beverage while they visited Indonesia. Through tourism, people spend their money to travel and seek for new experiences. Gastronomy is one of the experiences and become one of the most dynamic and creative segments of tourism, so called gastronomic tourism.

Business in culinary sector has put new perspective to one of the most contributed provinces in Indonesia GDP through its tourism sector, named Bali Province. A small district in Bali, Ubud, has turned into Indonesia's first gastronomic destination endorsed by World Tourism Organization (UNWTO) due to the expansion of cultural tourism in Bali (Pitanatri, 2016). The case of Ubud Food Festival (UFF) 2019 was selected to make significant contribution to local community. The festival which is founded in 2015 as an annual project of a not-for-profit organization named Yayasan Mudra Swari Saraswati has welcomed more than 15,000 visitors in 2019. With over than 100 local and international chefs, restaurateurs, farmers, food writers and culinary stars, the three days of cross-cultural culinary festival highlighted Indonesian food as the headliner. Over four fifths of the visitors were Indonesian who came from Bali, Jakarta, Bandung, Yogyakarta, Surabaya, and Papua. The remain visitors were foodies from Australia, Southeast Asia and beyond. There is an increase in approximately 30 percent visitors annually since 2015.

However, industry development does not always work smoothly as it will deal with several challenges in the future, so does tourism industry. Von Bergner & Lohmann (2014) stated that tourism sector faces plenty of challenges which have not been a part of normal business in the shape of global financial crisis, political issues, terrorism as well as natural disaster. A crisis, hereafter, portrays an occasion that leads to a failure of adapting to some changes (Ritchie, 2004) and the COVID-19 pandemic which was declared by the WHO on March 11, 2020 is considered as a crisis since it ceased people mobility at global scope to community scope, enforced several countries to close the border, led to a sluggish economy due to less or even terminated the production and distribution process of products. The outbreak of this pandemic has changed Balinese economic, social, and political structures since people attempt to deal with the 'new normal'.

2. Research Objectives

Due to the shortage of systematic comprehension on economic impact assessment on tourism sector that potentially provides insights and lessons for policymakers to improve and adjust the existing tourism policy options particularly at national level during the crisis, to achieve the research objective and provide a guidance for this research analysis, two objectives were formulated. Firstly, this study aims to enhance the understanding of tourism sector contribution, especially gastronomic tourism, to Bali's economy with the propensity to encourage sustainable

development in terms of creating economic impacts stimulated by the tourism products and services. This could be a booster to regenerate heritage restoration as well as raise local community identity. Due to the annual increase in visitor size, the tourism sector is indicated to support local communities. Bali Province is quite popular with their nature and culture for tourist attractions. This is, therefore, highly necessary for the province to gain a return on their investment to tourism sector in terms of local communities and local enterprises who attempt to attract more tourist to Bali by running their culinary and other businesses. However, the emergence of a crisis cannot be avoided along the way. Thus, the second objective indicates the economic impacts of tourism sector during crisis through the case of COVID-19 pandemic would be an indication to whether local community's investment will worth their while. This study will review the economic effect of gastronomic tourism by highlighting the number of tourists who visited Ubud Food Festival, their average spending during their visit, and regional multipliers generated by tourism sector. Therefore, the research question which would guide the thesis is exhibited the direct and indirect impacts of gastronomic tourism towards Bali's economy generated by Ubud Food Festival through 54 sectors in economy by constructing regional output, value added, income, and employment multipliers during COVID-19 pandemic.

3. Literature Review

Multiple models have been developed to compile the economic impacts of tourism, namely Input-Output (I-O), Social Economic Matrix (SAM), Computable General Equilibrium (CGE), and Tourism Satellite Account (TSA) models. Each of these models will be used depends on the purposes as well as scale of the analysis. The I-O model study can be employed to improve regional statistical system and provide reliable information to make regional tourism policies (Waluyo, 2015). The model has been broadly used in empirical study to forecast the economic impacts of tourism. Tourism-related information as data and models requires to influence both tourism activities and their relationship with local and regional economic activities. As stated by Van Wyk et al. (2015), the I-O model is ideally suitable to estimate the economic impacts of short-run regional development projects like events or festivals. This model is more popular for economic impact assessment due to its ability to presents accurate and detailed information on direct, indirect, and induced effects of visitors' or tourists' spending on certain 'key' industries in economy, thus Loomis & Walsh (1997) highlighted this as one of I-O model's strengths.

When tourists visit a certain area, there is an increase in this area's economic activity due to tourist activities that directly and indirectly create more demands for local goods and services. Estimating economic impact aims to measure the changes in sales, income, tax revenues, as well as employment from tourism activities.

The economic impacts in tourism activities as classified by Tribe (2011) is differentiated to primary and secondary effects. The significant input to the economic impact analysis of tourism activity usually addresses to tourist spending in the area, the portion of sales generated by tourism-related local businesses, the income generated by tourism industry for households and local enterprises, the employment in the area and tax revenue supported by tourism sector. The

primary effect contains the direct effects of extra demand occur within main tourism activities e.g. tourist spending on lodging, food and beverage, recreational, transportation, and retail trade. The secondary effect makes the economic impact assessment more accurate, since tourism will acknowledge the linkage of most sectors in economy as well as how dependable this region to good and service imports. Indirect and induced effects are included in secondary effect. This is assessed by multipliers through computing the leakage of new spending in the area (Janeczko et al., 2002). Indirect effects refer to additional demand for goods and services by industries that provide tourist needs in a target region e.g. the extra food ingredients that restaurants require to purchase, the extra inputs on supply and labor for hotels needs to serve their guests, and so forth. While induced effects generate after tourism's direct and indirect effects emerging due to an increase of demand for goods and services in specified region e.g. the labors whose jobs are supported within the value chain and spend their incomes on local goods and services therewith assisting the other economic activities.

The most common multipliers employed to analyze the economic impact are the output, income, employment, and value-added multipliers (Hughes, 2018). Stynes (1997) constructed the simple formula to estimate the economic impact of tourism as follow:

Economic Impact of Tourism
= Change in number of tourists x Average spending by visitor x Multiplier

This formula suggests three procedures: (1) estimating the change in number and type of tourist who visit a region due to a policy, (2) analysing the average levels of tourist expenditure (on several sectors) in a region, and (3) assessing the changes in expenditure of regional economy model or multipliers to determine the secondary effects of tourism. Total visits, average spending by visitor and an aggregate sales multiplier are inserted on a simple worksheet to analyze the direct and total sales effects of visitor expenditure. Sales effects are converted to income and employments using simple ratios of income to sales and employment to sales.
The general I-O model used to compute multipliers is the demand-side of I-O table which is determined by demand for its outputs. The aim of employing the demand-side model is to estimate direct, indirect, as well as induced impacts in an economy and grasp the differences between certain types of multipliers in each category. The direct effect of visitor expenditure on the regional economy could be simply enforced as mostly involves a comprehensive sampling procedure. Assessing the indirect effect can be more demanding since obtaining the appropriate multipliers is mandatory to organize a reliable and sufficient study. Assessing the impact on regional income and employment, I-O model constructs some multipliers and provides the linkages among sectors, personal income, as well as the total employment (Mazumder et al., 2009).

Output is the basis multiplier of the other derived multipliers. The output multipliers describe the total value of production by all domestic sectors in an economy required in order to produce one extra million Rupiah's worth of final demand for that sector's output. Therefore, if an output multiplier of a sector is 2. xx, it means for every million Rupiah of production in this sector,

IDR 2. xx million of activity is created in the local economy: total of original Rupiah (IDR 1.00 million) and an additional IDR 1.xx million. The first requirement for an extra million Rupiah's worth of a given sector's output is named the initial output effect. The amount of output needed from all sectors of the economy in order to produce initial output effect is called the first round effect. The first round effect can be estimated by deriving a table from the flow table by dividing every column by Total domestic input at basic prices of that sector (the column total) to construct Direct requirements coefficients which analyze the advantage of the backwards linkages.

The coefficients in a given sector's column indicates the amount of added output required from every sector to produce an extra million Rupiah's worth of output from that sector. The combined effect of the initial effect added by all the production induced rounds of extra output are named the simple multipliers (McLennan, 1996). The simple multipliers can be computed by deriving the first rows and columns in Direct Requirements Coefficients table and form the A matrix, then set up an Identity matrix with similar size to the A matrix dimension to gain a new Leontief's matrix $(I - A)$, accordingly calculate the Leontief's inverse matrix $(I - A)^{-1}$ to build the column total. The next step is assessing the effects of second and subsequent rounds in induced production by calculating the industrial-support:

$$Industrial\ support\ effects$$
$$= simple\ multiplier - initial\ effects - first\ round\ effects$$

as well as calculating the production induced effects:

$$Production\ induced\ effects = first\ round\ effects +\ industrial\ support\ effects$$

The household industry receives wages after production work and spends this income on goods and services. The wages are denoted by the matrix multiplication of Compensation of employee row and the Consumption by private household column. It is showed in Final consumption expenditure column as shown in the flow table. The induced production of extra goods and services in response to private fine consumption expenditure is portrayed as the consumption induced effects. Thus, we can calculate new multiplier set called the total multipliers by summing up the initial effects, the production induced effects and the consumption induced effects. The total output multipliers are computed by assigning an Identity matrix with the same size as dimension of A matrix added by the Compensation of employees row and Final consumption expenditure column, thus a new framework matrix called B matrix is build up as shown in Figure

					Final consumption expenditure
	Quadrant I				
	Intermediate Usage				
Compensation of employees					

Figure 1 The matrix B framework

The Leontief's inversed B matrix, $(I-B)^{-1}$ or symbolized as B* is built from the first six rows and columns of the B matrix includes the columns totals. This is called the total output multipliers. Then, the consumptions induced effects is computed as follows:

$$Consumption\ induced\ effects = total\ output\ multiplier + \ simple\ multiplier$$

The second multplier is the income multiplier. It indicates the increase in the total value of employee's income required to fulfill a million Rupiah's worth of final demand for the output of the target sector. An income multiplier of 2.xx exhibit that for every million Rupiah of Compensation of employees in certain sector another IDR 1.xx million of employee's income is created in the local economy. After estimating the househould coefficients in Compensation of employees row in Appendix B, these are the initial household income effects, or denoted as the vector *i*. Part of income multipliers can be computed by employing matrix multiplication function as follows:

$$First\ round\ income\ effects = i * A$$
$$Simple\ income\ multipliers = i * (I - A)^{-1}$$
$$Total\ income\ multipliers = i * B^*$$

The remaining income multipliers can be computed in the same way as the corresponding output multipliers.

The value added multipliers indicate the initial increment in output utilized from a sector and the total increase value added by all sectors. A value added multiplier of 2.xx shows that for every million Rupiah of direct value added in target industy another IDR 1.xx million of value added is creared in the local economy. The interpolation in value added bears with an increase in gross domestic product (GDP) as the GDP is established by sum of value added and net taxes as followed formula:

$$GDP\ = Value\ added + Net\ taxes$$
$$= (Output - Intermediate\ inputs)\ + \ (Taxes - Subsidies\ on\ products)$$

To compute value added multipliers, the vector h (the Value Added row) from direct requirements table is required that shows the initial effect on the excess of value added in response to output's direct increase by a million Rupiah. Hence, this vector h is multiplied by the Leontief's inverse matrix as follows:

$$Simple\ GVA\ multipliers = h * (I - A)^{-1}$$

The employement multipliers portray the total jobs created through an increase in initial output. If an employment multiplier is 2.xx, it means that every direct job generates 2.xx jobs in total economy: the original job (1.00 job) and 1.xx additional jobs. This multiplier is not obtained from the elements in I-O table, like in output and income multipliers, as I-O table does not include the employment-related elements indeed. Adding a new row to put the total amount of employment in a region or country in I-O table requires employment coefficients which can be derived from dividing each number of employment in given domestic sector by th etotal output generated by that domestic sector.

The previous empirical studies regarding the economic impact analysis tend to apply a common methodology, Input-Output model, even though there are certain diversities in application as it depends on the flows, agents, as well as tools utilized in the study. Those studies emphasize Input-Output analysis to calculate the multiplier effects and conduct visitor survey. Visitor survey is commonly employed by researches as it allows the visitors to share their spending pattern. Therefore, the survey also provides demographic questions that lead the researchers to understand the target market better. This study employs the first classification from Fletcher (1989) and Archer & Fletcher (1990) studies which assesses the economic impact of tourism in certain regions or countries with common Input-Output model.

4. Research Methodology

Before analyzing the economic impact of gastronomic tourism, assessing the economic value of tourism sector, and converting into the economic value of 54 sectors within 2007 Updated I-O table of Bali Province Domestic Transaction at Producer Price are required. The constructed I-O table fundamentally consider Law of the Republic of Indonesia Number 10 of 2009 concerning Tourism (State Gazette of the Republic of Indonesia of 2009 Article 11, Supplement to Official State Gazette of the Republic of Indonesia Number 4966) which emphasizes the management of government and tourism-related institutions in conducting research and development to support the tourism affairs development. The dimension of this research I-O table is classified by 54 x 54 sectors.

Estimating the linkage among sectors in Bali's economy aims to identify that tourism sector has strong correlation with other sectors. The gastronomic tourism-related sectors such as accommodation, food and beverage, as well as recreational, cultural and sporting activities only bring tourism sector backward further rather than bring it forward. This is assumed that tourism sector has high backward linkage with other sectors compared to other sectors' enforcement.

The total output generated by Ubud Food Festival was analyzed towards local attendees and business level researches. For business level research, a survey is included all visitors' expenditures to estimate the locals and visitors' spending during the festival. The data set used referred to The Ubud Food Festival 2019 held on April 26-28, 2019. The local attendees survey was conducted by contacting local visitor and asking them to complete a questionnaire translated in Indonesian regarding their demographics and influenced factors to attend UFF 2019. The visitor list was derived from secondary data of UFF and contacting them through email to distribute the online questionnaire that gain their festival-related spending in the area. A total 628 questionnaires are completed.

The business survey for supply approach focuses on six industries; accommodation, food and beverage service, inland transport service, retail trade industry, recreational, cultural, and sporting activities, as well as craftsman work industry. A total of 101 organizations and companies participated on the business survey.

5. Results

According to the calculation of backward linkage index (BL) and forward linkage index (FL) of the 54 sectors in Bali's economy can accordingly be grouped into four categories depending on their values (i.e. size):

1) Key Sectors; strong BL and FL: BL > 1 and FL > 1
2) Strong BL but weak FL: BL > 1 and FL < 1
3) Weak BL but strong FL: BL < 1 and FL > 1
4) Weak Linkage Sectors: weak BL and FL: BL < 1 and FL < 1

To emphasize the use of numerical linkage index calculation, taking fifteen gastronomic tourism-related sectors from Bali's economy and collecting in Table 1 that presents four of them have strong tourism components, including Textile, apparel, and leather products, Food and beverage services, Star hotels, and Air freight services. Five sectors have strong backward linkage index and weak forward linkage index, only one sector has weak backward linkage index and strong forward linkage index, and five sectors have both weak backward and forward linkage indices.

Industries	BL > 1 FL > 1	BL > 1 FL < 1	BL < 1 FL > 1	BL < 1 FL < 1
Food, beverage, tobacco, coffee industries			x	
Textile, apparel, and leather products		x		
Craftsman industry and excavated products			x	
Jewellery manufacturer				x
Food and beverage services		x		
Star hotels		x		

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Non-star hotels		x		
Inland transportation				x
Sea freight services				x
Air freight services	x			
Travel agent				x
Transportation support services		x		
Money changer		x		
Cultural attractions				x
Recreational and sporting activities			x	

Table 1 Inter-industry linkages for gastronomic tourism-related industries

Among the leading gastronomic tourism-related industries, most of their tourism components have strong backward linkages to other industries but weak forward linkages as well as have both weak backward and forward linkages. In particular, the backward and forward linkage indices differ among gastronomic tourism-related industries.

The average change in revenues of each sector assigned in this study shown in Table 2.

Selected sector	Business revenues during UFF 2019 (IDR)	Change in revenues (%)	Business revenues on the weekend after UFF 2019
Accommodation	3,194,443,376	10.6	2,885,915,631
Food & beverage	2,843,429,382	64.88	1,724,572,350
Inland transport	87,111,175	36.43	63,850,237
Retail trade	1,584,848,316	5.01	1,509,206,968
Craftsman work	63,469,235	84.13	34,469,235
Recreational, cultural and sporting activities	569,556,634	23.39	461,577,059

Table 2 Comparison of business revenues

Assessing the total expenditure of the local visitors during the event, the average expenditure on products and services served through six industries of interest is computed. The impact analysis of this study excludes the expenditures on festival admission and registration as they had seven purchased events during the three-day festival. Since the allocation of revenue by festival organizer is confidential, it is impossible to specify the percentage of their revenues spent in Bali or the industries where they are spent. Instead of presuming the purchases by the festival organizer obey the pattern of predefined sectors above, this research assumes that the UFF revenue is not involved in Bali's economy. Thus, the table of visitor's expenditure is shown in Table 3.

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Non-festival Expenditure	Expenditure (IDR)	Percentage (%)
Accommodations	79,117,000	15.6%
Foods and Beverages	96,615,500	19.1%
Transport Services	135,355,000	26.7%
Retail Shopping	110,551,500	21.8%
Craftsman Works	9,465,000	1.9%
Recreational Activities	74,901,000	14.8%
Total	**506,005,000**	**100%**

Table 3 Visitors' expenditure to UFF 2019

Computing the output multipliers, Leontief inverse matrix is derived. This type I inverse matrix represent the output amount required from each sector according to direct as well as indirect requirments to compose one unit (or IDR 1 million in this case) of output from a certain sector. The formula to get the output amount is:

$$L = (I – A)^{-1}$$

where   L = the Leontief inverse matrix;
 I = the Identity matrix;
A = the Direct Requirement matrix.

The Direct Requirement coefficients are computed using primary inputs and intermediate output table, directly divided every column by the Total Domestic Input at Basic Prices columns, hence producing Direct Requirement matrix.

The value added multipliers can be calculated by applying value added coefficients in Value Added at basic prices row of the Direct Requirement matrix. This coefficients are symbolized as the vector *h*. To compute the First round effect, Simple income multipliers, as well as Total income multipliers of each sectors, the matrix multiplication function is utilized. Manually, this calculation is a 1 x 54 and 54 x 54 matrix multiplication[1]. Followed by 1 x 54 array represented by the Innitial effects column and 54 x 54 array refered to matrix A for First round effects, matrix $(I – A)^{-1}$ for Simple value added multipliers, and matrix B* for Total value added multipliers. The remaining value added multipliers can be computed in the same way as the corresponding output multipliers.

The income multipliers can be computed by applying household coefficients in Compensation of employee row of the Direct Requirement matrix. These coefficients are denoted as the private income effects and symbolized as the vector *i*. To compute the First round effect, Simple income multipliers, as well as Total income multipliers of each sectors, the matrix multiplication function is utilized. Manually, this calculation is a 1 x 54 and 54 x 54 matrix multiplication.

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[1] For simplicity, MMULT function in Microsoft Excel is applied.

Followed by 1 x 54 array represented by the Initial effects column and 54 x 54 array referred to matrix A for First round effects, matrix $(I – A)^{-1}$ for Simple income multipliers, and matrix B* for Total income multipliers. The remaining income multipliers can be computed in the same way as the corresponding output multipliers, finally the income multipliers are constructed as shown in Appendix F.

The output, value added, income, as well as employment multipliers for gastronomic tourism-related sector in Bali's economy are presented in Table 4.

Sector	Output Multiplier	Value Added Multiplier	Income Multiplier
Food, beverage, tobacco, coffee industries	2.09	3.59	0.29
Textile, apparel, and leather products	1.75	2.96	0.26
Craftsman industry and excavated products	1.80	3.64	0.31
Jewellery manufacturer	1.69	3.44	0.37
Food and beverage services	2.15	4.25	0.34
Star hotels	1.82	4.34	0.27
Non-star hotels	1.89	3.70	0.32
Inland transportation	1.55	3.82	0.26
Sea freight services	1.53	4.41	0.27
Air freight services	1.47	3.97	0.12
Travel agent	1.57	2.81	0.23
Transportation support services	1.83	4.29	0.38
Money changer	1.57	4.46	0.17
Cultural attractions	1.59	4.58	0.27
Recreational and sporting activities	1.57	4.74	0.30
Average	**1.72**	**3.93**	**0.28**

Table 4 Multipliers of gastronomic tourism-related sectors

6. Discussion and Conclusion

A prominent feature of gastronomic tourism is that a rise in final demand shows an injection of funds beyond the economy. Accordingly, it is suitable to analyse tourism impacts on Bali's economy as if tourism output was an expand in final demand. In order to measure the economic impact on tourism sector, this study focuses on international tourist expenditure. By multiplying the Leontief inverse matrix of final demand vector with all sectors other than

tourism inserted as zero, the level of economic activities supported this consumption, differentiating between direct and 'direct + indirect' effects. The output, value added, and income impacts are presented in Table 4.

Table 4 identified that Recreational and sporting activities has the largest amount of Value Added Multiplier of 4.74. This number denotes an extra million Rupiah's worth in final demand of Recreational and sporting activities will impact to overall value added increase in Indonesian economy of IDR 4.74 million. Furthermore, Craftsman industry and excavated products, star and non-star hotels, as well as food and beverage, have Value Added Multiplier of 3.64, 4.37 and 3.7, as well as 4.25 respectively. The largest amount of Income Multiplier is defined by Transportation support services with 0.38. This number identified that every 100 people increase in certain sector will create job opportunity in other sectors of 38 people. The multiplier analysis concludes that gastrononmic tourism has quite large Value Added multipler effect as the average number of this multipliers is larger than 2.00. Considering the backward linkage and large multiplier numbers of tourism sector, hence gastronomic tourism could be the 'key' sector to expand Bali's economic growth through its relation with other sectors which play a role as tourism sector's input.

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SCIENCES AND TECHNOLOGY & MEDIA AND COMMUNICATIONS

SPECIES DIVERSITY AND TAXONOMY OF FRESHWATER COPEPODS IN SARABURI AND LOPBURI PROVINCES, THAILAND

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Abstract: A study on the diversity and taxonomy of freshwater copepods in Saraburi and Lopburi provinces, central Thailand was conducted. One hundred and one qualitative samples were collected from 9 caves and 21 freshwater habitats in May and December, 2019. A total of 32 species belonging to 8, 18 and 6 species of Calanoids, Cyclopoids and Harpacticoids were recorded, respectively. In addition, an undescribed harpacticoid copepod (Family Canthocamptidae), *Elaphoidella* sp., was recorded from Tham Erawan-Thae Wa Phithak Cave, Lopburi Province, and is considered as a new species. Three dominant species in freshwater bodies in both periods were *Thermocyclops decipiens*, *Mesocyclops thermocyclopoides thermocyclopoides* and *Mongolodiaptomus botulifer* which are common species in Thailand. Among harpacticoids, *Epactophanes richadi richadi* was frequently found in the caves. The list of freshwater copepods found in Saraburi and Lopburi provinces including the diversity indices and dominant species are provided herein.

Keywords: Canthocamptidae, Harpacticoida, freshwater copepod, taxonomy

1. Introduction

Copepod is a group of zooplankton, categorized into phylum Arthropoda and subphylum Crustacea. They are primarily free-living with some parasitic organisms (Dussart & Defaye, 2001, pp. 1-3). Mostly, free-living copepods are classified into order Calanoida, Cyclopoida and Harpacticoida (Dussart & Defaye, 2001, pp. 4-5). Copepods are an abundant microcrustacean group that can distribute in various habitats such as humid soil, ground water, small pools, ponds, lakes, swamps, reservoirs, brook, canals, rivers, estuaries, oceans or even

frozen water such as Antarctic lakes (Boysen-Ennen & Piatkowski, 1988, pp. 17-35; Kudoh et al., 2008, pp. 1539-1542). They play a role as intermediate organism between primary producer and consumer in the food chain, and they are a bioindicator species for water quality (Berraho et al., 2016, p. 661).

The diversity of freshwater copepods in Thailand has been studies since 1981. From the early studies, temporary and permanent freshwaters were intensively surveyed throughout the country. Zooplankton diversity researches were reported and found calanoid and cyclopoid copepods among zooplanktons (Cochard et al., 2014, pp. 157-173; Wongrat & Pipatcharoenchai, 2003, pp. 8-29; Jithlang & Wongrat, 2006, pp. 1-17). Most the identified copepod species have been published as new species. Up to now, 109 species of freshwater copepods were described in Thailand, of which twenty-six species are new species. These species consist of 39, 53 and 17 species of calanoid, cyclopoid and harpacticoid, respectively (Sanoamuang, 2002, pp.50-55; Alekseev & Sanoamuang, 2006, pp. 286-287; Watiroyram et al., 2015b, p. 81-99; Watiroyram et al., 2017, pp. 501-525; Watiroyram & Sanoamuang, 2017, pp. 15-31). Most harpacticoids have been further researched later in caves for a decade since 2007. The diversity and characteristic features of copepods that inhabit freshwater bodies are significantly different from cave-dwelling copepods. In Thailand, studies on the diversity of copepods in caves have been intensively explored in northern, western and southern regions of Thailand. This paper presents the copepod diversity in caves including freshwater bodies in Saraburi and Lopburi provinces, in the central part of Thailand, which have not been studied in detail before.

2. Research Objectives

This study focuses on diversity and taxonomy of freshwater copepods in caves and freshwater bodies in Saraburi and Lopburi provinces, central part of Thailand. The comparison of copepod diversity in freshwater bodies between May 2019 (represented as pre-monsoon season) and December 2019 (represented as post-monsoon season) are analyzed including the dominant species. Copepod taxa persisting in the caves are discussed.

3. Literature Reviews

Copepods are an abundant group of wanderers in the world (Abbas &Talib, 2018, p. 63). They belong to Subclass Copepoda, consisting of a total of 9 Orders. Most free-living copepods in Thailand belong to 3 orders: Calanoida, Cyclopoida and Harpacticoida (Dussart & Defaye, 2001, p. 2). Over 14,000 species are known worldwide, of which approximately 2,800 species are freshwater copepods (Reid & Williamson, 2010, pp. 915-916; Boxshall & Defaye, 2008, pp. 195-199). Since the 18th century, free-living copepods have been researched. Approximately 2,300 species are known worldwide, of which twenty-five percent are known as freshwater calanoids. Total 450 cyclopoid species were described in marine and freshwater. A total 2,800 harpacticoid species were reported worldwide, of which ten percent were found in freshwater (Sanoamuang, 2002, pp.17-20). Since 1981, one hundred and nine species of freshwater copepods have been found in Thailand. Total 26 species of new species were described in temporary and permanent water bodies including karstic caves, which consist of 12 calanoids (Dumont, Reddy, & Sanoamuang, 1996, pp. 139-148; Ranga Reddy & Dumont,

1998, pp. 201-223; Sanoamuang, 2001a, pp. 219-228; Sanoamuang, 2001b, pp. 41-52; Sanaomuang & Yindee, 2001, pp. 435-448, Sanoamuang & Athibai, 2002, pp. 71-82; Sanoamuang, 2004, pp. 392-406; Sanoamuang & Teeramaethee, 2006, pp. 475-487; Proongkiat & Sanoamuang, 2008, pp. 177-189; Watiroyram & Sanoamuang, 2017, pp. 15-32; Sanoamuang & Watiroyram, 2018, pp. 782-796; Sanoamuang & Watiroyram, 2020, pp. 1-20), 8 cyclopoids (Alekseev & Sanoamuang, 2006, pp. 277-290; Watiroyram et al., 2012, pp. 11-21; Watiroyram et al., 2015a, pp. 426-437; Karanovic, Komput, & Sanoamuang, 2017, pp. 26-47; Boonyanusith et al., 2018, pp. 1-30; Watiroyram, 2018, pp. 29-51) and 6 harpacticoids (Brancelj et al., 2010, pp. 779-793; Watiroyram et al., 2015b, pp. 81-99; Watiroyram & Brancelj, 2016, pp. 459-476; Watiroyram et al., 2017, pp. 501-525). In the early studies, temporary and permanent freshwater bodies especially in the northern and northeastern regions were investigated for copepod diversity. Since 2007, there have been more intensive studies in caves primarily in northern, western and southern of Thailand.

The previously studied cave-dwelling copepods, were mostly harpacticoids followed by cyclopoids. Commonly, 1-2 species of harpacticoids were found from the epikarstic zone of a cave (Watiroyram et al., 2015b, p. 97; Watiroyram et al., 2017, pp. 519-520). However, there are more species in saturated zones but with less diversity, compared to the copepod species in freshwater bodies outside a cave (Watiroyram et al., 2015b, p. 97). Even though, copepod species are rarely found in caves, they are frequently abundant especially female harpacticoids (Watiroyram et al., 2015b, p. 97). For example, *Elaphoidella namnaoensis* and *Elaphoidella bromeliaecola* were found only females more than 200 individuals in a sampling site (Watiroyram et al., 2015b, p. 96). This situation is relevant to parthenogenesis and environmental factors (Watiroyram et al., 2017, pp. 519-520).

4. Research Methodology

4.1 Sampling localities and periods

Copepods were collected from 9 caves and 21 freshwater bodies in May 2019 (represented as pre-monsoon season) and December 2019 (represented as post-monsoon season) (Fig. 1). Total 16 localities were collected in both pre and post-monsoon seasons. The list of localities and periods of sampling are shown in table. 1.

4.2 Qualitative sampling

Samples were filtered through a plankton net with 60 μm mesh size in horizontal direction in freshwater and transferred into plastic bottles. The collected samples were immediately fixed with 4% formaldehyde solution. Samples from caves were mostly collected from small pools on the floor or any containers by dropper and a filtering bottle. An Olympus SZ3060 stereomicroscope at 40x magnification is used for specimen sorting. Specimens are transferred into a ratio 1:1 (v/v) glycerol and 70% ethanol mixture for species dissection at 40-100x magnification under the stereomicroscope. The characteristic examination for species identification use an Olympus CH30 compound microscope.

4.3 Quantitative sampling

Samples are collected in a 20 L bucket, filtered through a 60 µm mesh size plankton net and transferred into plastic bottles. Immediately, samples were fixed with 4% formaldehyde solution. In the laboratory, the sediment of sample was taken into a cylinder and filled water up to 10 mL. Afterwards, the cylinder is well mixed and 1 mL was deposited on a pit glass plate for species identification and counting. The procedures as repeated three times.

4.4 Data analysis

The copepod diversity and dominant species were analyzed by using Shannon-Wiener diversity index (H') (Shannon & Wiener, 1949) and Pielou's evenness index (J) (Pielou, 1966) including Dominance Candidate Index (DC_i) (Avolio et al., 2019).
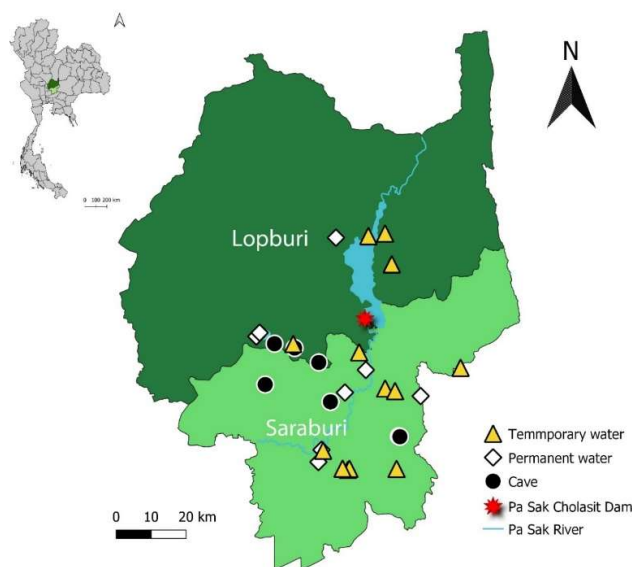

Fig. 1. The localities of total 30 sampling sites comprised 9 caves and 21 freshwater bodies in Saraburi and Lopburi provinces, central Thailand.

Table 1. List of sampling localities and GPS coordinates

Code	Name	District	Latitude	Longtitude
Saraburi Province				
CSH	Suanhin Cave*	Kaeng khoi	14°34'25.0"	101°08'49.0"
CTM	Thammatas Cave*	Kaeng khoi	14°34'30.0"	101°08'40.0"
CPP	Phrapotisat Cave*	Kaeng khoi	14°34'26.0"	101°08'50.0"
CPTC	Phrathat Charoen Tham Cave*	Kaeng khoi	14°39'37.7"	100°58'07.0"
CP	Petch Cave*	Kaeng khoi	14°39'37.8"	100°58'07.1"
CWM	Wimanjakkree Cave*	Phra Phutthabat	14°42'12.5"	100°48'03.2"
Lopburi province				
CPS	Pomsawat Cave*	Patthana Nikhom	14°45'29.7"	100°56'18.9"
CER	Erawan-Thae Wa Phithak Cave	Patthana Nikhom	14°47'39.2"	100°52'35.0"
CPT	Phratat Cave	Muang	14°48'17.1"	100°49'29.0"
Saraburi Province				
SSp	Muban Suksawat Pond*	Muang	14°32'21.6"	100°56'59.0"
KPp	Khlong Prew Canal*	Muang	14°32'28.2"	100°56'44.3"
KPre	Ban Kled Petch Reservoir	Muang	14°30'39.6"	100°56'15.6"
HHch	Huay Hang Channel*	Kaeng khoi	14°29'29.3"	101°00'48.3"
HHp1	Huay Hang Pond (1)*	Kaeng khoi	14°29'38.8"	101°01'02.7"
HHp2	Huay Hang Pond (2)	Kaeng khoi	14°29'40.0"	100°59'59.0"
KYc	Huay Kum Yai Canal	Kaeng khoi	14°41'00.7"	101°00'20.9"
PKp	Pong Kon Sao 2 Pond*	Kaeng khoi	14°29'38.0"	101°08'18.9"
PSr	Pa Sak River	Kaeng khoi	14°44'23.0"	101°03'34.3"
HSp	Mu 3-8 Hin Son Pond	Kaeng khoi	14°47'00.6"	101°02'32.7"
TSch	Ban Tha Sao Channel	Muak Lek	14°41'36.9"	101°06'33.2"
KMp	Kao Mai Keang Pond	Muak Lek	14°41'14.2"	101°08'05.1"
LTc	Klong Lam Thong Lang Canal*	Muak Lek	14°44'42.1"	101°18'11.5"
MLc	Khlong Muak Lek Canal*	Muak Lek	14°40'29.4"	101°12'02.0"
Lopburi province				
TLp	Tha Luang Pond*	Tha Luang	15°04'41.8"	101°06'32.4"
MKp	Maklua Pond	Tha Luang	15°00'06.4"	101°07'34.6"
TLPp	Tha Lad Pla Pond*	Chai Badan	15°04'18.6"	101°03'58.0"
KNc	Khlong Nok Ngam Canal	Chai Badan	15°04'04.0"	100°58'57.9"
SLc	Sub Lek Canal	Muang	14°49'55.0"	100°47'11.6"
SLre	Sub Lek Reservoir	Muang	14°49'22.2"	100°46'40.3"
As	A swamp on the roadside	Patthana Nikhom	14°48'14.7"	100°52'22.2"

* the locality was collected in both pre-and post-monsoon seasons.

5. Results

This study reports the diversity and taxonomy of freshwater copepods in Saraburi and Lopburi provinces, Thailand. A total of 101 samples were collected in 9 caves and 21 freshwater bodies. A total of 32 species belonging to 8, 18, 6 species of Calanoids, Cyclopoids and Harpacticoids were recorded, respectively. These calanoids and cyclopoids belong to five genera of family Diaptomidae and 7 genera of family Cyclopidae, respectively. The harpacticoids belong to 3 genera of family Canthocamptidae and Phyllognathopodidae. Moreover, the *Elaphoidella* sp. was collected from Erawan-Thae Wa Phithak Cave in Lopburi Province, was considered a new species. The list of 32 species found in the sampling sites in pre- and post-monsoon seasons are shown in table 2.

Nine freshwater bodies (SSp, KPc, HHch, HHp1, PKp, LTc, MLc, TLp and TLPp) were sampled in both seasons. According to the Shannon-Wiener diversity index (*H'*), the highest diversity recorded was 1.26 from site MLc followed by site LTc and PKp (0.69 and 0.68, respectively) in pre-monsoon. However, site LTc had the highest evenness index (*J*) of 1.00 followed by site MLc with 0.90 (Fig. 2). In post-monsoon season, site LTc could not be sampled because it had dried out (Fig. 2). The indices of other sites are shown as zero are because no adult copepods were found or there were too few individuals for quantitative investigation. Site SSp (Fig. 2) had the highest diversity followed by site MLc which had the highest evenness index in post-monsoon season.
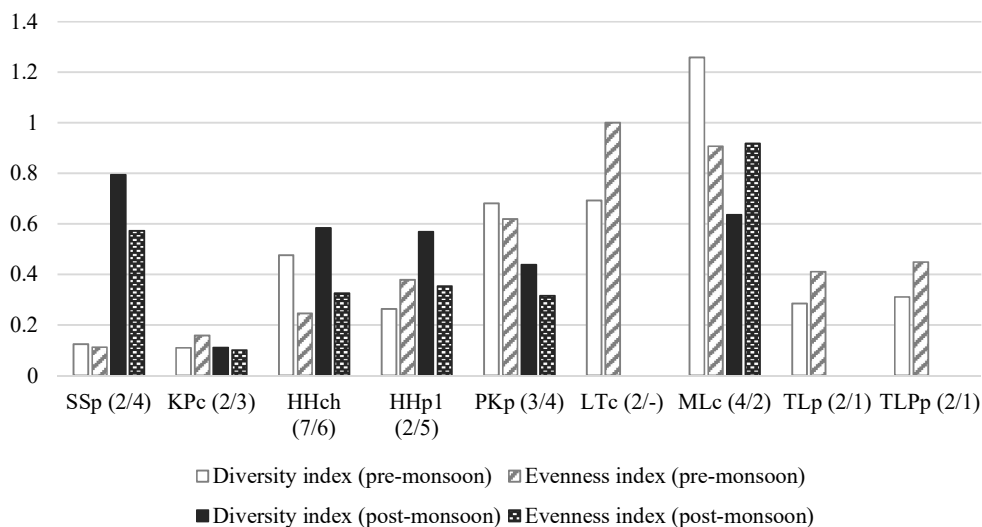

Fig. 2. The comparison between diversity and evenness indices in pre- and post-monsoon seasons of copepods in the sampling sites. In the bracket means the number of species in the site between pre-monsoon/post-monsoon.

Table 2. Copepod species found in sampling localities in pre-monsoon and post-monsoon seasons.

Taxon	Localities and periods	
	Pre-monsoon	Post-monsoon
Order Calanoida		
Family Diaptomidae Baird, 1850		
Heliodiaptomus viduus Gurney, 1916		KPc
Mongolodiaptomus botulifer (Kiefer, 1974)	CSH, SSp, HHch, HHp1, PKp	SSp, KPc, KPre, HHp1, HHp2, TKc, PKp, PKr, KNc
M. calcarus (Kikuchi, 1936)		As
M. malaindosinensis Lai & Fernando, 1978	SSp, HHch, HHp1, PKp	KPc, KPre, HHch, HHp2, KYc, PKp
Neodiaptomus schmackeri (Poppe & Richard, 1893)	HHch	HHch
Vietodiaptomus blachei (Brehm, 1951)		HHch
Phyllodiaptomus (Ctenodiaptomus) praedictus praedictus Dumont & Ranga Reddy, 1994	HHch	HHp2, KYc, As
Phyllodiaptomus (Phyllodiaptomus) christineae Dumont, Ranga Reddy & Sanoamuang, 1996		PSr
Order Cyclopoida		
Family Cyclopidae Rafinesque, 1815		
Bryocyclops maewaensis Watiroyram, Brancelj & Sanoamuang, 2012		CER
Eucyclops euacanthus euacanthus (Sars G.O., 1918)	MLc	
Eu. serrulatus serrulatus (Fischer, 1851)		SLc
Paracyclops fimbriatus fimbriatus (Fischer, 1853)		HSp
Mesocyclops affinis van de Velde, 1987	PKp, TLp	PKp, HSp
M. aspericornis (Daday, 1906)		PSr, KNc

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M. ogunnus Onabamiro, 1957	CWM, MLc	MKp, KNc
M. thermocyclopoides thermocyclopoides Harada, 1931	CSH, KPc, HHch, HHp1, PKp,TLp, TLPp	SSp, HHch, HHp1, PKp, PSr, KMp, SLc, SLre

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Table 2. Copepod species found in sampling localities in pre-monsoon and post-monsoon seasons (cont.).

Order Cyclopoida		
Family Cyclopidae Rafinesque, 1815		
Microcyclops dubitabilis (Kiefer, 1934)		HSp, TSch, KMp
Mi. karvei Kiefer & Moorthy, 1935		TSch
Mi. varicans varicans (Sars G.O., 1863)	SSp, PKp, LTc, MLc	CSH, HHp2, KYc, PKp, HSp, MLc, TLp, MKp, KNc, SLc
Thermocyclops crassus crassus (Fischer, 1853)		KPc, HHch, KMp
T. decipiens (Kiefer, 1929)	SSp, HHch, PKp	SSp, KPre, HHch, HHp1, PKp, KYc, KMp
T. operculifer Kiefer, 1930	CSH	
T. rylovi rylovi (Smirnov, 1928)	SSp	SSp
T. vermifer vermifer Lindberg, 1935	CSH, TLp	KPc, TLp, SLre, As
T. wolterecki Kiefer, 1938	HHch	
Siamcyclops cavernicolus Boonyanusith, Sanoamuang & Brancelj, 2018	CSH	
Order Harpacticoida		
Family Canthocamptidae Brady, 1880		
Elaphoidella intermedia Chappuis, 1931		SLc
E. isana (Watiroyram, inpress)	CWM	CWM, CER
E. namnaoensis Brancelj, Watiroyram & Sanoamuang, 2010		CSH
Elaphoidella sp. (new species)		CER
Epactophanes richardi richardi Mrázek, 1893	CPTC, CP, CPS	CPTC
Family Phyllognathopodidae Gurney, 1932		
Phyllognathopus cf. *viguieri viguieri* (Maupas, 1892)	CPTC	CTM

The comparison of total species number from all sampling sites collected in both seasons (except site LTc) shows no difference with 13 and 12 species in pre- and post-monsoon seasons, respectively. However, the copepod density is significantly different with high total individuals of copepods in post-monsoon season (Fig. 3). Moreover, site HHch is the locality of the highest diverse species in pre-monsoon with 7 species and 6 species in post-monsoon which the highest number of individuals of *Thermocyclops decipiens* species.
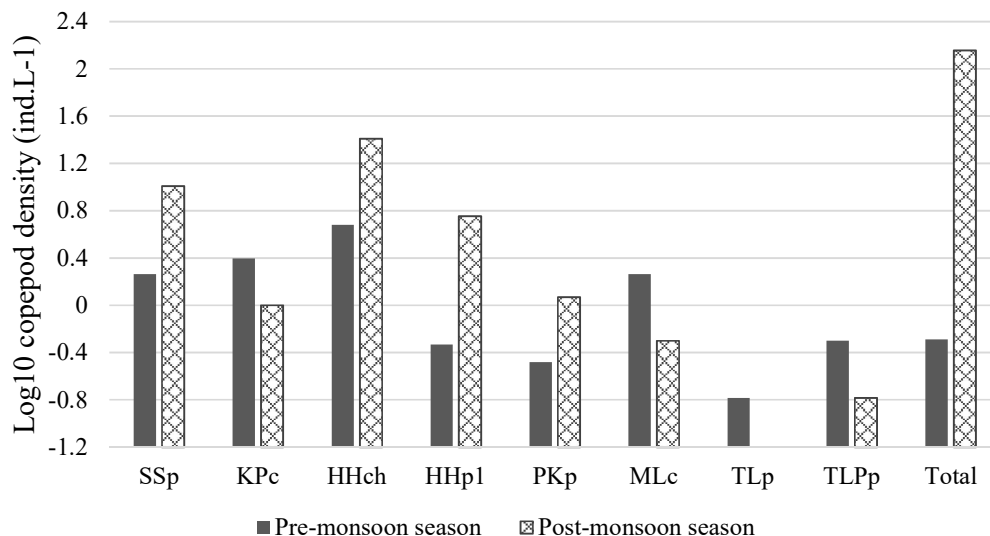
Fig. 3. Total copepod density between pre and post-monsoon seasons and in the sampling site collecting in both season.

The dominance candidate index (DC_i) indicated the dominant species in freshwater sampled from sites that were collected in both seasons. Three dominant species in both seasons were *T. decipiens*, *Mesocyclops thermocyclopoides thermocyclopoides* and *Mongolodiaptomus botulifer*. The outstanding species was *T. decipiens* in post-monsoon, which was also the second most dominant species in pre-monsoon. The pre-monsoon season was dominated by *M. thermocyclopoides thermocyclopoides* but was not conspicuous in post-monsoon season. The species, *M. botulifer* was more dominant in post-monsoon than pre-monsoon (Fig. 4).

Total 13 species were found in the caves, consisting of one calanoid, 7 cyclopoids and 5 harpacticoids (Table 2). In fact, most harpacticoid copepods were found in cave habitats especially from dripping water. However, one harpacticoid, *Elaphoidella intermedia* was recorded from Sub Lek canal, which is directly connected to Sub Lek reservoir, but these were only few individuals. In this study, most calanoids and cyclopoids were found in freshwater bodies especially in ponds, but some species were also found in caves especially in pre-monsoon season in site CSH, i. e. *Mongolodiaptomus botulifer, M. thermocyclopoides thermocyclopoides, Thermocyclops operculifer, T. vermifer vermifer* and *Siamcyclops cavernicolus*. Site CWM was found *Mesocyclops ogunnus* in pre-monsoon season. In post-

monsoon, *Microcyclops varicans varicans* was found in site CSH and *Bryocyclops maewaensis* in site CER.
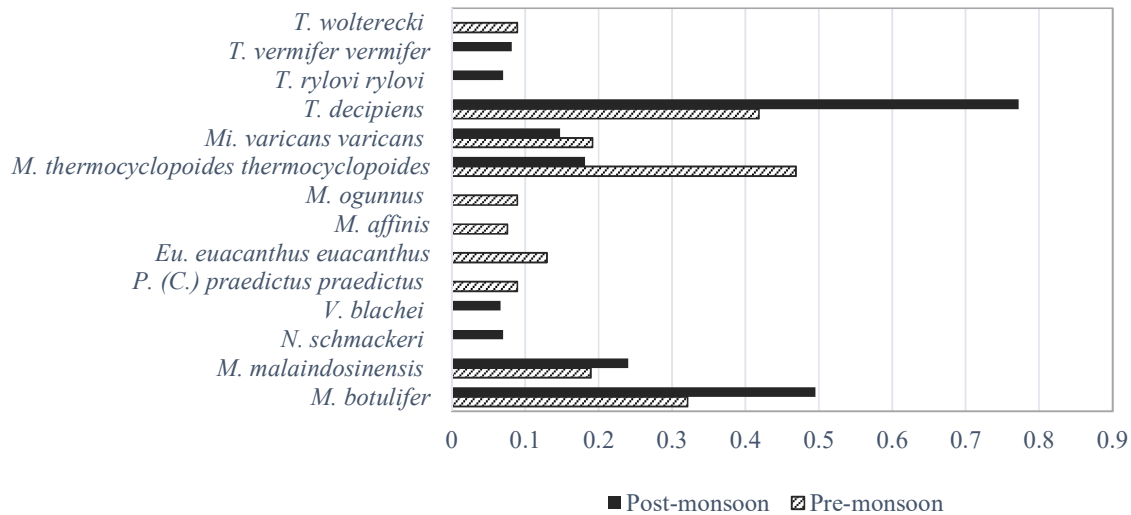

Fig. 4. The dominance candidate index (DC_i) shows the species dominating in freshwater sampled from sites collected in both pre- and post-monsoon seasons.

The characteristics of the site CSH is a large calcareous pool, including rainfall from a few days before sampling in pre-monsoon season, but could not be sampled in post-monsoon season because it had dried out. Therefore, dripping water formed as small pools on the floor were collected instead. The sampling point in the site CWM is groundwater which found *M. ogunnus* in pre-monsoon season. Among harpacticoids (Table 3), *Epactophanes richadi richadi* was widely distributed species in all caves, and was found in pre-monsoon season at site CPTC, CP and CPS with 20, 4 and 33 adults, respectively. In Tham Phrathat Charoen Tham Cave (CPTC), *E. richadi richadi* was found in small pools on the floor and a big jar that was filled by dripping water. A species, *Phyllonagthopus* cf. *viguieri viguieri* was found together in the jar for 22 females in only the pre-monsoon season. In post monsoon, only *E. richadi richadi* was more existent (28 individuals) in site CPTC but was not found in site CP and CPS without water to collect. However, the most abundant species was *Elaphoidella isana,* collected from groundwater in site CWM: Tham Wimanjakkree Cave (Table 3). In pre-monsoon, only 7 adults were recorded, but 249 adults in post-monsoon season. In two caves, i.e. Tham Phrapotisat Cave (CPP) and Tham Phratat Cave (CPT), no species were found in both seasons.

Table. 3 List of harpacticoids collected from the caves and total individual number: (+=present).

Species	Males	Females	Juveniles	Pre-monsoon	Post-monsoon
Elaphoidella namnaoensis	-	9	27		+
Elaphoidella isana	-	256	30	+	+
Elaphoidella sp.	17	12	-		+
Epactophanes richardi richardi	51	34	42	+	+
Phyllognathopus cf. *viguieri viguieri*	5	25	15	+	+

5. Discussion and Conclusion

The diversity and taxonomic features of freshwater copepods in caves and freshwater bodies are significantly different. Among three orders of copepods, calanoida and cyclopoida are more diverse and abundant in freshwater bodies in Thailand compared to harpacticoida that have been mostly reported from Thai caves (Sanoamuang, 2002, pp.17-20; 50-55; Alekseev & Sanoamuang, 2006, pp. 286-287; Brancelj et al., 2010, pp. 779-793; Watiroyram et al., 2015b, pp. 81-99; Watiroyram & Brancelj, 2016, pp. 459-476; Watiroyram et al., 2017, pp. 501-525). The common taxonomic characteristics of freshwater copepods in caves are significantly different such as eyeless, colorless, and less prolongation on the appendages (Protas & Jeffery, 2012, pp. 823-845).

The diversity indices (*H'* and *J*) of the freshwater bodies indicated that site MLc had the highest *H'* in pre-monsoon and rather high in post-monsoon. The *J* value was high especially in post-monsoon, but less different species were encountered (Fig .2). Site MLc is a small canal next to a local restaurant. A high abundance of zooplankton groups (cladocerans and rotifers) and algae were found at the site MLc together in both seasons. This may be related to the trophic state of water, since a few zooplankton species are higher abundant in eutrophic water bodies (Papa & Zafaralla, 2011, p. 5). In contrast, site HHch is a man-made water channel directly connected to the rice field and had the highest species diversity in both seasons (7 and 6 species, respectively). This is in agreement with a greater zooplankton diversity that has been reported in rice fields in Pathum Thani province (Chittapun et al., 2009). Moreover, many rare species were found in rice fields (Wongrat & Pipatcharoenchai, 2003, p. 24). Three dominant species in both seasons were *Thermocyclops decipiens*, *Mesocyclops thermocyclopoides thermocyclopoides* and *Mongolodiaptomus botulifer*, which are common species that are widely distributed throughout Thailand (Jithlang & Wongrat, 2006, p. 8; Wongrat & Pipatcharoenchai, 2003, p. 23; Chittapun et al., 2009, pp. 263-265).

In this study, 13 species were recorded from the caves. Harpacticoid copepods have been frequently found in caves (Brancejl et al., 2010, p. 791). In this case, cyclopoida is a more diverse species than harpacticoida, with only two more species difference. However, *M. botulifer, M. thermocyclopoides thermocyclopoides, Thermocyclops operculifer, T. vermifer vermifer* and *Siamcyclops cavernicolus* were recorded from a large calcareous pool in site CSH only in pre-monsoon season that received rain before sample collection. These species might

be washed down into the caves along with rain flow especially site CSH that is directly connected to the epigean zone. In addition, *S. cavernicolus* and *Bryocyclops maewaensis* were found at site CSH and CER, respectively, and were originally reported from karstic habitats (Boonyanusith et al., 2018, pp. 1-30; Watiroyram et al., 2012, pp. 11-21). The species, *Mesocyclops ogunnus* was recorded from saturated zone in site CWM where are more diverse species than the unsaturated zone of karstic habitats because of the high spatial dispersion (Watiroyram et al., 2015b, p. 98). Harpacticoids were consistently recorded from the caves in both pre- and post-monsoon seasons. Most of these harpacticoids are classified into the genus *Elaphoidella*, which is distributed worldwide (Watiroyram, et al., 2015b, p. 81) and frequently found in Thailand and southeast Asia (Watiroyram et al., 2017, pp. 501-502, 521). *E. intermedia* is a stygophillic copepod (Watiroyram, et al., 2015b, p. 96). Therefore, it is not surprising that *E. intermedia* was found in freshwater bodies (Sub Lek Canal) in this study. As can be seen in table 2, *Epactophanes richadi richadi* were distributed in the epikarstic zones of many caves compared to other harpacticoids because they are cosmopolitan (Watiroyram, et al., 2015b, p. 95; Boonyanusith & Athibai. 2014, p. 23). The highest abundant species in the caves was *Elaphoidella isana* (Watiroyram, inpress). Over 200 specimens were found in Tham Wimanjakkree Cave (CWM) from a bucket that was gradually filled with water from the adjacent groundwater-well. Water from this groundwater-well was also collected directly in both seasons but less than 10 individuals of *E. isana* together with *M. ogunnus* were found only in pre-monsoon season. *M. ogunnus* may be washed down from the epigean zone into hypogean zone of the cave. However, the saturated zone (groundwater) contains more diverse species, which suggests that the biological interaction is a factor to control the species abundance (Watiroyram et al., 2015b, p. 98).

Acknowledgments

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DEVELOPMENT AND EXPERIMENTAL STUDY OF AUGMENTED REALITY PICTURE BOOK APPLICATION FOR KIDS

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Abstract: This study intends to design an augmented reality (AR) picture book-mobile application for learning reading skills for preschool children between the ages of 4-7 and compare the interests of children between learning material that utilizes AR technology and traditional storybooks. The design of this study focuses on children's interests. The prototype development consists of user interface designs, user experience designs, and illustrations. The story in each chapter encourages children to practice their reading skills, vocabulary, and daily routines. The contents in each chapter are applied using Executive Function (EF) which refers to a group of important mental skills that control our thoughts, emotions, and actions via the mobile augmented reality application which can be enhanced by augmenting the virtual object.

Keyword: Augmented Reality; Mobile Application; Learning Material; User Experience; Elementary Level

1. Introduction

Children have immense creativity. Every child likes to listen to stories or tales. When they learn to read, they should commence with picture books. For children, the picture book is one of the best options to learn different skills such as reading, writing, imagination, creativity, language, meditation, etc. Many stories perhaps include the substance of living skills and morals that can be used as a medium for children to develop good behavior.

Younger children under the age of 6 have an increased reading rate of 8 minutes per day and have better language development of 36.2 percent found in 2015. But compared to the amount that adults buy books for children reducing it to 8.3 percent and children who do not read as much as 38.8 percent, which is the reason that children do not like to read, children were too young, illiterate, reading skills were not good and like to watch television. The top 5 reasons

why adults don't read to children is that children are too young, don't have time to read, like to watch television, illiterate, and don't like to read. The main reason for the increase in reading time is because this survey has defined the scope of the definition of "reading" as extensive, including new media such as social media / SMS / E-mail, not limited to only paper books. It is new media that can be accessed more conveniently, therefore, has a significant effect on the behavior and volume of reading. Especially for the youth (ages 15-24 years) takes the most reading time of up to 94 minutes per day. But the popularity of reading books or paper forms has not decreased as much because 96.1 percent of the readers are still reading books or documents (Decreased by about 3 percent from previous surveys). About 55 percent read content from various electronic media (such as social media, websites, e-books, emails, data files, and CDs) through various types of devices (such as PCs, laptops, smartphones, and tablets) it is expected for them to read from new media via mobile devices which should increase as shown in subsequent surveys (The National Statistical Office Thailand, 2018).

After observation and interview with the teachers and students at SriSawangwong Kinderarten School in Hatyai, found that most of the learning material is conventional DIY learning material like; books, toys, or picture cards. Therefore, there is a shortage of such innovations (for example, technology-enhanced learning) implemented at schools.

Kindergarteners are ages that need to prepare to learn various things. Increasing the reading experience using a mobile phone or tablet for teaching is interesting because it may develop better reading skills for them. This research introduces a set of research questions as follows: is it possible to attract the attention of children to create reading habits? What features should the mobile application have? However, this project is to achieve the goal of further reading preparation for children as the augmented reality picture book application.

2. Research Objectives

The research objectives are as follows.

1. Design User Experience (UX) and User Interface (UI) of AR storytelling mobile application which helps practicing reading skills of children around 4-7 years old.

2. Developing a storytelling application that utilizes augmented reality technology, 3D/2D visual content to enhance early childhood's reading experience and helps them to get more motivated to read the book.

3. Compare children's interest in reading material between an AR storybooks application and traditional storybooks.

3. Literature Review

3.1   The definition of augmented reality

Augmented Reality (usually abbreviated as AR) is a technology that enables to mix virtual objects generated by a computer with a real environment, producing a mixed environment that can be viewed through any technological device in real time (Azuma

et al, 2001) In a survey of Augmented Reality Ronald T. Azuma (Azuma, R,1997) has defined the three main characteristics of AR as followed

    1. Combines the real and virtual world.

    2. Is interactive and in real-time.

    3. Use of 3D virtual elements

Where a related technology such as virtual environment technologies (VR) completely immerses the user in a virtual world, AR technology allows the user to see the real world that overlays with virtual 3D objects. AR's goal is to integrate the physical world with virtual objects in a way that changes the user's perception of reality. AR applications can be used in many different platforms such as desktops, laptops, video see-through head-mounted displays, and smartphones.

3.2 Augmented reality in childhood education.

AR technology has been developed and tested for many years in a field of education. Many studies have shown that AR can help increase learner engagement and motivation more effectively and could increase the retention of knowledge compared to traditional learning material.
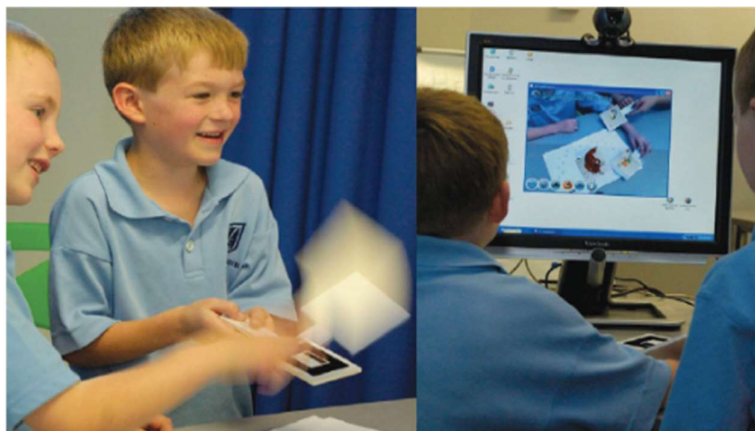

Figure 1: Children playing with an AR enhanced book. (Dünser and Hornecker, 2007)

Using AR-enhanced books in education was found to enhance memory retention and enhance understanding of reading. One study brought together two children and observed them while they were interacting with an AR book using physical paddles to manipulate virtual content (Dünser and Hornecker, 2007). They found that kids could easily interact with books and AR content. This research has demonstrated that it is easy to use AR books in an educational setting.

A second study explored how AR books could help enhance story retention (Dünser, 2008). In this case, two groups of children read both traditional books and books with animated AR scenes as well as the printed text. The children were divided into those that had a high reading ability

and those with a low reading ability (determined by their teacher). From the text-based story conditions, those in the high-capacity group could retell significantly more key story points than the low-capacity group. The two groups, however, showed no significant difference in retaining the key story point. The researcher concludes that the AR book could benefit students who are less able to learn using text-based learning materials and thus could be very helpful in learning environments.

There are numerous use cases of applying AR technology in the field of education. One case was conducted in language learning using AR to improve the pronunciation and memorization of the Chinese language (Chen et al., 2007). Mathematics was also explored using a serious game to learn mathematics (Lee & Lee, 2008). A recent study in Spain found that using AR content could improve learning processes and learning outcomes for children aged 4-5 years (Cascales et al, 2013)

3.3   Advantages of Using Augmented Reality in Education

Many studies have shown that applying augmented reality in an educational setting can offer many benefits. For example, AR helps students to engage in authentic explorations in the real world (Dede, 2009). By overlaying virtual elements and merging on top of real objects, AR facilitates the observation of events that cannot easily be observed with the naked eye (Wu, Lee, Chang, & Liang, 2013). Thus, increases the motivation of the students and helps them to develop better investigation skills (Sotiriou & Bogner, 2008). According to (Dunleavy, Dede, and Mitchell, 2009, p. 20), AR's most significant advantage is the unique ability to create immersive hybrid learning environments that combine real and virtual objects. This type of learning experience can motivate students to explore educational materials and information from different perspectives and encourage critical thinking, problem-solving, and learner imagination. Also, the rapid development and progress of AR technology have made it suitable for many education subjects. It also promotes the required educational objectives and innovations in educational activities. There is no doubt that AR technology could be considered an education technology of the future.

3.4   Obstacles to using AR technology

The obstacles using AR technology are quite varied, they may involve multiple factors, such as human factors, hardware and software infrastructure, and others. Users of AR technology may have problems with usability and technical problems. For example, (Lin, Hsieh, Wang, Sie, and Chang, 2011) stated that students find AR complicated and often encounter technical problems while using AR. Without a well-designed interface and user guidance, AR technology can be too complicated to use (Squire & Jan 2007). Additional technical problems may arise with the various devices that deliver AR applications (Wu et al. ,2013). Additionally, the availability of AR supported smartphones are limited due to the requirement to certify the quality of the camera, motion sensors, and design architecture to ensure that good AR experience can be achieved. The device also needs a powerful enough CPU that integrates with the

hardware design to ensure good performance and efficient real-time calculation to perform the AR functionality.

3.5 AR application development in smartphone

AR has become increasingly portable with the rise of the mobile smartphone and Tablet AR applications (Craig, 2013; Yuen, Yaoyuneyong, & Johnson, 2011). With the use of marker-less AR, any physical space or feature can now have additional information attached to it. Instead of markers, students can use mobile devices such as phones or Tablets to access the AR experiences anywhere if they have a device that allows them to benefit from the immersion of AR. (Dunleavy, Dede, & Mitchell, 2009) see how AR can affect the experiences and interactions of students. As (Klopfer et al., 2004) argued, AR can directly infuse digital resources into our physical world. It has been noted that several advantages of AR in education include "aligning with many of the guiding principles of constructive learning, attracting a variety of learning styles and enabling greater understanding through 3D visualization" (Green, Lea, & McNair, 2014, p.29).

The AR development process usually consists of the various technology stack to create the final application. To develop the AR application for this project, the developer has used two combinations of development tools. The first tool is a Unity game engine that is in charge of being a 3D platform for visualizing 3d contents on mobile and its ARfoundation package that will provide basic functionality to create AR applications. The second tool is the Flutter framework which is in charge of creating a cross-platform application for this project.

3.6 Illustrations of children's story books.

Illustrators must always be aware that the illustrations in children's picture books are an essential part of the book. An illustration that attracts the attention of children assists them to be more interested in, excited in, or wonder to find an answer. It will make the children want to read more and eventually create a habit of reading. If the illustrations for children are beautiful or colorful, it will make children love art because excellent illustrations influence the feelings and impressions of children.

3.6.1 Types of illustrations for kids.

● **Realistic form**: The picture is generally the attempt to represent subjects from reality without artificiality such as photos or virtual drawings.

Figure 2: Realistic tree

● **Analogical form:** The image has a strange shape from reality but can still guess what the image is.

Figure 3: Cartoon tree.

● **Surrealistic form:** The image from an imagination that does not exist in the real world.

Figure 4: Monster tree.

3.6.2 Characteristics of illustrations for kids.

☐ Illustrations make books more interesting. Either the design of the cover, the use of color, or the type of illustration must attract children to want to read. In particular, Illustrations must be consistent with the story.

☐ Illustrations assist children to understand more of the story. Children can guess what happened in the story and illustrations should not look too scary.

☐ Illustrations must help expanding the children's experience of things they never had before.

☐ The composition of illustrations must be correct according to the truth. Some parts of the illustrations shouldn't be missing because children can't imagine that missing part.

3.7 User interface (UI)

User interface is anything that a user can communicate with when using a digital product or service. It covers all displays, touchscreens, sounds and even lights. UI also integrates a product's style, look, sound, responsiveness, and interactivity. Good UI design would mean

that the interface is easy to use without a manual. Simple design patterns of the user can be created through recognizing the visual perceptions, behavior, interpretation and intuition. When done well, they eventually establish an attentive, complex, and user interface that become universal design patterns. The user interface design consists of branding, illustration, typography, animation, UI prototypes, transitions, design system, interactivity and responsive UI (Heath, 2020).

3.8 User experience (UX)

User experience is how a customer feels when using a particular product or service. This involves a variety of stimuli including feelings, physical contact and senses. The first requirement for designing a user experience is to meet the exact user needs and fulfill what they want (Norman & Nielsen, 2020).

3.8.1 What does good user experience mean?

Peter Moreville created a great graphic to show what goes into successful UX designs, to recognize what makes a good one.

Figure 7: Morville's user experience honeycomb ("User Experience Basics | Usability.gov", 2020).

He states that, in order for user experience to be valuable, the key points must be:

● **Useful:** Practitioners have to find the solutions of usage to make their products and systems more useful and meaningful.
● **Desirable:** Emotion and appreciation is evoked by identity, brand, image and other design elements
● **Accessible:** The contents and sites require easy accessibility to all people and people with disabilities.

- **Credible:** Users have to be comfortable and trust the information given to them.
- **Findable:** The content on site and off site requires to be navigable and locatable.
- **Usable:** Platform must be user-friendly.

3.8.2 User experience process

The UX process is highly dependent on the project. Various projects require different approaches. UX designers should be flexible on all projects. However, there are principles in every aspect of the process which must be adapted to the particular project.
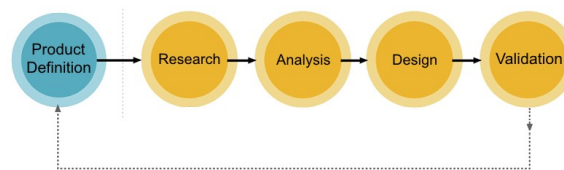
Every UX process will comprise 5 main phases:

Figure 5: This image is UX processes, which are product definition, research, analysis, design, validation (Babich, 2020).

- **Product definition:** UX designers are required to understand the concept of the product, define the product's values and goals with stakeholder's interviews.
- **Research:** UX designers are required to research their target group, user, market and competition. Research allows UX designers to understand users' needs, fears, motivations, behaviour, and also consider industry trends and to find product opportunities in a given area.
- **Analysis:** The purpose of the analytical process is for the data obtained during the product analysis process to be gathered. UX designers should consider the "why" users need about and draw decisions about "what" users need by creating a hypothetical persona and experience map
- **Design:** This process includes sketching the idea, creating a wireframe, prototype, and design specifications consisting of task flow and user flow diagram.
- **Validation:** This is a testing process that the designer can do by testing their team or real users. The most popular methods are focus groups, usability testing, beta testing, surveys and metric analysis.

UX design isn't a linear process. The UX design stages also have major overlaps and there are typically several back-and-forth steps. Designers are required to learn about problem-solving. It could be important to revisit any of the research undertaken or to seek out new concept ideas (Babich, 2020).

3.8.3 How user experience solves problems?

User Experience is a paragliding concept for assisting frame the process of developing products that have useful and appropriate user experiences. The UX area exists to enhance people's experiences with technology by adjusting products to suit user's needs. User Experience Design is an umbrella term that encompasses:

● **Visual design:** Visual design focuses on a site's aesthetics and related materials through the strategic application of images, colours, fonts, and other elements.
● **Information Architecture (IA):** IA focuses on organizing, structuring, and labeling content of the site and application.
● **Interaction design:** Interaction design focuses on developing interfaces with the user's behaviour that are well thought out.
● **Usability:** Usability is how easy it is to use the product for users and investigating how users use the product.
● **User research:** User research uses different qualitative and quantitative approaches to understand user needs, attitudes, knowledge and motives to inform the process to solve user problems
● **Content strategy:** Content strategy is responsible for fulfilling market requirements by producing and distributing content.

4. Research Methodology

4.1 Planning Process

To develop the Wisekids application, we have divided the entire development process into 3 phases which consists of the research phase, application development phase, and final product phase. As shown in the project timeline below.
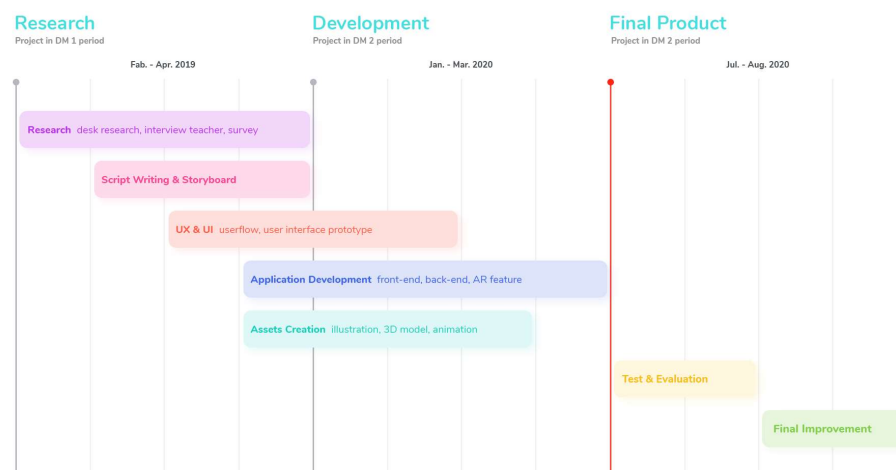

Figure 6: Wisekids project timeline.

4.2   Research phase

In the research phase, we focus on identifying the key problems and try to collect the user requirements and insight information as much as we can, so we could use it to define project objectives, target audience and plan our application feature. To do that, we have done many kinds of research methods including gathering from third-party research, teacher and student interviews and parent surveys.

4.2.1 Third-party research

After conducting desk research, we have found that about 1.1 million or 24.8 percent of Thai population under 6 years old in the last quarter of 2019 cannot read and write and about 5.1 hundred thousand Thai population between 6-14 years old cannot read proficiently. (The National Statistical Office Thailand, 2019)

Considering the results of the PISA assessment which are programs for international student assessment that evaluate reading literacy, mathematical literacy, and scientific literacy of students around the world. From PISA 2000 until PISA 2015, it is found that among Thai students aged 15 years, there are still problems with reading skills. With an average score of 409 which is lower than the international average And lower than neighboring Asian countries.

Furthermore, the statistical information on the situation of children and women in Thailand 2015-2016 from UNICEF Thailand also show that nearly 60 percent of the Thai population under 5 years old have less than 3 books in the house and almost 80 percent of poor families have less than 3 books in the house. From this fact we can see that one of the factors that decrease the numbers of a parent who buys a book for their children is the price of the reading material for kids which is usually costly nowadays.

Another topic that we have conducted from third-party research was about using augmented reality technology in childhood education. Many researches have shown that applied augmented reality in education can help increase learner engagement and motivation more effectively and could increase the retention of knowledge compared to traditional learning material. However, there are some concerns about introducing a smartphone or tablet to very early childhood that might have a negative effects on infancy development. Most of the child health experts suggested that we shouldn't introduce a smartphone or tablet to children who are under the age of 3 because their rapidly developing brains can learn best from exploration and social interaction.

4.2.2 Teachers and students interview at Sri-Sawangwong school

To gather information about the obstacles and opinions of reading in childhood we went to Sri-Sawangwong school to have a survey and interview with 3 teachers and 96 kindergarten students. After interviewing three preschool teachers, we have gained the teacher's opinion that apart from academic knowledge, preschool children should also learn about social news, life skills, critical thinking, and how to live with other people in the society. They also talk about obstacles they have found while teaching preschool children that children can get bored and lose their concentration easily, so they have to

make a couple of new learning materials every month to keep it fresh and interesting to the children. The learning materials that are used to teach children to read and write at the school are usually books, picture cards, toys, or video media. After showing some examples of reading material that has been applied with AR technology to the teacher, they have agreed that it could be attractive to the children and could engage the children to have more interaction than the traditional reading material.

Figure 7: Interviewing with the preschool teacher at Sri-Sawangwong kindergarten school in Hatyai.

We also did a survey with 96 kindergarten students about their favorite character and content genre they prefer. To conduct the survey, we have shown a poster that contains a group of cartoon characters which represents the different genres of the story including Hero, Adventure, Funny, Action, Romantic/love, Investigation, and Friendship to the children and allowed them to choose the most preferred poster only once per each person and the result has shown in Figure 8 below.

Figure 8: A content survey with preschool children at Sri-Sawangwong kindergarten school in Hatyai.

The result of the content survey with preschool children at Sri-Sawangwong kindergarden school in Hatyai (96 people)

friendship 2.1%
funny 3.1%
Romantic/Love 29.2%
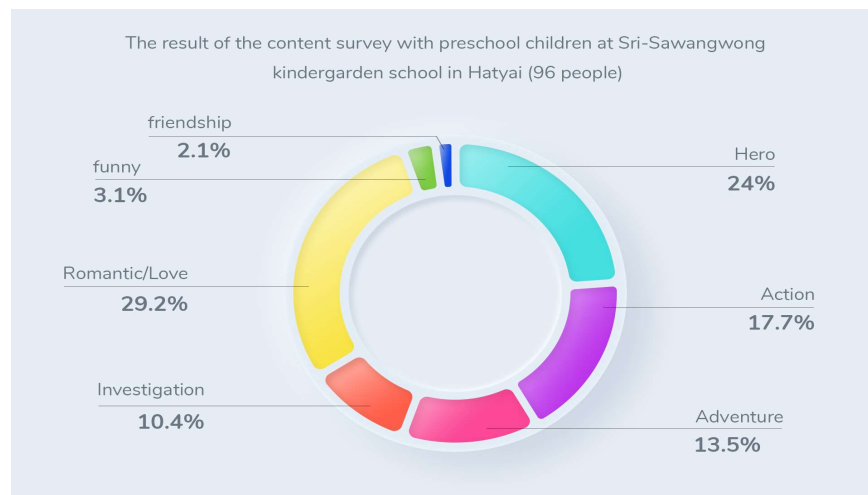Investigation 10.4%
Hero 24%
Action 17.7%
Adventure 13.5%

Figure 9: Interviewing with the preschool teacher at Sri-Sawangwong Hatyai School

From conducting this survey, rather than the result of children's favorite topics, we also noticed that most of the male children prefer hero, action, adventure, and investigation topics and prefer male characters more than female characters while female children prefer Romantic/love stories and prefer female characters more than male characters. However, both male and female children also prefer animal characters in common.

4.2.3 Parent Survey

An exploration behavior of using mobile phones and tablets in children at SriSawangwong Kindergarten School, Hatyai received 55 responses from the children's parents. The questionnaire has nine questions in total.

The data from the questionnaire is a quantitative data collection. The data collected from this open-ended questionnaire was analyzed using typological analysis techniques, which will classify and analyze data according to events. To understand and look for the pattern of the problems of the target audience.
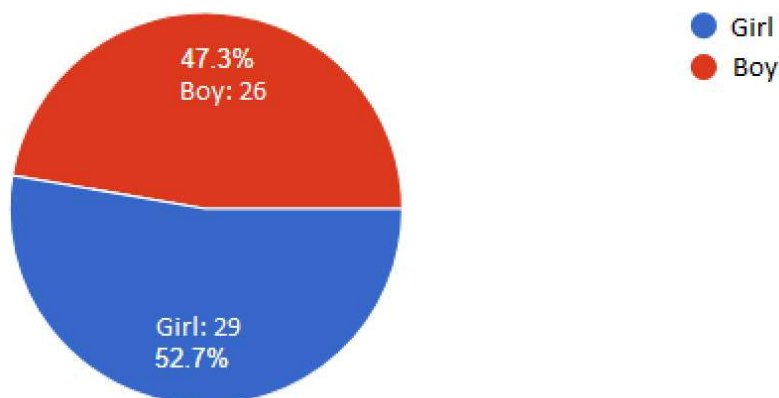
เพศของเด็ก

55 responses

Figure 10: Participants gender

The first question was the children's gender which was divided into two groups, 26 males and 29 females.
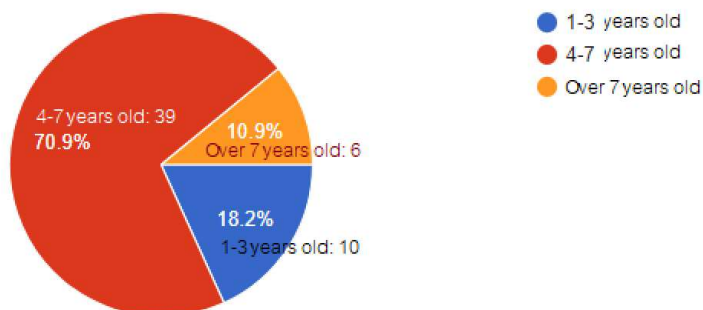
อายุของเด็ก

55 responses

Figure 11: Participants ages

The second question was the children's age, which divided into three groups. The first group was children 1-3 years old with ten people, the second group was children 4-7 years old with 39 people, and the third was children over seven years old with six people.
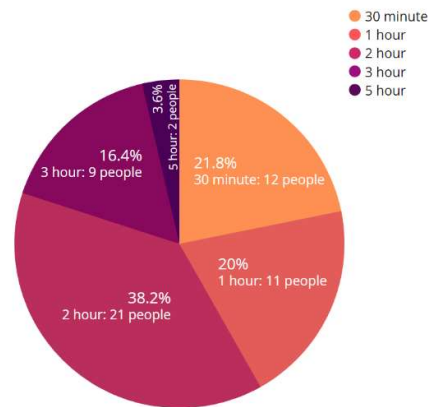
109

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Figure 12: Number of hours parents allowed using smartphones and tablets per day

The third question was about how many hours' parents allowed using smartphones and tablets per day and how many days per week. The survey found that most parents allow their children to use mobile phones and tablet two hours a day 38% or 21 people, thirty minutes a day 21.8% or 12 people, one hour a day 20% or 11 people, three hours a day16.4% or 9 people, and five hours a day 3.6% or two people.
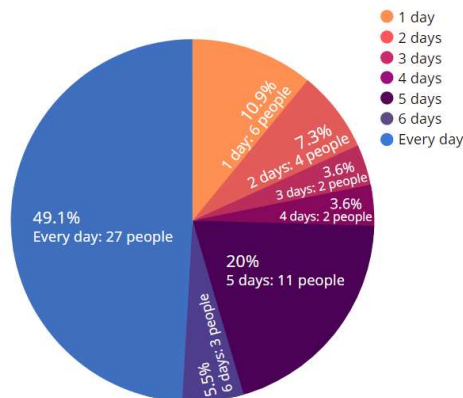

Figure 13: Number of days parents allowed using smartphones and tablets

Most parents allowed their children to use mobile phones and tablets every day 49 percent or twenty-seven people, five days a week 20 percent or eleven people, one day a week 10.9 percent or six people, two days a week 7.3 percent or four people, six days a week 5.5 percent or three people, three days a week 3.6 percent or two people, and four days a week 3.6 percent or two people.
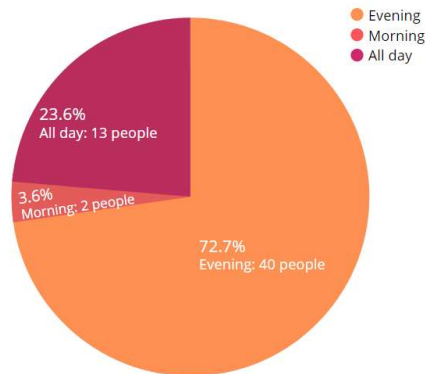
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Figure 14: Time that parents allowed using smartphones and tablets

The fourth question was about which time that parents allowed using smartphones and tablets. The number one answer was in the evening 72.7 percent or forty people, the number two was all day 23.6 percent or thirteen people, and the last was on morning 3.6 percent or two people.
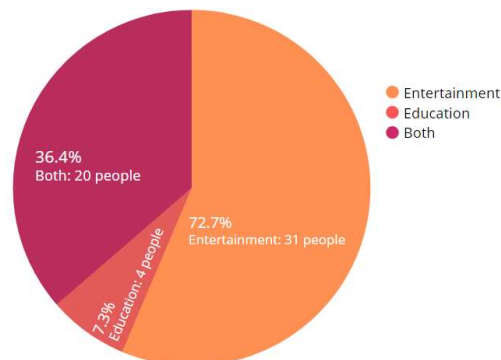

Figure 15: Types of applications that children like to play

The fifth question was the types of applications that children like to play. The responses were for entertainment purposes 56.4 percent or twenty-one people, for educational purposes 7.3 percent, for both purposes 36.4 percent or twenty people.

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4. ยกตัวอย่างแอพพลิเคชั่นเพื่อการศึกษาที่เด็กชอบใช้ (ถ้ามี)
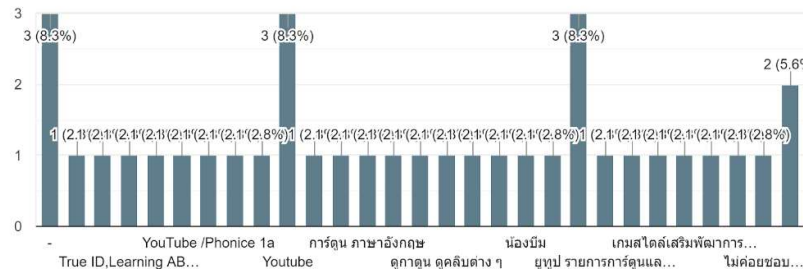
36 responses

Figure 16: Preferable education mobile application

The sixth question was the writing of an example of an education mobile application, but this question was an option that parents can answer or not answer. There were 36 responses in total with Various types of answers, and the most popular answer was Youtube.
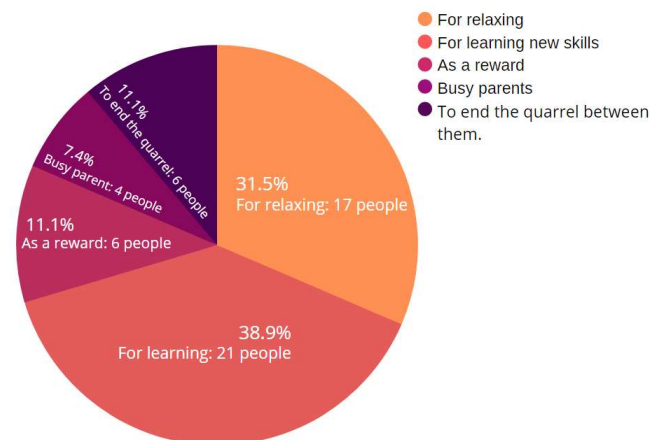
Figure 17: Reason why the parents allowed their children to play on smartphones and tablets

The seventh question was the reason why the parents allowed their children to play on smartphones and tablets. The most popular answer was for learning new skills 38.9 percent or twenty-one people, for relaxing 31.5 percent or seventeen people, giving as a reward 11.1 percent or six people, for ending the quarrel 11.1 percent or six people, and the last was parents were very busy 7.4 percent or four people.
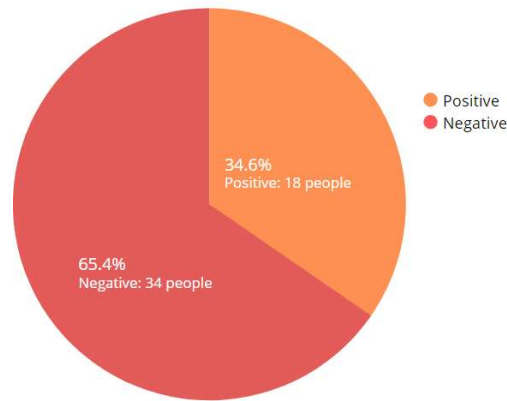
Figure 18: Behavior children have when not playing on the phone

The eighth question was what behavior children have when not playing on the phone. Children have positive behavior 34.6 percent or eighteen people and negative behavior 65.4 percent or thirty-four people.
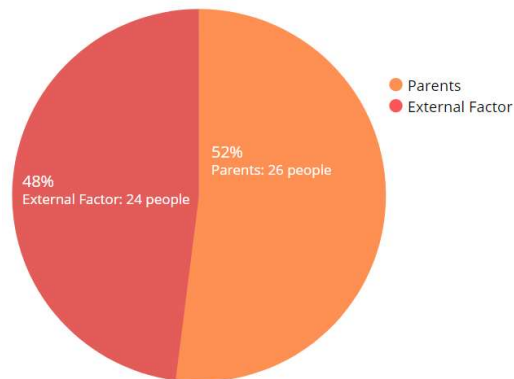
Figure 19: Reasons why you think children are addicted to mobile phones or tablets

The ninth question was why you think children are addicted to mobile phones or tablets, which divided into two groups. There were 50 responses. First, parents thought the cause was from themselves 52 percent or twenty-six people. For instance, not setting playing time and they used their mobile phones, and therefore children imitate parent's behavior. Second, parents thought that the cause was external factors such as friends, games, and feeling fun.

4.3 Design Process

4.3.1 Personas

Persona is a reflection of the actual target audience data collected in previous research such as an interview with users. It helps us standardize needs, get solutions faster, and drive the decision making for interface design. Personas aren't actual people, but in the design process, they represent real people.
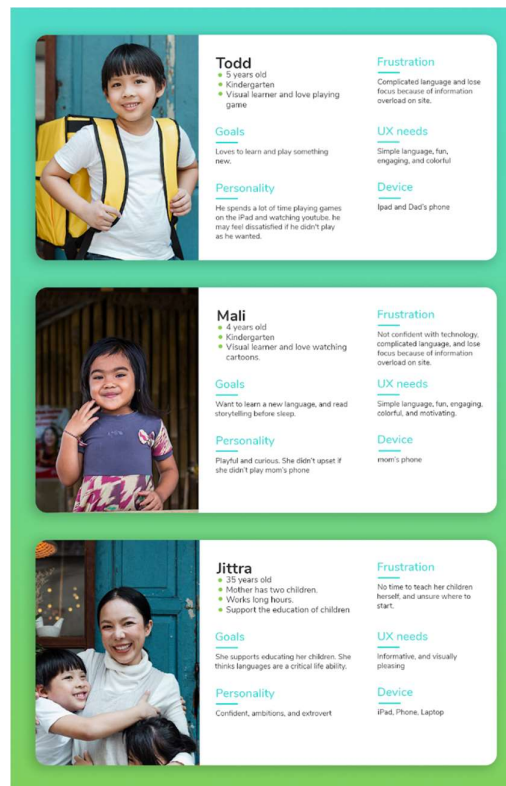
Figure 20: There were three personas, which are two children and a parent who are typical examples of the people that will be using our app. (Free people picture from pexels.com)

4.3.2 Flow diagram

The diagram is a line drawing consisting of symbols describing the main points and actions happening within a structure. Although a diagram might well take several forms, the main purpose of creating one is to help resolve the problems of organization and behavior in the elements within a system. I used flow diagrams to plan, develop an application, audit a process, map information, and manage workflows.

Figure 21: Team discussion about the app flow diagram for understanding the same workflow. This project improved the hierarchy by using Post-it to define the structure of content and involved the way users move through.

Figure 22: It is Wise kids' user flow diagram (Page to page). The operation of the application started from the red box then sorted the flow according to the arrows.

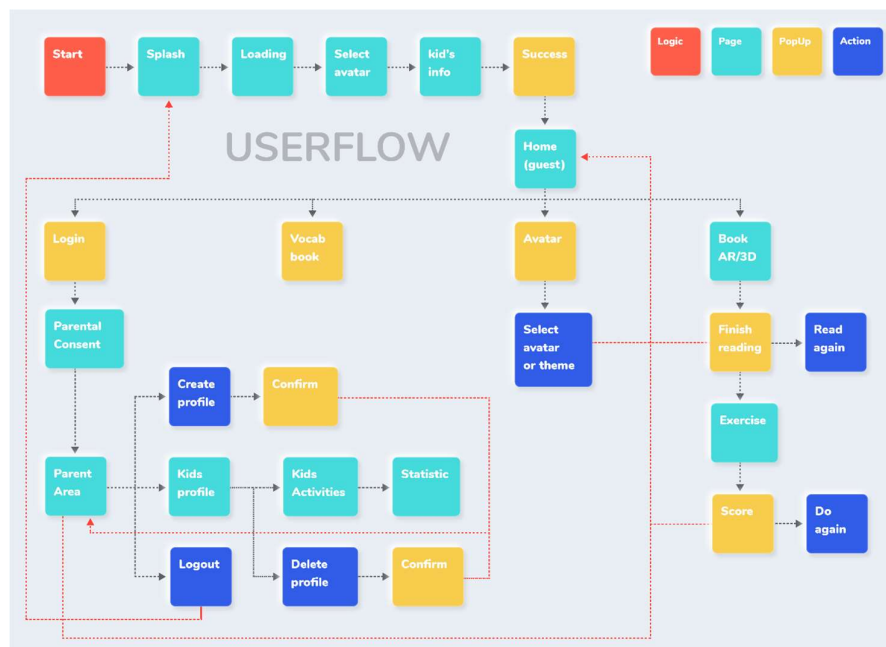*The 5th TICC International Conference 2020*
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4.3.3 Functional requirements

Requirements are statements that claim to specify what the product does or expected to do. When research and interview have completed well, then eliciting the requirements from the flow diagram. This document explains why it is needed or what the problem was. It was effective for communicating with the Wisekids team.

Number	Requirement	Description	Level of importance
1	Select an avatar	For the first use, the user has to create a profile before going to the home page. The first step is to select an avatar.	MUST HAVE
2	First time create new profile	the system required user to enter name and age before press "finish" button.	MUST HAVE
3	Select theme and avatar	This popup will show up when the user presses the avatar button on the home page. The user can change the theme and avatar anytime.	SHOULD HAVE
4	Vocabuary book	All stickers the user got will be collected on this page. The user can see this page by tapping the "vocabulary" button on the home page and when the user taps on	MUST HAVE
5	Login	The user can see the login popup when pressing the login button on the home page.	MUST HAVE
6	AR	3D mode	MUST HAVE
7	Reading Subtitle	While the user read a book there will have subtitle that a user cand press on word and the sound will play.	MUST HAVE
8	Finding monster game	While reading the candy monsters chapter, there will be mini-games for users to play. This game will let the user find candy monsters in the mouth. The user will	MUST HAVE
9	Matching game	After finishing reading, there will be mini-games for users to play. This game will let the user place the picture into space by guessing from the shape of space and	MUST HAVE
10	Parental consent	The user must accept parental consent for accessing more features.	MUST HAVE
11	add new profile in parent area	The user can create a new profile from the parent area page.	MUST HAVE
12	Kid's profile	This page will show information about scores and lessons learned in each book.	MUST HAVE
13	Kid's activity	The child activity page will collect the information about the score of each book and time read. Parents can edit and delete kid's profiles.	MUST HAVE
14	Delete profile	parents can delete children's profiles.	MUST HAVE
15	book level	The user can change the book level by tapping on the "level" button on the home page.	MUST HAVE
16	Limit time notification	When the user uses the application for one hour, there will show notification popup that does not allow the user to play but this app can be accessed by parents.	MUST HAVE
17	Unlock book	The user can get a new book by using stars that collect from activities.	MUST HAVE
18	Parents area	Parents' area has all children's profiles and can create new profiles.	MUST HAVE

Figure 23: Requirement determines what is required, not how it should be designed.

4.3.4 Wireframe

A wireframe is a page layout that shows what interface elements will exist on key pages. It can provide a product page's visual understanding and create navigation to meet user needs and ensure the structure before the creative process begins.
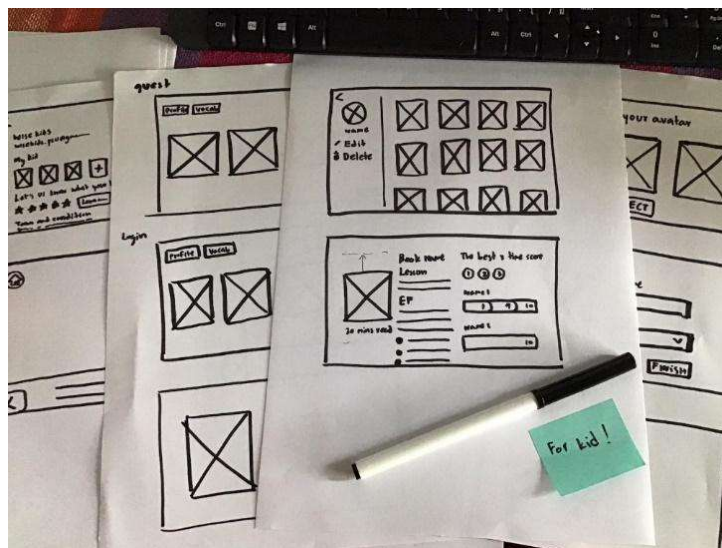
Figure 24: It was the first step of interface design (UI), it can indicate the structure of an application. This process was a quick way to plan the interface element.

4.3.5 Task flow

Task flow helped to improve features by focusing on a single task.
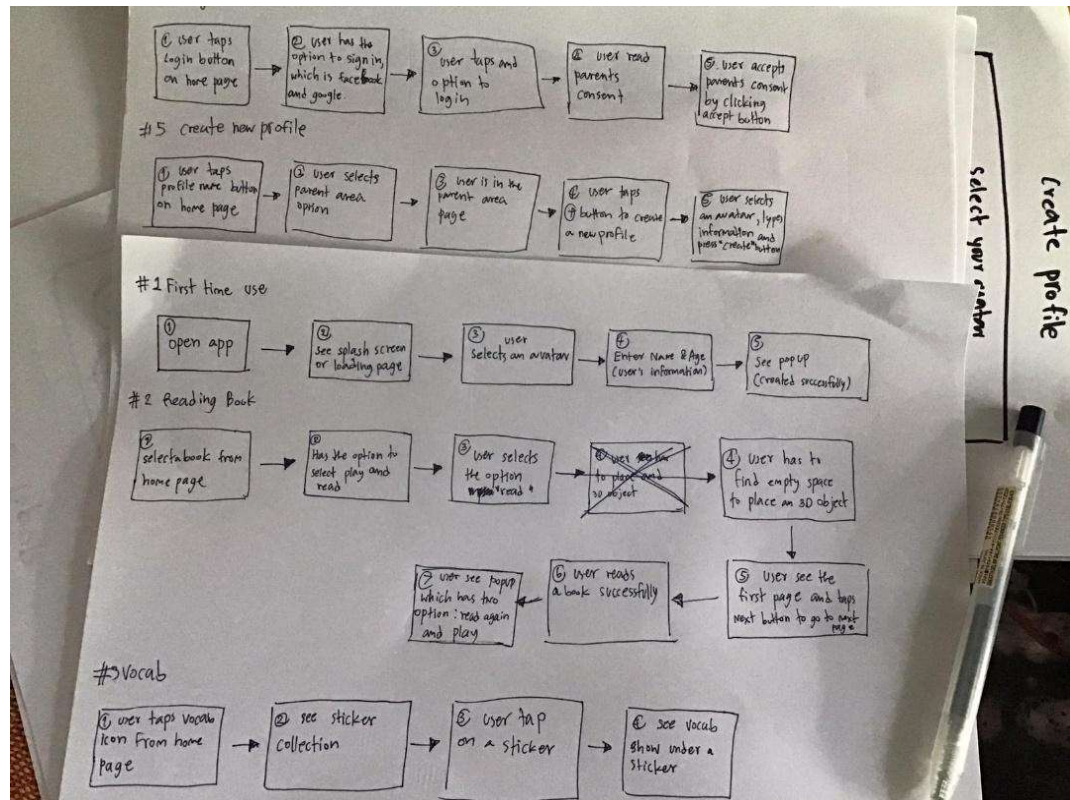
Figure 25: Task flow is a series of steps the user takes to achieve the goal. This project used this method to improve the user experience.

4.3.6 Low-fidelity prototype

A low-fidelity prototype is a computer-based visual rough representation of concepts that allow designers to test certain ideas early in the design process.
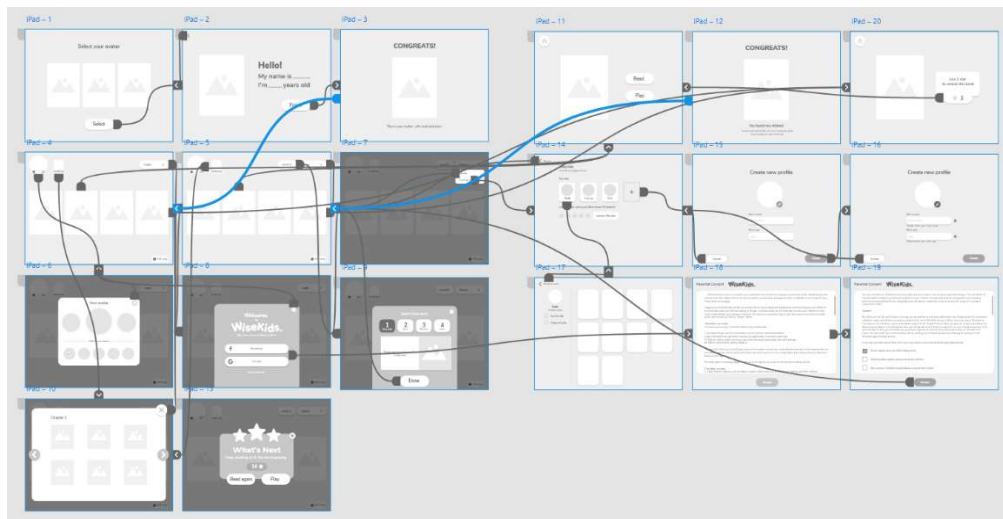
Figure 26: A low-fidelity prototype created from Adobe XD, which is based on sketch wireframes.

4.3.7 Wireflow

Wireflow was an important step that helped to improve logic by seeing how users interact in different scenarios.
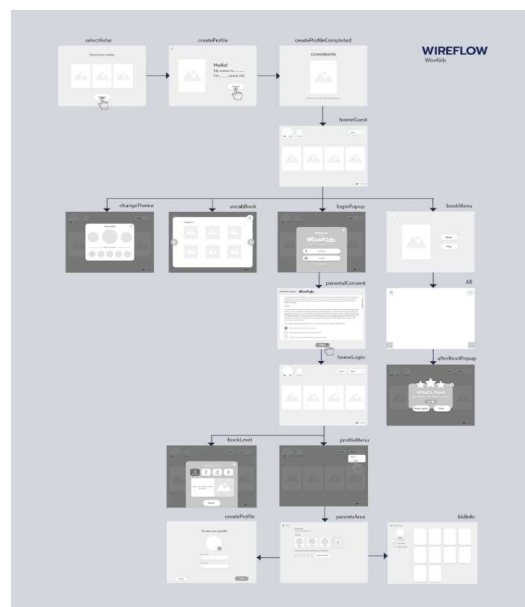
Figure 27: Wireflow (Component level) used for communication in the Wisekids team for consistent understanding

4.3.8 Low-fidelity prototype testing

Low-fidelity prototype tested by the team. The test result found some problems. For instance, it was hard to press some buttons, difficult to see the text, some icons weren't big enough, etc. Therefore, this low-fidelity prototype improved all problems before proceeding to the high-fidelity prototype.

4.3.9 High-fidelity prototype

A high-fidelity prototype is the nearest relation to the final version with terms of detail and functionality.

Figure 28: The splash screen will show first when the user opens the application.
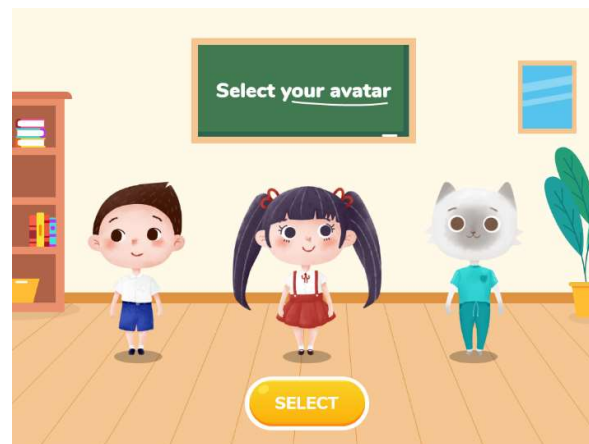
Figure 29: For the first use, the user has to create a profile before going to the home page. The first step is to select an avatar.

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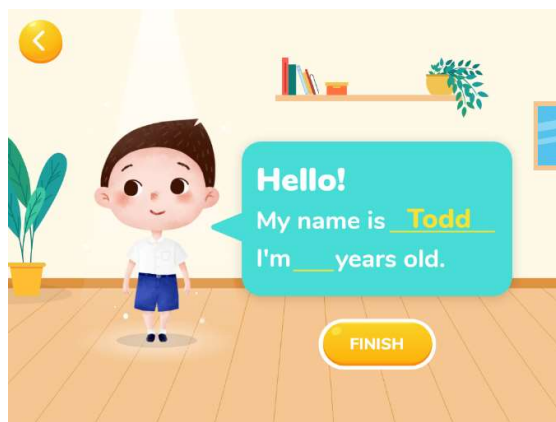
Figure 30: The second step of creating a profile is entering name and age.
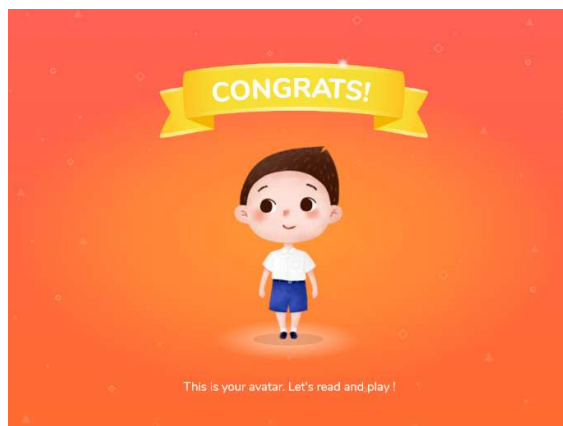
Figure 31: This page will show up when creating a profile successfully.
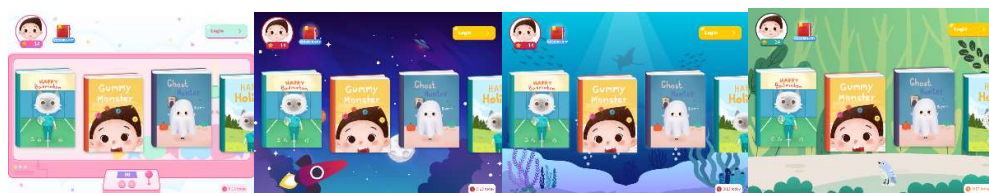
Figure 32: The home page which has five themes.

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Figure 33: The avatar button on the home page

This popup will show up when the user presses the avatar button on the home page. The user can change the theme and avatar anytime.

Figure 34: Two options "read and play"
When the user selects a book from the home page, this page will show up, which has two options "read and play".

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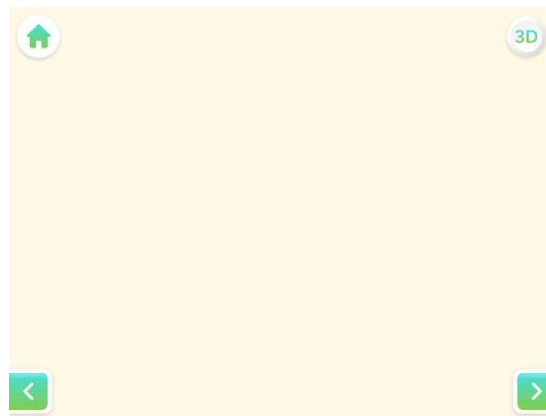
Figure 35: AR Mode

When the user selects the "read" button, then the AR mode will show up, and the user can press the green button with a white arrow to read next.

Figure 36: Mini-games

While reading the candy monsters chapter, there will be mini-games for users to play. This game will let the user find candy inside the monsters' mouth. The user will be able to tap on monsters until all disappear. The lesson learned is counting the number 1-10.
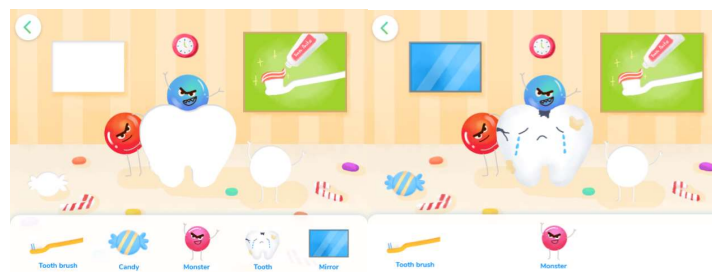
Figure 37: Mini-games

After finishing reading, there will be mini-games for users to play. This game will let the user place the picture into space by guessing from the shape of space and picture. The user will be able to drag and drop the picture until all done. The lesson learned is observation skills and vocabulary.

Figure 38: Finish reading page
The popup will show after the user finished reading. The user can read a book again or play a mini-game.
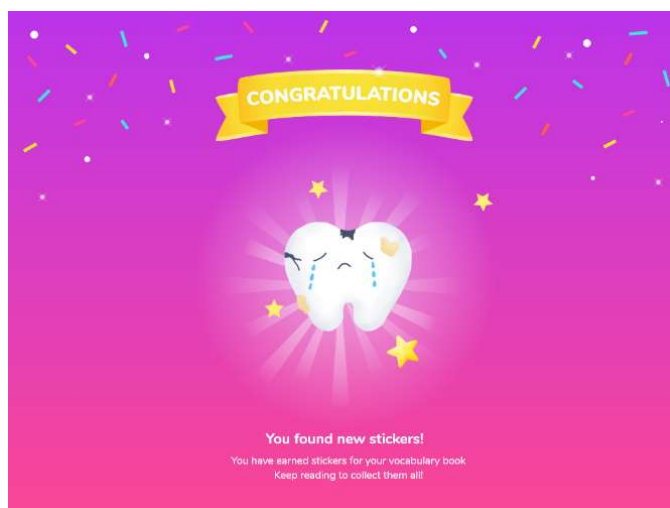
Figure 39: New sticker page
This page shows the new sticker that the user got when the user finished reading and playing.
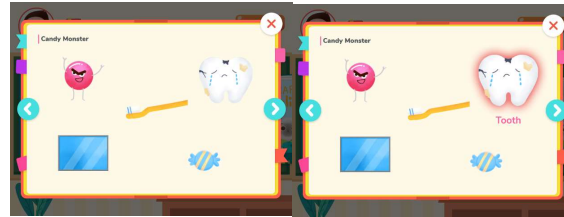
Figure 40: Vocabulary page All stickers the user got will be collected on this page. The user can see this page by tapping the "vocabulary" button on the home page, and when the user taps on each sticker, there will be vocabulary shown under the picture.
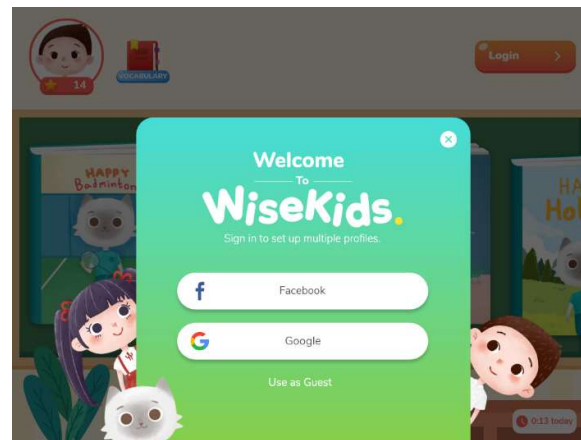
Figure 41: Login page
The user can see the login popup when pressing the login button on the home page.
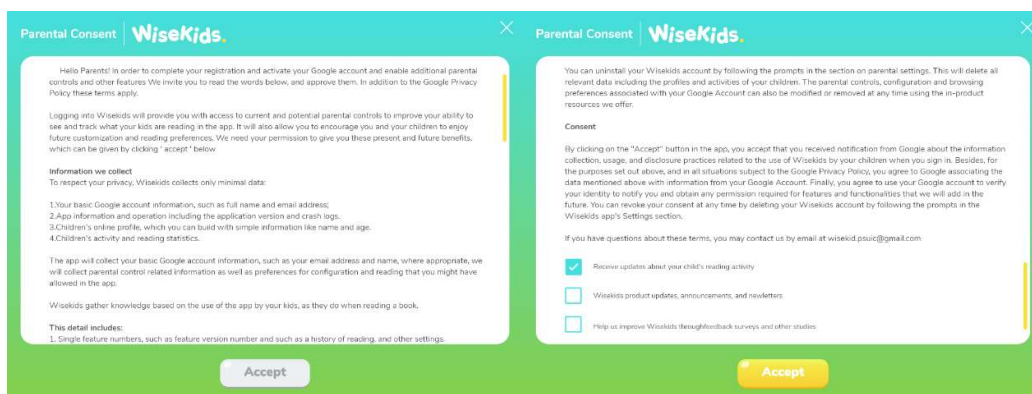
Figure 42: The user must accept parental consent for accessing more features.
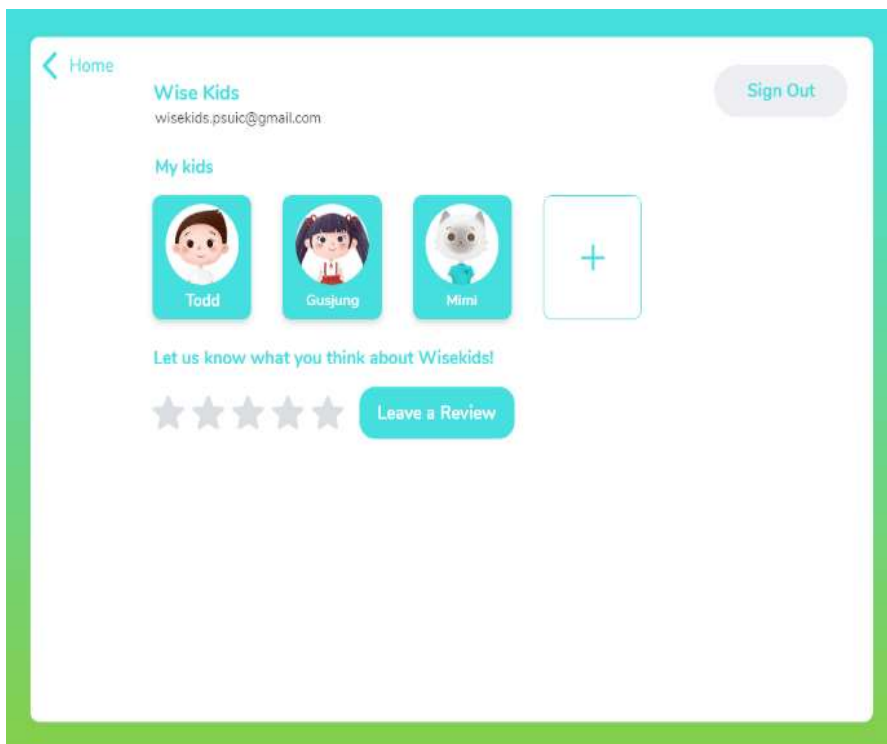
Figure 47: Parents' area has all children's profiles and can also create multiple profiles.
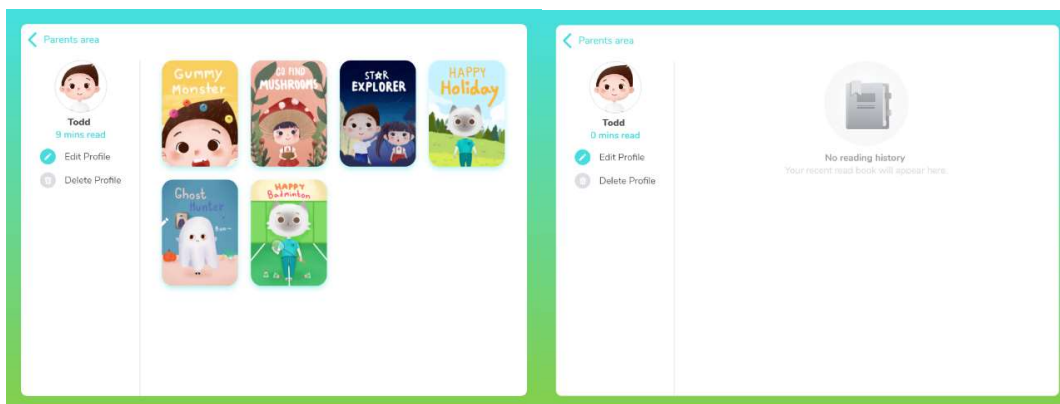
Figure 43: Edit and delete kid's profiles
The child activity page will collect the information about the score of each book and time read. Parents can edit and delete kid's profiles.
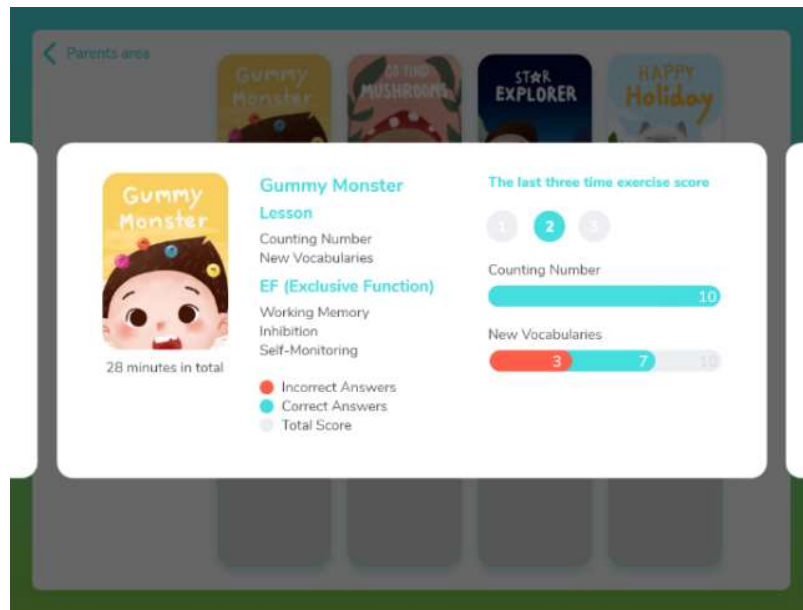
Figure 44: This page will show information about the scores and lessons learned in each book.

Figure 45: The user can create a new profile from the parent area page.
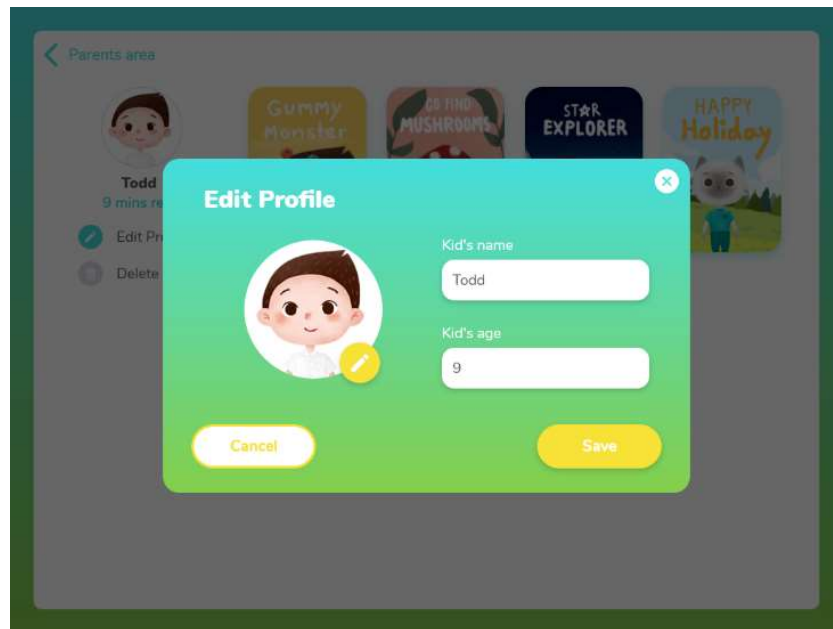
Figure 46: The user can edit children's profiles.
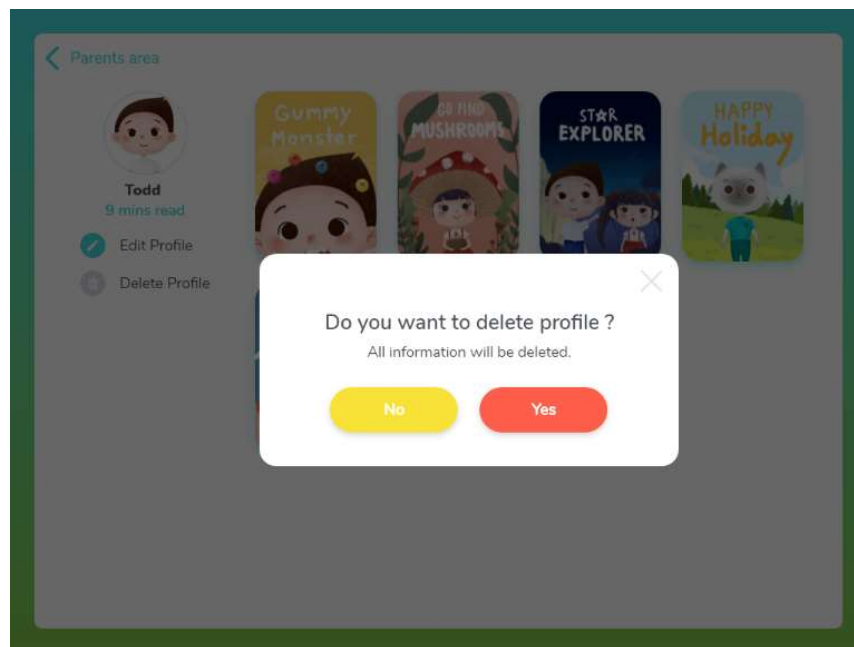
Figure 47: The user can delete children's profiles.
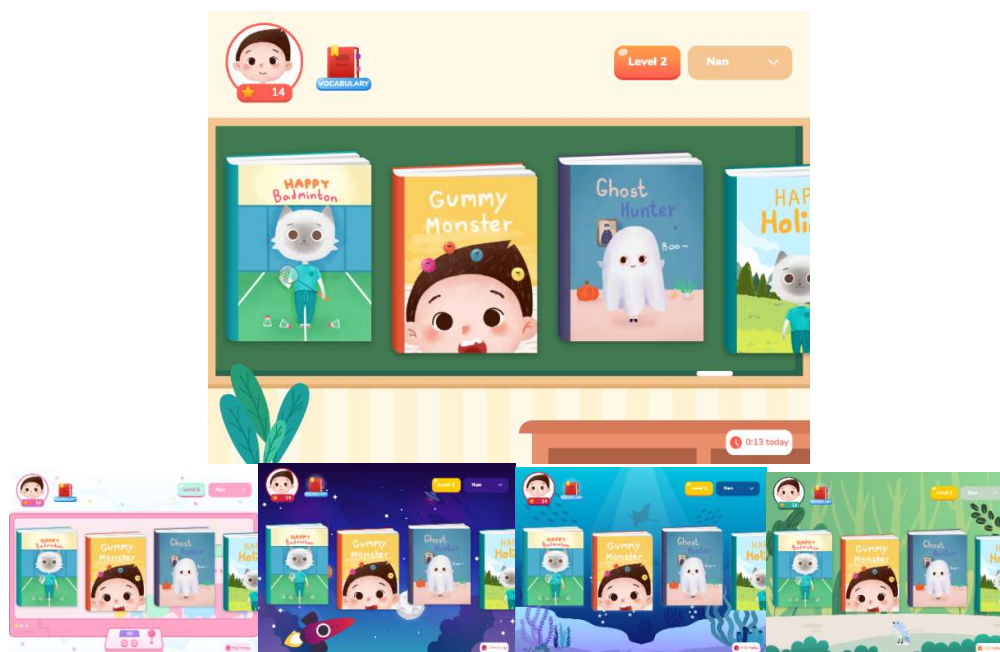
Figure 48: Home page

If you are logged into the home page. There will be more features than the guess mode, such as users can create profiles more than one and can change book levels.
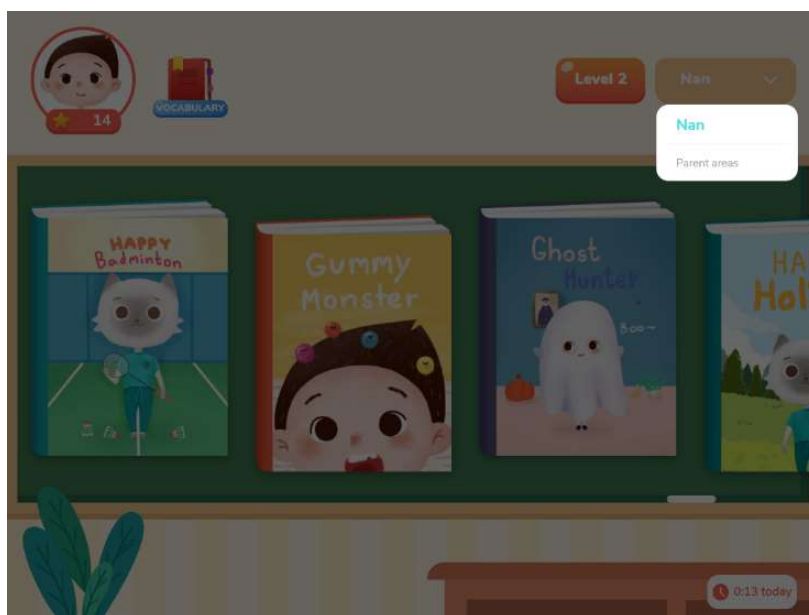
Figure 49: This popup is the entrance to the parent area page and switches the children's profile.
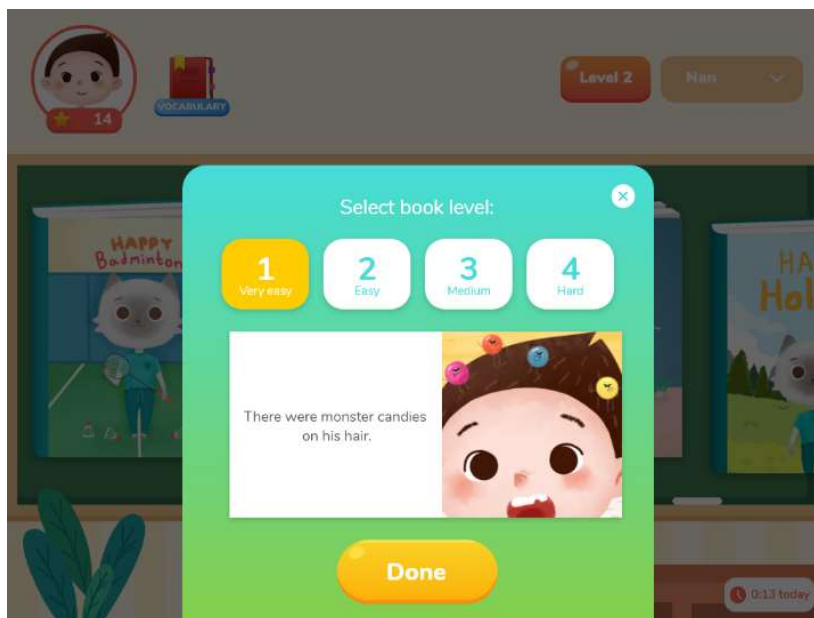
Figure 50: The user can change the book level by tapping on the "level" button on the home page.
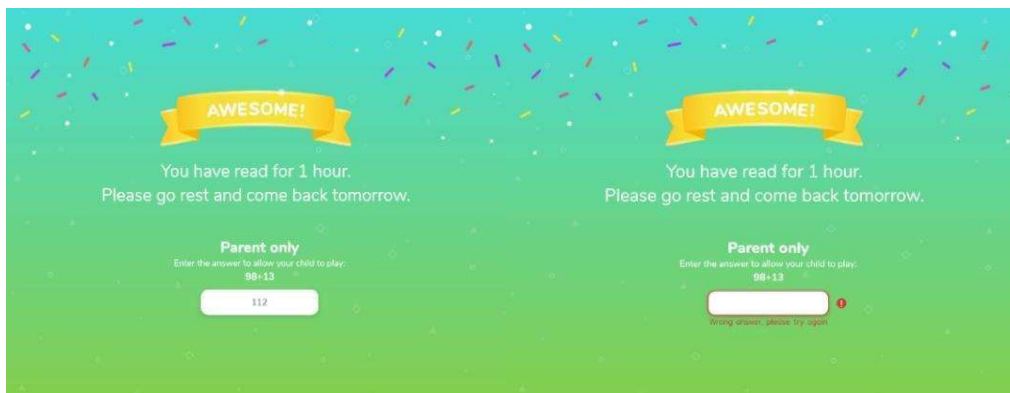
Figure 51: Notification popup
When the user uses the application for one hour, there will be a notification popup that does not allow children to play, but it can be accessed by parents.

Figure 52: The user can get a new book by using stars that are collected from activities.
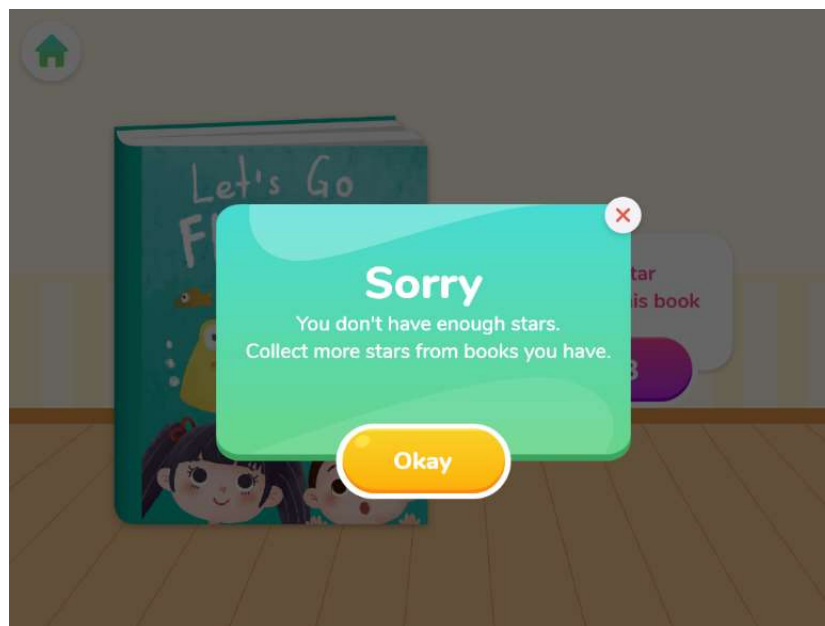
Figure 53: This popup will show up when the user doesn't have enough stars.

4.3.10 High-fidelity prototype testing

The key aim of prototypes was used in the usability testing of the application to be tested by target customers. It is necessary to check the application to foresee any issues or failures before launching. A prototype is the closest to the final product in its detail, and functionality can be used to get the most out of the feedback.

Figure 54: The application was tested by two kids. They got some problems while using it and all the problems will be solved before continuing development.

4.3.11 User flow

A user flow is a series of steps a user takes on an app to complete a task. User flow helps step understand better how to build a logic of different screens by seeing how users interact in different scenarios. This method displayed the design from the perspective of the user.
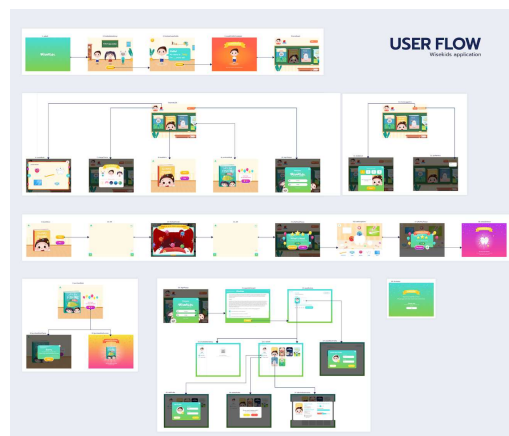
Figure 55: This project used user flow for communication in the Wisekids team for consistent understanding between designer and developer.

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4.3.12 AR book
Character design and concept art

An interest in preschool children survey on 20 September 2019 at Sri-Sawangwong kindergarten school found that children have different interests of genres of a cartoon, and most of the children like characters that are the same gender as them. Therefore, I made a feature that allows the user to select an avatar as the main character of every story. There were three different characters, which were a girl, a boy, and a cat. In the future, this feature can add more characters as well.

Figure 56: Characters wear a school uniform that represents to Thai children.

Figure 57: Design concept art for expressing the mood and tone of the story before it is placed in the storybook.

Story Content

This project classifies contents into four levels. There were differences in the difficulty of content vocabulary and grammar. In which readers can choose the level that suits them.

● Level one (very easy) usually used simple tense and short description.
● Level two (easy) used simple, continuous tense and a short
● description.
● Level three (normal) used simple, continuous, perfect, perfect
● continuous tense, and short descriptions.
● Level four (hard) used simple, continuous, perfect, perfect continuous tense and long descriptions.

4.3.13 Storyboard

The storyboards have been created based on story content. It is a graphic representation of how the plot unfolds.

Figure 58: A draft of candy monsters storyboard was about a kid who loved to eat sweets, and one night he dreamed about a candy monster in his mouth.
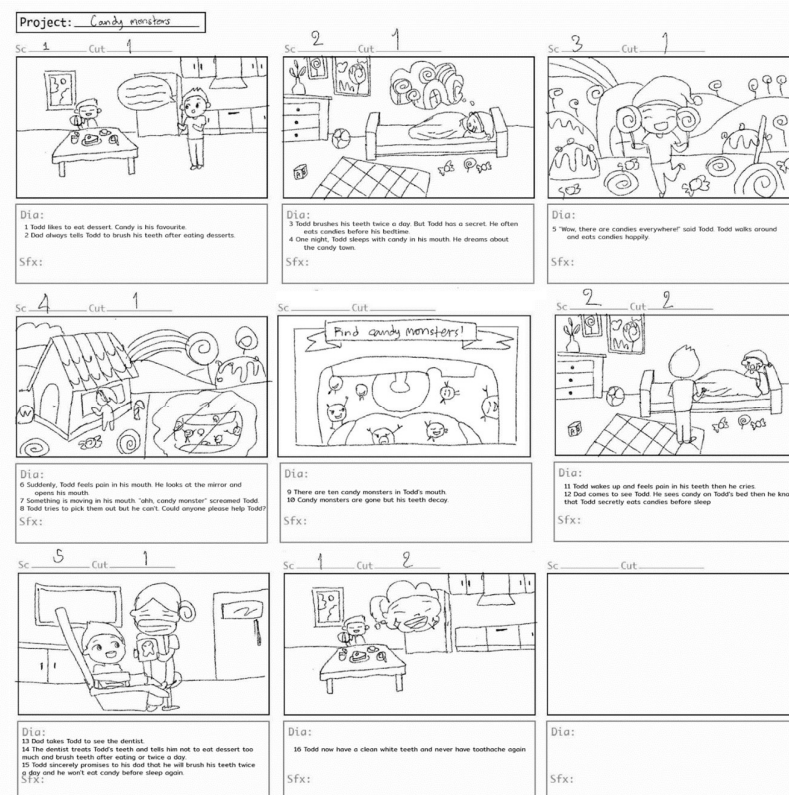
5. Results

5.1 Focus group with the students at Sri-Sawangwong school

At the end of July 2020, Wanichaya and I conducted a focus group with a group of students at Sri-Sawangwong school to collect user feedback and to gain a better understanding of the user's perception and issue while they used the Wisekids application. The focus group members are 3 students between the ages of 4-7 year that will evaluate all of the application features except parental area features. During the tests, we focused on getting answers to the below topics.

- The tablet/smartphone usage.
- What will be their reaction and opinion after using the application?
- Which reading material do they prefer between storytelling application and traditional book?
- Overall satisfaction after playing the application.

Figure 59: Testing Wisekids application with the students at Sri-Sawangwong school.

The result from the focus group discussion are separated to be result from the interview and result from the observation as follows.

5.1.1 Result from the observation.

1st participant

Nam doesn't hesitate to explore and press the button in the application. She knows the fundamentals of using smartphone applications. For example, she knows how to use the basic navigation button to navigate the application screen and knows how to use pinch gestures to zoom in-out a 3d model inside the AR book without any instruction. On some screens, she doesn't know where to tap or interact with the application interface for example, she doesn't know where to tap to input her name and age into the text field. She is excited about the artwork and AR functionality inside the AR book and likes the mini-games inside the application.

2nd participant

Baimon is a bit shy at the beginning of testing but she is interested and excited when she sees a 3D model appear while reading the AR book. She expected to see a change on every button or interface element she pressed, if she doesn't see any change she will be confused and will hesitate to continue using the application.

3rd participant

Kendo is not a talkative person and very polite. He hesitates to explore around and presses buttons or elements he doesn't know the meaning. He has a fundamental knowledge of using mobile applications and understands all of the icons in the application. On some screens, he was confused and misunderstood that some graphic elements are a button.

5.2   Teacher interview

We also tested the Wisekids application and interviewed the teachers of grade 1 students to gain feedback and suggestions on the application usability and content in the AR book. From conducting the interview, the teachers gave us an opinion on the application usability that Wisekids application is easy to use, the graphic elements and color are suitable for the kids and integrating mini-game, music, and animation in an AR book could engage the kid to continue playing the application. The teachers also suggested that the sentences in the AR book should be shorter, the subtitle font size is too small for young children and the developer should add some game or song as an introduction of the book chapter to gain attention from the kids before going to the story.

The interview and observation with the students and teachers helped us to gain an insight user's perception and know which parts of the application are still an obstacle to use for the user. Allowing the developer to improve the final product and make the application more suitable for our target user.

Figure 60: First participation (Nam) while testing Wisekids application.

Figure 61-62: Second participation (Baimon) while testing Wisekids application.
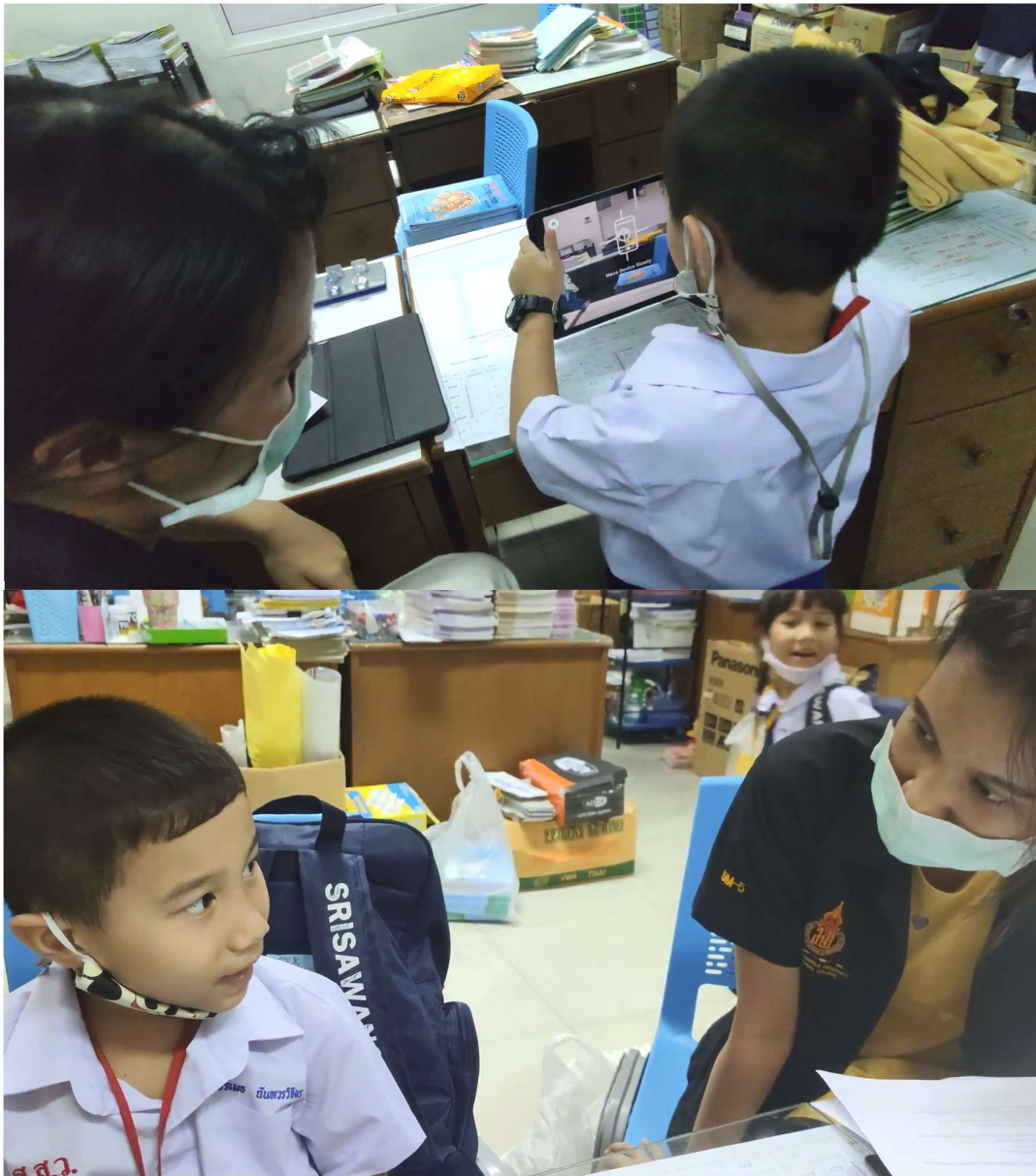
Figure 63-64: Third participation (Kendo) while testing Wisekids application and interview by the researcher.
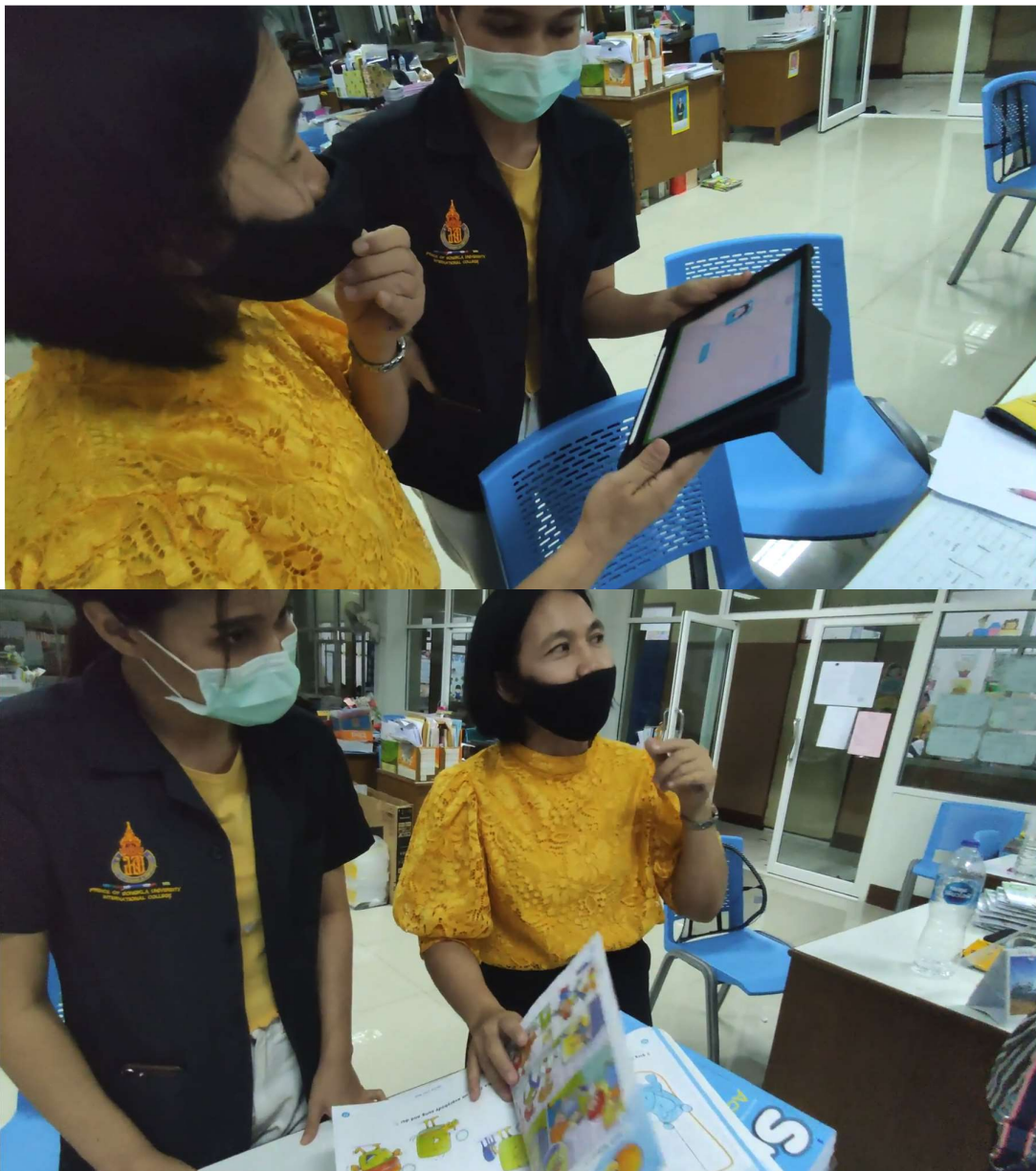
Figure 65-66: Interview with the teacher to gain the application feedback and suggestions on content in the AR book.

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6.   Discussion and Conclusions

6.1 Conclusion

This project aimed to create a storytelling application that utilized augmented reality technology in nowadays smartphones to enhance the reading experience for children and compare children's interest in reading material between an AR storybooks application and traditional storybooks. Based on the positive feedback of the focus group interview and observation with the kid participants, it can be concluded that applying augmented reality in reading material can help to gain children's attention and motivate them to read and designing applications using the UX / UI Design principles make apps easy to use and can draw attention from children as well. Moreover, the interview results also show that all kid participants prefer an application to be their reading material. Thus, both objectives of this project are achieved.

6.2 Suggestion

- Although AR technology has improved, it can still be difficult for children to use. Therefore, more researches related to the development and usability of AR applications in early childhood users are needed.
- The amount of AR supported smartphones/tablets nowadays is still limited. more research on AR optional should be conducted and implemented to the application to prevent application failure on unsupported devices
- To select participants for evaluation, researchers should choose children who are confident to talk and give their opinion, allowing developers to identify issues and improve the final product effectively.

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A NOTE ON GRAPH TRANSFORMATIONS AND THE INTERMEDIATE VALUE THEOREMS FOR THE ARBORICITY OF GRAPHS

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Abstract: This article reviews the graph transformations and the intermediate value theorems for the arboricity, linear arboricity, linear-k-arboricity and star arboricity of graphs. The arboricity of graph G is the minimum number of subsets of the edge set $E(G)$ into which the set of edges of G can be partitioned such that each subset induces a forest, denoted by $a(G)$. The linear arboricity of a graph G, denoted by $la(G)$, is the minimum number of subsets of the edge set $E(G)$ into which the set of edges of G can be partitioned such that each subset induces a linear forest. The linear-k-arboricity of a graph G, denoted by $la_k(G)$, is the minimum number of subsets of the edge set $E(G)$ into which the set of edges of G can be partitioned such that each subset induces a linear-k-forest. The minimum number of subsets of the edge set $E(G)$ into which the set of edges of a graph G can be partitioned such that each subset induces a star forest is called the star arboricity of G denoted by $sa(G)$.

Some simplified proof of linear arboricity, linear-k-arboricity and star arboricity of graphs are shown that these graph parameters are interpolation graph parameters. Additionally, some bounds of the arboricity, linear arboricity and linear-k-arboricity of graphs are also summarized in this paper.

Keywords: arboricity, intermediate value theorems, interpolation graph parameters, interpolation theorems

1. Introduction

A *graph G* is an ordered paired of $(V(G), E(G))$ where $V(G)$ is the set of vertices and $E(G) \subseteq \{uv \mid u, v \in V\}$ called the set of edges, which are unordered pairs of vertices. The cardinality of $V(G)$ is called *order* written as $|V(G)|$. The cardinality of $E(G)$ is called *size* written as $|E(G)|$. A subgraph of $G = (V(G), E(G))$ is a graph $H = (V(H), E(H))$ such that $V(H) \subseteq V(G)$ and $E(H) \subseteq E(G)$. For a graph $G = (V(G), E(G))$, a subgraph H of G where $V(H) \subseteq$

$V(G)$ and $E(H)$ is all of the edges connecting pairs of vertices in $V(H)$ is called an *induced subgraph H* of G. Moreover, a subgraph H' of G where $E(H') \subseteq E(G)$ and $V(H)$ is all of the end vertices in $E(H)$ is called an *edge induced subgraph H'* of G.

In the edge uv, u and v are called *end vertices* of the edge uv. The edge uv is said to *join* vertices u and v and to be *incident* on vertices u and v. The number of edges incident to a vertex v is called the *degree* of a vertex v, denoted by $deg\ v$. The minimum and maximum degrees of a graph are denoted by $\delta(G)$ and $\Delta(G)$.

If there are more than one edge join vertices u and v, then these edges are called *multiple edges.* The edge with the same end vertices is called a *loop*. A graph G is *finite* if the sets of vertices and edges are finite set. A graph is *simple* if it has no a loop and multiple edges. Graphs considered in this paper are finite and simple.

A *connected graph* is a graph having a path join any vertex to any other vertex in the graph. A *tree* is a connected graph without a loop. A connected subgraph of a graph G is called a *component* of G. Two graphs G_1 and G_2 are *isomorphic*, written as $G_1 \simeq G_2$, if there exists a bijective function $\varphi : V(G_1) \rightarrow V(G_2)$ such that for vertices x and y are adjacent in G_1 if and only if $\varphi(x)$ is adjacent to $\varphi(y)$ in G_2.

A graph containing at most one vertex with degree more than one is called a *star*. A *forest* is a graph without a loop. A forest whose vertices have degree at most two is called a *linear forest*. A forest which each component contains at most one vertex having degree more than one is called a *star forest*. Figure 1 shows graphs G_1 and G_2 which are a star and a forest, respectively.

Figure 1.

A *path* in a graph G is a sequence of vertices $v_1, v_2, \ldots, v_k$ such that v_i, v_{i+1} where $i = 1,2,\ldots,k-1$ is an edge of G. The number of edges in a path is called *length* of a path. A linear forest which each component is a path with length at most k is called *a linear-k-forest.* The graphs G_1 and G_2 illustrated in Figure 2. are a star forest and a linear-3-forest, respectively.

G_1 G_2
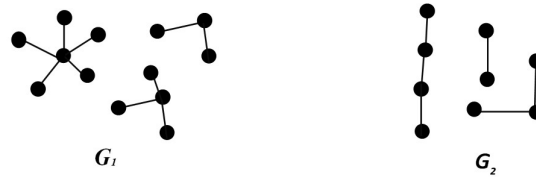
Figure 2.

The *arboricity* of graph G is the minimum number of subsets of the edge set $E(G)$ into which the set of edges of G can be partitioned such that each subset induces a forest, denoted by $a(G)$. For example, K_5 has $a(K_5) = 3$ because K_5 can partition the edge set into at least 3 subsets in which each subset is a forest, see Figure 3.

K_5 E_1 E_2 E_3
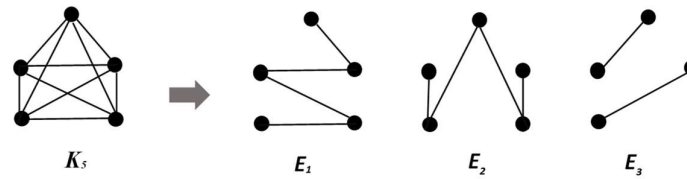
Figure 3.

$\lceil A \rceil$ and $\lfloor A \rfloor$ denote the minimum integer which is not less than A and the maximum integer which is not greater than A, respectively.

The arboricity of graph was introduced by Nash-Williams in 1961. Furthermore, Nash-Williams provided a well-known formula of arboricity.

Theorem 1.1 (Nash-Williams, 1961, p. 445) For any graph G with order is greater than 1,

$$a(G) = \max \lceil q_n / (n\text{-}1) \rceil$$

where $q_n = \max\{|E(H)| \mid H \text{ is a subgraph of } G \text{ with} |V(H)| = n \}$.

The *linear arboricity* of a graph G, denoted by $la(G)$, is the minimum number of subsets of the edge set $E(G)$ into which the set of edges of G can be partitioned such that each subset induces a linear forest. It is clearly standing out that for a graph G with maximum degree $\Delta(G)$ has $la(G) \geq \lceil \Delta(G)/2 \rceil$ since each linear forest can use only two edges adjacent to a maximum degree vertex. Harary is the first one who introduced linear arboricity in 1970 (Harary, 1970, pp. 198-205) and the first result of it was published in 1980 (Akiyama Exoo and Harary, 1980, pp. 405-417). Akiyama Exoo and Harary conjectured in 1980 that every graph has linear arboricity at most $\lceil \Delta(G) + 1/2 \rceil$ (Akiyama Exoo and Harary, 1981, pp. 69-82). This conjecture is very interesting. It is, however, unproved.

The *linear-k-arboricity* of a graph G, denoted by $la_k(G)$, is the minimum number of subsets of the edge set $E(G)$ into which the set of edges of G can be partitioned such that each subset

induces a linear-k-forest. The linear-k-arboricity is refinement of linear arboricity introduced by Harary (Harary, 1970, pp. 198-205) and it has been defined by Habib and Peroche (Habib and Peroche, 1982, pp. 219-220). Bermond and others proved that the following formula, for $|E(G)| = m$ and $|V(G)| = n$, $la_k(G) \geq \max\left\{\lceil \Delta(G)/2 \rceil, \left\lceil \frac{m}{\lfloor k \cdot n/(k+1) \rfloor} \right\rceil\right\}$ (Bermond and others, 1984, pp. 123-132).

The minimum number of subsets of the edge set $E(G)$ into which the set of edges of a graph G can be partitioned such that each subset induces a star forest is called the *star arboricity* of G denoted by $sa(G)$. In 1984, star arboricity was first introduced (Akiyama and Kano, 1984, pp.11-22) where the authors proved that the star arboricity of the complete graph on k vertices is $\lceil k/2 \rceil + 1$. Furthermore, Aoki showed the star arboricity of any complete multipartite graph with color classes of equal size (Aoki, 1990, pp.115-122).

The purpose of this paper is to review the graph transformations and the intermediate value theorems for the arboricity, linear arboricity, linear-k-arboricity and star arboricity of graphs. In addition, some simplified proof of linear arboricity, linear-k-arboricity and star arboricity of graphs are shown that these graph parameters are interpolation graph parameters. Moreover, some bounds of the arboricity, linear arboricity, linear-k-arboricity and star arboricity of graphs are also summarized in section 3 of this paper.

2. Intermediate Value Theorems

In 1981, the following problem was posed by Chartrand (Chartrand, 1981).

"If a graph G contains a spanning tree with m end vertices and another with n end vertices where $m < n$, then does G contain a spanning tree with k end vertices for every $m < k < n$?"

This problem was answered in 1984 (Barefoot, 1984, pp. 109-112) and led to the several papers on intermediate value properties of different graph parameters over various classes of graphs.

Definition 2.1 Let $\mathbb{J}$ be a class of graphs or subgraphs of a fixed graph. If there is transformation of a member of $\mathbb{J}$ into another, then this will be called a *graph transformation* on $\mathbb{J}$. Equivalently, a graph transformation may be defined as a relation τ from $\mathbb{J}$ to $\mathbb{J}$. In other words, $\tau \subseteq \mathbb{J} \times \mathbb{J}$.

Let τ be a graph transformation on $\mathbb{J}$. Define the τ-*graph* having $\mathbb{J}$ as its vertex set and for $G_1, G_2 \in \mathbb{J}$, there is a directed edge from G_1 to G_2 if and only if $(G_1, G_2) \in \tau$. If τ is symmetric, we have an undirected graph and if not, it is a directed graph.

Definition 2.2 For the positive integers m and n where $0 < m \leq \binom{n}{2}$, let $G(m,n)$ and $CG(m,n)$ be the class of all simple graphs and connected simple graphs, respectively, with m edges and n vertices. Let $G \in G(m,n)$ where $e \in E(G)$ and $e' \notin E(G)$. Then $G^{T(e,e')}$ is defined to be the graph with $V(G^{T(e,e')}) = V(G)$ and $E(G^{T(e,e')}) = E(G) - e + e'$. The notation $T(e, e')$ is called the *jumping transformation*.

Let $T_{(m,n)}$ be a relation on $G(m,n)$ defined by $(G_1, G_2) \in T_{(m,n)}$ if $G_1 \not\simeq G_2$ and G_2 be obtained from G_1 by a jumping transformation. Because $T_{(m,n)}$ is symmetric, $T_{(m,n)}$-graph is undirected. The $T_{(m,n)}$- graph induced by $CG(m,n)$ is called the $CT_{(m,n)}$- graph. Punnim proved that they are connected, see the following theorems and corollaries.

Theorem 2.3 (Punnim, 2007, pp. 103-114) Let $G_1, G_2 \in G(m,n)$. Then $G_1 = G_2$ or there is a finite sequence $T(e_1, e'_1)$, $T(e_2, e'_2)$, $\ldots, T(e_k, e'_k)$ for some integer k where $1 < k \leq \binom{n}{2}$ and $G_2 = G_1^{T(e_1,e'_1),T(e_2,e'_2),\ldots,T(e_k,e'_k)}$.

Corollary 2.3.1 (Punnim, 2007, pp. 103-114) $T_{(e,e')}$- graph is connected.

Theorem 2.4 (Punnim, 2007, pp. 103-114) Let $G_1, G_2 \in CG(m,n)$. Then $G_1 = G_2$ or there is a finite sequence $T(e_1, e'_1)$, $T(e_2, e'_2)$, $\ldots, T(e_k, e'_k)$ for some integer k where $1 < k \leq \binom{n}{2}$ and $G_2 = G_1^{T(e_1,e'_1),T(e_2,e'_2),\ldots,T(e_k,e'_k)}$.

Corollary 2.4.1 (Punnim, 2007, pp. 103-114) $CT_{(e,e')}$- graph is connected.

Definition 2.5 Let $\mathbb{G}$ be the class of all simple graphs and $\theta: \mathbb{G} \to \mathbb{Z}$. If $\theta(G_1) = \theta(G_2)$ for all graphs $G_1, G_2 \in \mathbb{G}$ with $G_1 \not\simeq G_2$, then θ is called a *graph parameter*.

Definition 2.6 Let $\mathbb{G}$ be the class of all simple graphs. A graph parameter θ is called an *interpolation graph parameter* over $\mathbb{J} \subseteq \mathbb{G}$ if there exist integer a and b such that $\{\theta(G) : G \in \mathbb{J}\} = [a,b] = \{x \in \mathbb{Z} : a \leq x \leq b\}$.

By Corollaries 2.3.1 and 2.4.1, the following theorems are true.

Theorem 2.7 (Punnim, 2007, pp. 103-114) Let $G(m,n)$ be the class of all simple graphs with m edges and n vertices. A graph parameter θ is an interpolation graph parameter over $G(m,n)$ if $\left|\theta\left(G^{T(e,e')}\right) - \theta(G)\right| \leq 1$ for all $G \in G(m,n)$ and for all jumping transformation $T(e,e')$ where $e \in E(G)$ and $e' \notin E(G)$.

Theorem 2.8 (Punnim, 2007, pp. 103-114) Let $CG(m,n)$ be the class of all connected simple graphs with m edges and n vertices. A graph parameter θ is an interpolation graph parameter over $CG(m,n)$ if $\left|\theta\left(G^{T(e,e')}\right) - \theta(G)\right| \leq 1$ for all $G \in CG(m,n)$ and for all jumping transformation $T(e,e')$ where $e \in E(G)$ and $e' \notin E(G)$.

Theorem 2.9 (Punnim, 2007, pp. 103-114) Let $\mathbb{J} \subseteq G(m,n)$ such that the subgraph of the $T_{(e,e')}$-graph induced by $\mathbb{J}$ is connected. Suppose that θ is a graph parameter over $\mathbb{J}$ and for each graph $G \in \mathbb{J}$, $\left|\theta\left(G^{T(e,e')}\right) - \theta(G)\right| \leq 1$ for all jumping transformation $T(e,e')$ where $e \in E(G)$ and $e' \notin E(G)$. Then θ is an interpolation graph parameter over $\mathbb{J}$.

As the result of Theorems 2.7 and 2.8, the graph parameter θ is an interpolation graph parameter over $G(m,n)$ and $CG(m,n)$ if we just proved that $\left|\theta\left(G^{T(e,e')}\right) - \theta(G)\right| \leq 1$ for all $G \in G(m,n)$ and $G \in CG(m,n)$, respectively. In 2007 and 2011, the graph parameters $a(G)$ have proved that it is an interpolation graph parameter over $G(m,n)$ (Khoployklang, 2008) and $CG(m,n)$ (Chaemchan, 2011), respectively, as shown in Theorems 2.10 and 2.11.

Theorem 2. 10 (Khoployklang, 2008, p. 52) Let $G \in G(m,n)$ and T be a jumping transformation on G. Then
$$|a(G^T) - a(G)| \leq 1 .$$

Theorem 2. 11 (Chaemchan, 2011, pp. 210-211) Let $G \in CG(m,n)$ and T be a jumping transformation on G. Then
$$|a(G^T) - a(G)| \leq 1 .$$

Theorem 2.12 Let T be a jumping transformation on $G \in G(m,n)$. Then
$$sa(G^T) \leq sa(G) + 1 .$$
Proof. Let $e \in E(G)$, $e' \notin E(G)$ and $T(e,e')$ be a jumping transformation on G. Suppose $sa(G) = k$. Because subgraphs of any graph cannot have star arboricity larger than the graph itself, if the edge e is removed from G, then $sa(G - e) \leq k$. It follows that $G - e$ can be partitioned into l subsets $E_1, E_2, \ldots, E_l$ each of which induces a star forest where $l \leq k$. Next, the edge e' is added into $G - e$. Then $G - e + e' = G^{T(e,e')}$, simply written as G^T. Consider the partition of the graph G^T into two cases.
Case 1. There exists a set E_i for some $1 \leq i \leq l$ such that a subgraph of G^T induced by $E_i \cup \{e'\}$ is a star forest. Then G^T can be partitioned into l subsets $E_1, E_2, \ldots, E_{i-1}, E'_i, E_{i+1}, \ldots, E_l$ each of which induces a star forest where $E'_i = E_i \cup \{e'\}$. This implies that $sa(G^T) \leq l$.
Case 2. A subgraph of G^T induced by $E_i \cup \{e'\}$ is not a star forest for all $1 \leq i \leq l$. Then G^T can be partitioned into $l + 1$ subsets $E_1, E_2, \ldots, E_l, E_{l+1}$ each of which induces a star forest where $E_{l+1} = \{e'\}$. Consequently, $sa(G^T) \leq l + 1$. ∎

Because $sa(G) - 1 \leq sa(G - e)$ and $sa(G - e) \leq sa(G - e + e') = sa(G^T)$, it follows that $sa(G) - 1 \leq sa(G^T) \leq sa(G) + 1$. This implies that $-1 \leq sa(G^T) - sa(G) \leq +1$. The following corollary is immediately obtained.
Corollary 2.12.1 Let $G \in G(m,n)$ and T be a jumping transformation on G. Then

$$|sa(G^T) - sa(G)| \leq 1 .$$

Theorem 2.13 Let T be a jumping transformation on $G \in G(m,n)$. Then

$$la(G^T) \leq la(G) + 1 .$$

Proof. Let $e \in E(G)$, $e' \notin E(G)$ and $T(e,e')$ be a jumping transformation on G. Suppose $la(G) = s$. Then the subgraph $G - e$ has $la(G - e) \leq s$ because subgraphs of any graph cannot have linear arboricity larger than the graph itself when the edge e is removed from G.

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Thus, $G - e$ can be partitioned into t subsets $E_1, E_2, \ldots, E_t$ each of which induces a linear forest where $t \leq s$. The edge e' is added into $G - e$. Then the result graph is $G - e + e' = G^{T(e,e')}$ written as G^T. Consider the partition of the graph G^T into two cases.

Case 1. There exists a set E_i for some $1 \leq i \leq t$ such that a subgraph of G^T induced by $E_i \cup \{e'\}$ is a linear forest. Hence, G^T can be partitioned into t subsets $E_1, E_2, \ldots, E_{i-1}, E'_i, E_{i+1}, \ldots, E_t$ each of which induces a linear forest where $E'_i = E_i \cup \{e'\}$. Hence, $la(G^T) \leq t$.

Case 2. A subgraph of G^T induced by $E_i \cup \{e'\}$ is not a linear forest for all $1 \leq i \leq t$. Then G^T can be partitioned into $t + 1$ subsets $E_1, E_2, \ldots, E_t, E_{t+1}$ each of which induces a linear forest where $E_{t+1} = \{e'\}$. This means that $la(G^T) \leq t + 1$. ∎

By Theorem2. 13, $la(G^T) \leq la(G) + 1$. Furthermore, $la(G) - 1 \leq la(G - e)$ and $la(G - e) \leq la(G - e + e') = la(G^T)$. This implies that $la(G) - 1 \leq la(G^T) \leq la(G) + 1$. Then $-1 \leq la(G^T) \leq la(G) + 1$. Consequently, Corollary 2.13.1 is obtained.

Corollary 2.13.1 Let $G \in G(m, n)$ and T be a jumping transformation on G. Then

$$|la_k(G^T) - la_k(G)| \leq 1 .$$

Theorem 2.14 Let T be a jumping transformation on $G \in G(m, n)$. Then

$$la_k(G^T) \leq la_k(G) + 1 .$$

Proof. Let $e \in E(G)$, $e' \notin E(G)$ and $T(e, e')$ be a jumping transformation on G. Suppose $la_k(G) = s$. Then the subgraph $G - e$ has $la_k(G - e) \leq s$ since subgraphs of any graph cannot have star arboricity larger than the graph itself when the edge e is removed from G. Therefore, $G - e$ can be partitioned into t subsets $E_1, E_2, \ldots, E_t$ each of which induces a linear-k-forest where $t \leq s$. Next, the edge e' is added into $G - e$. Then $G - e + e' = G^{T(e,e')}$, simply written as G^T. Consider the partition of the graph G^T into two cases.

Case 1. There exists a set E_i for some $1 \leq i \leq t$ such that a subgraph of G^T induced by $E_i \cup \{e'\}$ is a linear- k- forest. Thus, G^T can be partitioned into t subsets $E_1, E_2, \ldots, E_{i-1}, E'_i, E_{i+1}, \ldots, E_t$ each of which induces a linear-k-forest where $E'_i = E_i \cup \{e'\}$. Hence, $la_k(G^T) \leq t$.

Case 2. A subgraph of G^T induced by $E_i \cup \{e'\}$ is not a linear-k-forest for all $1 \leq i \leq t$. Then G^T can be partitioned into $t + 1$ subsets $E_1, E_2, \ldots, E_t, E_{t+1}$ each of which induces a linear-k-forest where $E_{t+1} = \{e'\}$. It follows that $la_k(G^T) \leq t + 1$. ∎

As a consequence of Theorem 2.14, $la_k(G^T) \leq la_k(G) + 1$. In addition, $la_k(G) - 1 \leq la_k(G - e)$ and $la_k(G - e) \leq la_k(G - e + e') = la_k(G^T)$. Therefore, $la_k(G) - 1 \leq$

$la_k(G^T) \leq la_k(G) + 1$. It is clear that $-1 \leq la_k(G^T) \leq la_k(G) + 1$. Hence, Corollary 2.14.1 is complete.

Corollary 2.14.1 Let $G \in G(m, n)$ and T be a jumping transformation on G. Then
$$|la_k(G^T) - la_k(G)| \leq 1 .$$

By combining Theorems 2.7, 2.10 and 2.11, and Corollaries 2.3.1, 2.12.1, 2.13.1 and 2.14.1, the following theorems are obtained.

Theorem 2.15 Let $G(m, n)$ be the class of all simple graphs with m edges and n vertices and a parameter $\theta \in \{a, sa, la_k\}$ where a, sa, la and la_k are the arboricity, star arboricity, linear arboricity and linear-k-arboricity of graphs, respectively. There exist integers $s = \min\{\theta(G) : G \in G(m, n)\}$ and $t = \max\{\theta(G) : G \in G(m, n)\}$ such that there is G $\in G(m, n)$ with $\theta(G) = r$ if and only if r is an integer satisfying $s \leq r \leq t$.

By combining Theorems 2.8, 2.10 and 2.11, and Corollaries 2.4.1, 2.12.1, 2.13.1 and 2.14.1, Theorem 2.16 are obtained.

Theorem 2.16 Let $CG(m, n)$ be the class of all connected simple graphs with m edges and n vertices and a parameter $\theta \in \{a, sa, la_k\}$ where a, sa, la and la_k are the arboricity, star arboricity, linear arboricity and linear-k-arboricity of graphs, respectively. There exist integers $p = \min\{\theta(G) : G \in CG(m, n)\}$ and $q = \max\{\theta(G) : G \in CG(m, n)\}$ such that there is G $\in CG(m, n)$ with $\theta(G) = k$ if and only if k is an integer satisfying $p \leq k \leq q$.

3. Some bounds of the Arboricity of Graphs

This section will summarize some bounds of the arboricity, linear arboricity and linear-k-arboricity of graphs, respectively. In 1989, Zhang and others proved the relation between the arboricity of a graph and its complement graph as the following theorem.

Theorem 3.1 (Zhang, Wang and Xu, 1989) For any graph G with order $n \geq 2$,

$$\lceil n/2 \rceil \leq a(G) + a(\overline{G}) \leq n.$$

Wang, Chen and Zhang proved the upper bound of $a(G) + a(\overline{G})$ are sharp (Jianfang, Chuanping and Zhongfu, 1998, pp. 28-35), see Theorem 3.2.

Theorem 3.2 (Jianfang, Chuanping and Zhongfu,, 1998, pp. 28-35) For any graph G with order n,

$$a(\mathrm{G}) + a(\bar{\mathrm{G}}) \leq \begin{cases} \left\lceil \frac{5n+4}{8} \right\rceil & \text{if } n \leq 4, \\ \left\lceil \frac{5n+5}{8} \right\rceil & \text{if } n = 7, \\ \left\lceil \frac{5n+6}{8} \right\rceil & \text{if } n = 10, \\ \left\lceil \frac{5n+7}{8} \right\rceil & \text{for other cases} \end{cases}$$

In 2008, Khoployklang proved the bounds of arboricity of graphs in terms of the number of edges and vertices of graph (Khoployklang, 2008) and the bounds are sharp as shown in Theorem 3.3.

Theorem 3.3 (Khoployklang, 2008, pp. 55-59) Let $G \in G(m, n)$. Then

$$\left\lceil \frac{m}{n-1} \right\rceil \leq a(\mathrm{G}) \leq \left\lceil \frac{2+\sqrt{2m-2}}{2} \right\rceil.$$

In addition, the sharp bounds of arboricity of connected graphs in terms of the number of edges and vertices of graph are determined by Chaemchan, see the following theorems.

Theorem 3.4 (Chaemchan, 2011, p. 214) Let $k \geq 2$ be an integer and $f(n, k) = 2(k-1)^2 - 2k + n + 2$. If $p \geq 2$ is an integer, then $a(\mathrm{G}) \leq p$ where $G \in CG(m, n)$ if and only if $f(n, k) \leq m \leq f(n, k+1)$.

Theorem 3.5 (Chaemchan, 2011, p. 215) Let $G \in CG(m, n)$. Then $\left\lceil \frac{m}{n-1} \right\rceil \leq a(\mathrm{G})$.

Next, the following theorems show the bounds of linear arboricity, in terms of maximum degree, for some classes of graphs determined by Gulden.

Theorem 3.6 (Guldan, 1986, pp. 505-509) If G is a graph with maximum degree Δ, then

$$\left\lceil \frac{\Delta}{2} \right\rceil \leq la(\mathrm{G}) \leq \left\lceil \frac{6}{5} \cdot \frac{\Delta}{2} \right\rceil \text{ if is even and}$$

$$\left\lceil \frac{\Delta}{2} \right\rceil \leq la(\mathrm{G}) \leq 1 + \left\lceil \frac{6}{5} \cdot \frac{\Delta-1}{2} \right\rceil \text{ if is odd.}$$

Theorem 3.7 (Guldan, 1986, pp. 505-509) Let G be an r-regular graph. If r is odd and $V(G) \leq r + 2$ or r is even and $V(G) \leq r + 3$, then $la(\mathrm{G}) = \lceil (r+1)/2 \rceil$.

In 2001, Alon, Teague and Wormald determined the upper bound on the linear-k-arboricity of r-regular graphs using a probabilistic argument (Alon, Teague and Wormald, 2001, p. 12), see Theorem 3.8.

Theorem 3.8 (Alon, Teague and Wormald, 2001, p. 12) There is an absolute constant $\ell > 0$ such that for every r-regular graph G and every $\sqrt{r} > k \geq 2$,

$$la_k(\mathrm{G}) \leq \frac{(k+1)r}{2k} + \ell\sqrt{kr \log \ell}$$

Moreover, Chen and Huang provided the lower bound on linear-k-arboricity of K_n and $K_{n,n}$ (Chen and Huang, 2002).

Theorem 3.9 (Chen and Huang, 2002, pp. 54-55) Suppose $n > i \geq 2$ and let $\lceil n/i \rceil - 1 \leq k \leq \lceil n/(i-1) \rceil - 2$. Then $la_k(K_n) \geq \lceil n(n-1)/2(n-i) \rceil$ and the equality holds in case that $i = 2$.

Theorem 3.10 (Chen and Huang, 2002, pp. 54-55) Suppose $2n > i \geq 2$ and let $\lceil 2n/i \rceil - 1 \leq k \leq \lceil 2n/(i-1) \rceil - 2$. Then $la_k(K_{n,n}) \geq \lceil n^2/2n - i \rceil$ and the equality holds in case that $i = 2$.

3. Conclusion

This article has shown that the arboricity, star arboricity, linear arboricity and linear-k-arboricity of graphs are interpolation graph parameters over the class of simple graphs and connected graphs with m edges and n vertices.

This implies that for a parameter $\theta \in \{a, sa, la_k\}$ where a , sa , la and la_k are the arboricity, star arboricity, linear arboricity and linear-k-arboricity of graphs, respectively, there are integers $s = \min\{\theta(G) : G \in G(m,n)\}$ and $t = \max\{\theta(G) : G \in G(m,n)\}$ such that there exists $G \in G(m,n)$ with $\theta(G) = r$ if and only if r is an integer satisfying $s \leq r \leq t$. Furthermore, there exist integers $p = \min\{\theta(G) : G \in CG(m,n)\}$ and $q = \max\{\theta(G) : G \in CG(m,n)\}$ such that there is $G \in CG(m,n)$ with $\theta(G) = k$ if and only if k is an integer satisfying $p \leq k \leq q$.

In addition, some bounds on arboricity, linear arboricity and linear-k-arboricity of graphs are presented. Some of them has been shown in terms of maximum degree of a graph. The bounds on arboricity of simple graphs and connected graph in terms of m edges and n vertices are determined. Especially, those bounds are sharp.

There are many interesting problems that remain unproved such as the intermediate value theorems for the star arboricity, linear arboricity and linear-k-arboricity of the class of regular graphs. Moreover, the bounds on star arboricity, linear arboricity and linear-k-arboricity of graphs in terms of m edges and n vertices are also draw interest towards further investigation. The study of arboricity of a graph is to consider how dense of a graph is. If a graph has several edges, then it has high arboricity. This implies that a graph has a dense subgraph. The computing of arboricity of graphs can be expressed as a special case of the matroid partitioning problem, the one concerning a mathematical topic of the matroid and used in analysis and design of algorithms in computer sciences. Therefore, the properties of arboricity of graphs can be utilized in solving the matroid partitioning problem.

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FORMATION OF 3-DIMENSIONAL BIO-COMPOSITE FROM LOCAL MUSHROOM MYCELIA

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Abstract: A mycelium-based bio-composite is composed of fungal mycelia and natural fibers. This type of material is also used in the architecture and design industry. In this study, it aims to choose 4 types of local mushroom species (*Pleurotus ostreatus, Lentinus polychrous, Lentinula edodes,* and *Flammulina velutipe*) and two types of substrates (coconut husk and rice husk) to test the growth of the mushroom mycelia and form 3-dimensional bio-composites. There were two different experiments, the measurement of the mushroom growth in the substrates in test tubes and the formation of the 3D bio-composites. In the first experiment, it suggested that *P. ostreatus* grew on the coconut husk (5.6 ± 0.53 cm at day 15) significantly better than the others ($p \leq 0.05$). On contrary, the mycelial growth of all mushrooms in the rice husk was not satisfying because they stopped growing after day 4. Thus, in the test tubes, it can be said the coconut husk was the substrate significantly better than the rice husk to grow the mushrooms ($p \leq 0.05$). However, to form the 3D bio-composites, the result turned out to be different. *L. polychrous* was the mushroom species that could grow and colonize in the bottles containing rice husk better than the others. Thus, the successful formation of 3D mycelial bio-composite was from the combination of *L. polychrous* and rice husk. This research provided the results for further experiments on large-scale 3D bio-composite production and mechanical properties tests.

Keywords: Mushrooms, Agricultural wastes, Green materials

1. Introduction

Buildings keep growing every year for demanding of people's lifestyle, but they also produce construction wastes such as glasses, woods, concretes, steels, bricks, or plastic materials, etc. They become influential factors to environmental sanitation and people. Scientists try to find solutions to innovate the use of biological resources to replace non-renewable resources. Because of the increasing demand for "green" materials and productive processing, scientists have been developed the new method and product called bio-composite and bio-based

materials (Girometta et al., 2019, pp. 11-22). Such biomaterials are made from bacteria, algae, or fungi, and they are progressively used to produce different bio-based innovations nowadays (Karana et al., 2018, pp. 119–136).

Agriculture is an important economic factor to develop the country. Composting is a recycling system of organic wastes in association with beneficial microorganisms of specific temperature and aeration to obtain useful organic fertilizers to restore soil fertility and improve the crop (Oyewole, 2016, pp. 511–521). The usefulness of agriculture wastes has been acknowledged by researchers and scientists in different science fields (Nguyen et al., 2019, pp. 1039–1051). Bio-composites from agriculture wastes for growing mushrooms are coconut husk, rice husk, rice straws, or coffee husk. Rice husk composts with soil mixture to improve the yield of many crops effectively as a good fertilizer to rice under diverse irrigation periods (Aliyu et al., 2011, pp. 74–79). The mixture of poultry waste and coconut husk are composites to speed up the decomposition and improve the crop products (Anbuselvi & Kumar, 2017, pp. 94–96).

Most people have general knowledge mushrooms can be food and medicines, but they do not know fungi play important roles in bioproduction. Mycelium is essential to provide nutrition to the soil, and it also plays a key role in ecosystems in the environment (Stamets, 2005, pp. 103–110). A mycelium-based composite is a combination of natural fibers and mycelium which is used as a binding compound, and it has successfully replaced nonrenewable materials (Travaglini et al., 2013, pp. 517–535). Mycelium is from fungi including mushroom. Various types of mushrooms have been used to produce composites. For instance, *Pleurotus ostreatus* was cultured with supplements for cultivating the mycelium on wheat bran to produce materials as masonry in construction and this mycelium-based composite was tested for compressive strength (Ghazvinian et al., 2019, pp. 505–514). In the article of Tacer-Caba et al., (2020, p. 108728), *Lentinula edodes* and *Flammulina velutipes* were grown on Petri dishes and fed on oat husk as mycelium composites for density measurement, and they were determined for dynamic mechanical properties to analyze the potential of the composites for sustainable materials.

Due to these effective promising properties of agriculture wastes and mushrooms, therefore the preparation of bio-composites obtained from local mushrooms mycelia, *Pleurotus ostreatus, Lentinula edodes, Flammulina velutipes*, and *Lentinus polychrous* and agricultural wastes (rice husks and coconut husks) as growth substrates were interesting to be achieved in this study.

2. Objectives of the study

2.1 To collect and isolate 4 local mushrooms, *P. ostreatus, L. edodes, F. velutipes* and *L. polychrous* to test for the growth on two different substrates, rice husks, and coconut husks.
2.2 To form the 3D mycelium composites from the collected mushrooms and the substrates.

3. Literature review

The construction sector becomes the main factor to develop the country and earn benefits, but construction wastes are harmful to the environment and human society. Researchers and scientists take this challenge and innovate bio-composites which are from different living

organisms e.g. algae, fungi, and bacterial as biomaterials in order to reduce the environmental impacts.

3.1 Construction wastes

The construction sector has become a key role for countries all over the world for development. It also reflects their countries economic growth based on this sector. However, it leads to an increase in the number of construction wastes and landfills for disposal too. Material wastes consist of glasses, concretes, ceramics, roof tiles, steels, soil, woods, bricks, or plastic materials, etc. Construction materials will become wastes when they are no longer considered of value to retain, and they are also difficult to be recycled. Construction wastes are considered as solid pollution harmful to the environment. Moreover, fossil fuel-based materials which are known as nonrenewable resources, also serve as building materials. If people use them until they reach the limitation, those resources can be lost infinitely because they take a million years to restore themselves again. In the EU, the construction waste quantities were caused by more than 700 million tons per year (Iacoboaea et al., 2019, pp. 30-52). Malaysian government reported that Hulu Selangor district was found about 39.3% of construction wastes (Nagapan et al., 2012, pp. 325-330). In 2005, construction wastes in the UK about 28 million tons were thrown into landfills and Australia disposed of about 7 million tons of construction wastes from 2006 to 2007 (Fadiya et al., 2014, pp. 1-9).

3.2 Alternative biodegradable materials

Scientists produce bio-materials from bio-composite processing to replace petroleum and plastic products in the construction sector to reduce wastes. In this research, four biodegradable materials are taken to describe what they are, and how to produce them. Nowadays, scientists start to replace nonrenewable materials with these biomaterials.

3.2.1 Bacteria-based material

Concretes are used as materials in construction all around the world. They play an important role to support buildings, roads, bridges, and houses, etc. However, concretes cannot avoid cracks. Scientists found a new technology which could heal the cracks by expedited calcium carbonate ($CaCO_3$) called bacteria-based self-healing. Bacterial-based self-healing is an innovative technology which uses $CaCO_3$ to repair open micro-cracks in concretes (Nguyen et al., 2019, p. 103340). Such carbonates (CO^{2-}_3) and $CaCO_3$ were produced by bacteria which were useful healers due to high consistent with cement compositions to heal cracks of concretes both interior and exterior (Seifan et al., 2016). During casting the concretes mixtures, spores of a bacterium named *Sporosarcina pasteurii* was mixed with nutrients, then spores produced $CaCO_3$ and exposed to moisture and air for sealing the cracks (Xu et al., 2018, pp. 5-11).

3.2.2 Desert sand concrete

Desert sand is a renewable resource of natural crushed rocks. It is used to produce non-toxic, low-carbon, and naturally decomposed concretes and plays a significant role in high demand construction development (Zhang et al., 2019, pp. 1-18). The main ingredients were followed: fly ash, desert sand with the modulus of 0.721, polyvinyl alcohol fiber (PVA), superplasticizer,

and freshwater. These chemical compositions were developed desert sand concretes (Che et al., 2019, pp. 238-245).

3.2.3 Bio-based plastic

Bio-based plastic or bioplastic is another newly innovated material which can be applied in industries, agriculture, or constructions to replace nonrenewable resources. Bioplastic is "biobased, biodegradable, or can be both" which its carbon is produced from a renewable plant or animal source (Özdamar & Ateş, 2018a, pp. 1-9). The mixture was molded with $15 \times 15 \times 15$ cm steel-concrete molds, formed from starch, heated below 95^0C in a hot plate, then dried in an oven to produce the bioplastic (Özdamar & Ateş, 2018b, pp. 249-260).

3.2.4 Mycelium-based materials

There is another new technology called mycelium-based material to innovate bioproduct to replace the nonrenewable product and reduce wastes too. Mycelium-based composite is the result of the structure of filamentous fungi or mushrooms species grow on different natural fibers to produce bio-materials or 3-D structure mushroom (Appels et al., 2019, pp. 64-71). Mycelium-based materials can be applied for industrial materials as biodegradable alternative resource to develop a broad scope of production in the fields of architectures and industrial design such as bricks to walls (Attias et al., 2017, pp. 2-11).

3.3 Mushrooms

Mushrooms are classified in Kingdom Fungi, and they have a part functioning as a reproductive structure which springs up from the ground like plants, and roughly equivalent like flowers (Nicolas & Ogamé, 2006, p. 223). They are neither plant nor vegetation, but they either single-cell, multi-cellular, or spores outgrowth structure including molds, yeasts, and mushrooms which are fed on natural fibers (Jones et al., 2017, pp. 241-257). Mycelium is an association of interwoven and sting-like fungal hyphae which composes the vegetation part of mushroom growth by stretching and splitting their hyphae into substrates (Karana et al., 2018, pp. 119-136). In this study, 4 different local mushrooms for the experiment were chosen. First, *Pleurotus ostreatus* or oyster mushrooms are classified in Family Pleurotaceae, originated from China, and they have been distributed worldwide as a common tasty mushroom and grow commercially around the world as a food source (Piska et al., 2016, pp. 484-518). Secondly, *Lentinula edodes* or shiitake mushrooms are in Family Omphalotaceae as edible mushrooms from India to East Asia. They have been cultivated worldwide, popular for cooking and known as value traditional medicines in Asian countries too (Cassileth, 2011, pp. 1-3). Thirdly, *Flammulina velutipes* or enoki mushrooms are in the family Physalacriaceae. They are white, long, and thin tasty mushrooms are known for nutritional value and popular ingredients in Asian cuisines such as China, Japan, or Korea (Mahfuz et al., 2018, pp. 705-711). Finally, *Lentinus polychrous* are in Family Polyporaceae, a native edible mushroom from India to southeast Asia, and they can be found in every region of Thailand; especially, in northeastern and northern Thailand as popular medicinal fungi and the cell wall of this mushroom contains polysaccharides possessing the health beneficial property and ligninolytic enzymes used in the biotechnological and environmental application(Sharma et al., 2015, pp. 1-16; Fangkrathok, 2019, pp. 49-57).

3.4 Culturing and growth

The growth of mushrooms is associated with different factors including temperature, moisture, and media. Potato Dextrose Agar (PDA) is common for culturing fungi. The ingredients of PDA were followed: potato 200 g, dextrose 200 g, agar 20 g, and distilled water 1,000 ml. Media and Petri dishes were autoclaved at 121^0C for 30 min. Mushroom's inner parts were placed in PDA Petri dishes and incubated at a temperature dark room. Substrates were autoclaved for 30 min at 121^0C before inoculating. The water content was measured at the beginning of the experiment to test whether the substrate contained about 65% of water for fungal growth (Attias et al., 2017, pp. 505-514). Jones et al., (2017, pp. 241-257) reported inoculation conditions had an important consequence to increase fungi growth rate on substrates from 5 to 14 days. Also, the temperature was important for the initial growth rate between 18 to 22^0C. Mycelium of *Pleurotus ostreatus* and *Pleurotus cystidiosus* were maintained in these different media including Potato Dextrose Agar (PDA), Sweet Potato Dextrose Agar Medium (SPDA), Yam Dextrose Agar Medium (YDA), and Malt Extract Agar Medium (MEA) to measure for 8 days. PDA (9.00 ± 0.00 and 3.92 ± 0.05 cm) and YDA (9.00 ± 0.00 3.98 ± 0.09 cm) were suitable for the mycelium growth of both species (Hoa & Wang, 2015, pp. 14-23).

3.5 Mycelium bio-composites

Bio-composite is classified as green material consisting of natural fibers which are biodegradable (Dicker et al., 2014, pp. 280-289). Scientists have used bio-composites and investigated their properties e.g. density, modulus, natural fiber composites, toughness, thermal conductivity, high temperature, and so on (Nusyirwan et al., 2019, pp. 1-11). A mycelium brick as one of the bio-composites is formed from agriculture waste with the mycelium to produce 3D structure (Santhosh et al., 2018, pp. 3066-3068). They can be used as materials with strong flexure and non-flammable building materials which can release less smoke and CO_2 (Jones et al., 2018, pp. 816-825). Nowadays, the architectural and construction industry has recently taken interest in using mycelium bricks to replace clay bricks. They are known as environmentally friendly material while clay bricks are produced from muddy clay which is the result of deforestation and harmful to the environment and human (Kishan et al., 2018. pp. 484-518)

3.6 Agriculture waste for mycelium growth

Agriculture waste is defined as the non-product output of production from cultivating and agricultural activities such as grains, vegetables, or crops (Obi et al., 2016, p. 957). Agriculture has expanded three times over the past 50 years due to the development of land, agricultural needs, mechanical improvement, and population expansion which approximately result in 23.7 million tons of agriculture products per day globally (Duque-Acevedo et al., 2020, p. 1-22). Around 80% of solid wastes are from farms in form of organic decay, so agricultural wastes such as straw, coconut shells, and others are contributing varieties of helpful materials for many purposes (Nguyen et al., 2019, pp. 1039-1051). In this review, there are 2 agricultural wastes, coconut husk, and rice husk to be mentioned.

3.6.1 Coconut husk

Coconut husk or coir is a natural fiber from the outer part between the hard-inner shell and the external part of a coconut. In a study by Christita & Suryawan, (2018, pp. 35-41), pieces of coconut husk were cut (1.2 cm × 0.5 cm) and disinfected with 70% alcohol and 10% hypochlorite before placed into culture medium tubes and incubated with *Pleurotus ostreatus* at 28^0C and the average length of mycelium grew 14.5 cm on 28 days. Following a study by Albuquerque et al., (2016, pp. 1767-1775), coconut husk pieces (1.2 cm × 0.5 cm) were disinfected with 70% alcohol and 10% hypochlorite, placed onto PDA culture medium, and incubated with *Aspergillus niger* and *Trichoderma reesei* at 28^0C for 14 days to enhance the hydrolytic activity for ethanol production from disposed of coconut husk.

3.6.2 Rice husk

The rice husk or rice hull is the coat on the grain of rice. This agricultural waste is also a supplement for fostering the growth of a mushroom. In the study by Arifin & Yusuf, (2013, pp. 504-508), rice husk were prepared and filled in the test tubes and sterilized at 121^0C for around 15 min and they left samples cool for 24 hours before physical properties testing. Researchers found that the specimens had high density because rice husk was lighter than wheat grain. Moreover, in the study by Hanai et al., (2005, pp. 123-127), 3 kg of rice husks were crushed until they became powder and could absorb 18-liter of methanol and kept at room temperature for two weeks. Then, the powder was weighted for 10 mg to put into a Petri dish and co-cultured with *Coprinopsis cinerea*, *Grifola frondosa*, *Lentinus edodes,* and *Pleurotus eryngii* at 80 mg/ml concentration to compared with non-treated methanol rice husk. It showed that the fungal mycelia could be stimulated to grow more in rice husk treated with methanol compared to non-treated ones.

4. Research Methodology

In this research, the two natural fibers were selected as substrates for growing the mycelium, coconut husk and rice husk. The 4 mushrooms obtained from the local market in Thailand were *Pleurotus ostreatus* (Oyster mushroom), *Lentinula edodes* (Shiitake mushroom), *Lentinus polychrous*, and *Flammulina velutipe* (Enoki mushroom). Then, the mushrooms were isolated for pure cultures and grown on two substrates, rice husk and coconut husk for producing the bio-composites.

4.1 Specimen isolation

Each mushroom species was isolated for the pure mushroom mycelia. Small tissues (1×1 mm^2) inside the fresh mushrooms were taken using sterile surgical blades. Then, they were placed on Petri dishes containing potato dextrose agar (PDA). The plates were kept at room temperature for 7 days to let the fungi grow under dark conditions. The mycelia growing from the mushroom tissues were isolated on the new PDA to obtain the pure culture for another 7 days and stored at room temperature for further experiment.

4.2 Mushroom growth on the substrates in test tubes

Coconut husk and rice husk were autoclaved for 30 min in 121^0C. Then, the substrates were weighted for 2 g and put into the sterile tube before adding 1 ml of distilled H_2O in substrates to moist them. After that, the mycelium plugs of each mushroom species from the previous experiment were placed on top of the substrate. This was achieved in 5 replicates. Then, they were kept for 15 days for mycelium growth at room temperature. The mycelium growth in both substrates was measured and recorded every 3 days.

4.3 Mushroom growth on the substrates in boxes

Twenty-four boxes were prepared for coconut husk and rice husk. Each autoclaved substrate was weighted for 20 g and put into the boxes. Then, 12 pieces of mycelium plugs of each mushroom species were transferred to each substrate before adding 10 ml of distilled H_2O in the boxes to provide moisture for the mushrooms. Then, the visual observation of the mushroom growth inside the substrates was determined for the formation of mycelium bio-composites.

4.4 Mycelium bio-composite in substrates bottles

Apart from boxes, glass bottles with the substrates were also prepared for the mushroom species. The substrates (10 g) were put in the bottles and autoclaved. Before inoculating the mushroom mycelia into the bottles, the mycelium from the first experiment was transferred in potato dextrose broth (PDB) and agitated at 160 rpm for 7 days. Then, the mushroom mycelium growing in PDB was transferred in the provided bottles to visually observe the successful formation of mycelium bio-composites.

4.5 Statistical Analysis

The growth of the mushroom mycelia was measured for 15 days. The average lengths of the samples were compared by using the T-test and analysis of variance (ANOVA) ($p \leq 0.05$) in Statistical Package for the Social Sciences (SPSS) to find significant differences.

5. Results

5.1 Mushroom growth on the substrates

This experiment was conducted to measure the mycelia growth of each mushroom on the substrates as shown in Figure 1. The average distances of the mycelia were compared in two aspects as follows.
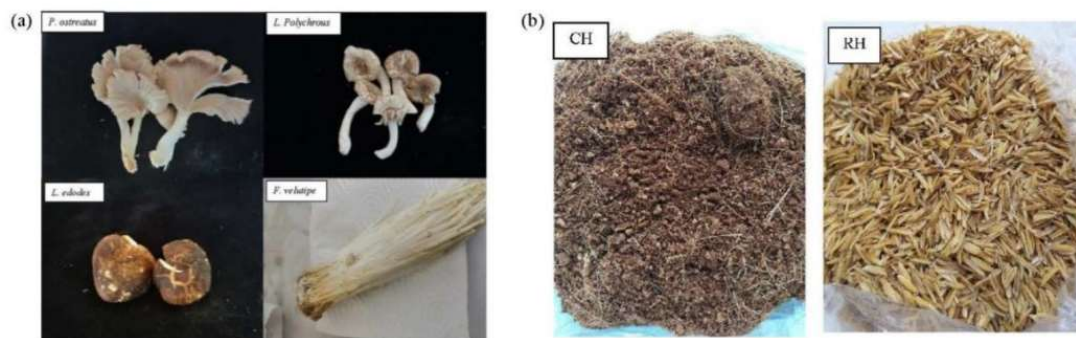
Figure 1. Collected mushrooms and substrates; (a) *Pleurotus ostreatus*, *Lentinus polychrous*, *Lentinula edodes* and *Flammulina velutipe* and (b) Coconut husk (CH) and rice husk (RH).

5.1.1 The growth of all mushrooms in each substrate

Mycelium growth of the mushrooms on each substrate was measured for 15 days. According to the results shown in Figure 2 on coconut husk, the average growth of *P. ostreatus* was 5.60 ± 0.53 cm statically faster than *L. polychrous* (3.04 ± 0.65 cm), *F. velutipe* (5.38± 1.15 cm), and *L. edodes* (2.30 ± 0.15 cm) ($p < 0.05$). It can be said the mushroom, *P. ostreatus* was the best one on this substrate. However, on the rice husk, the growth of *F. velutipe* was 1.48 ± 0.24 cm which was significantly better than the others ($p < 0.05$) as shown in Figure 3. The growth of all mushroom able to travel through the rice husk was found to stop at day 4 for *F. velutipe* (1.48 ± 0.24 cm) and at day 1 for *P. ostreatus* (1.14 ± 0.54 cm), *L. edodes* (0.44 ± 0.60 cm) and *L. edodes* (0.20 ± 0.04 cm).
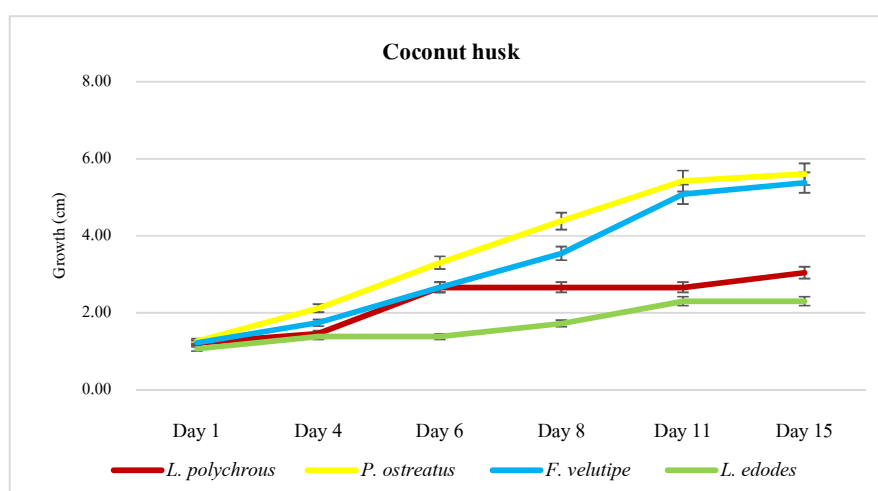
Figure 2. Average growth of 4 mushroom species in coconut husk for 15 days.
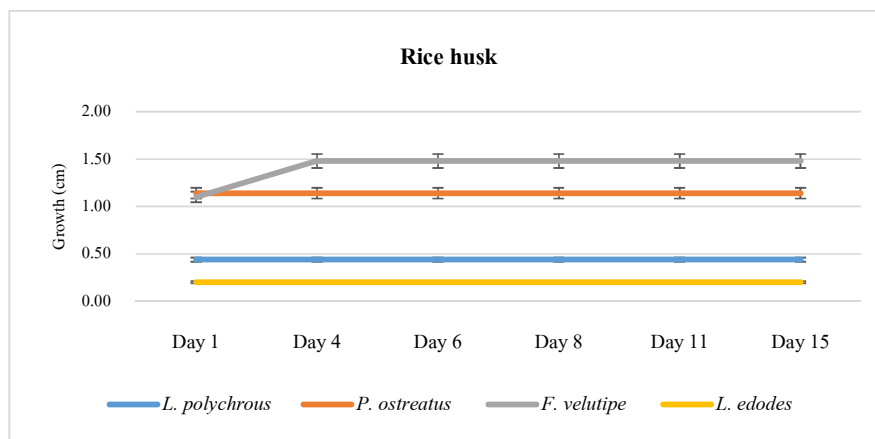
Figure 3. Average growth of 4 mushroom species in rice husk for 15 days.

In the test tubes, the mushroom mycelium in rice husk did not grow well because their lengths were still the same from the fourth day meaning that the coconut husk could keep moisture for the mycelium to grow. Especially, the mycelium of *P. ostreatus* mushroom was the best one from day 1 until day 15. In comparison with coconut husk, this substrate was not able to maintain the moisture long enough for the mycelium to grow.

5.1.2 The growth of each mushroom in the substrates

Based on the graph below (Figure 4), *L. polychrous* was able to grow better in coconut husk than rice husk based on the T-test ($p<0.05$) at all time intervals. For *P. ostreatus,* the result was also the same, significant growth in the coconut husk compared to the rice husk. However, *F. velutipe* and *L. edodes* grew quite slow in coconut husk and they grew only on the first day in the rice husk. Then, they stopped growing. In conclusion, based on the statistical test, the growth of *P. ostreatus* was the best among all mushrooms in the test tubes containing the coconut husk substrate.

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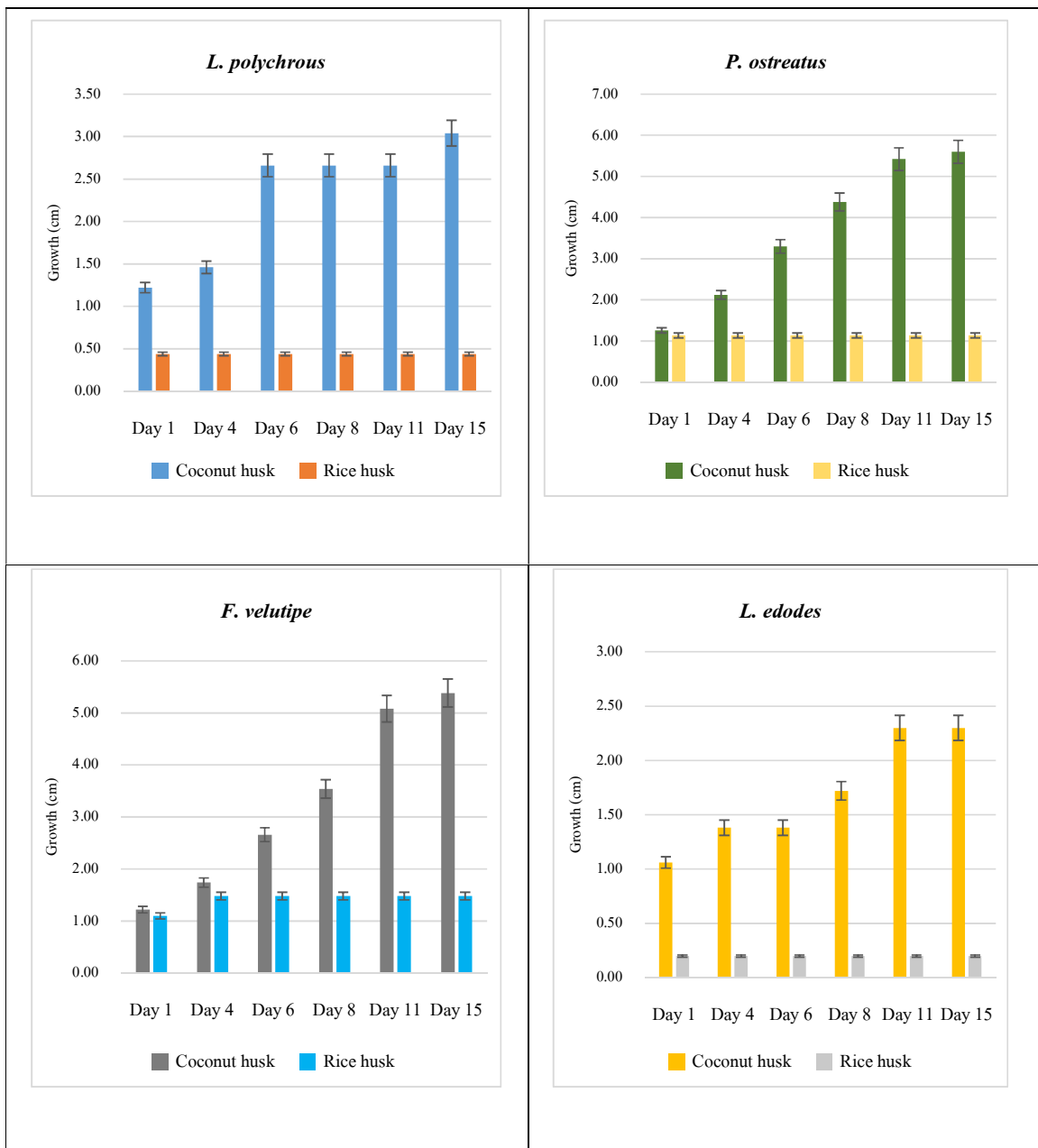
Figure 4. The growth of each mushroom species in coconut husk and rice husk for 15 days.

5.2 Formation of mycelium bio-composite

5.2.1 Mycelium bio-composites in substrate boxes

According to the results of this experiment based on visual observation, the mycelium of the mushroom was able to travel better in the boxes with rice husks. Presumably, the rice husk particles were larger than coconut husk. Because of this, it could provide rooms with oxygen for the mushroom mycelium. Therefore, the mycelium was able to grow throughout this substrate box. Also, rice husk contains 20% silica. The mushrooms could absorb it as a fertilizer to improve the growth (Sekifuji & Tateda, 2019, pp. 1–9). So, the mushroom mycelium grew better in the boxes with rice husk because of the better moisture level, nutrients, and air exchange (Owaid et al., 2015, p. 59). The coconut husk could also keep moisture for many days in boxes, but this substrate was heavier. The particles were powder-like which became very dense when water was added. This might lead to the insufficient level of oxygen for the mycelium to form the network. These results were different from the previous experiment. Even though the mycelium grew faster in the rice husk, but the contamination was found in all boxes. Assumingly, the water level was high in substrates and trapped in the boxes which could bring other bacterial and fungal contamination in the samples easily. Also, a high moisture level in the substrates results in the disrupted respiration of the mycelium and impossibility of the improvement of fungal bodies which could develop non-desired organisms such as bacteria and fungi (Bellettini et al., 2019, p. 108728). Thus, this experiment was unable to find the conclusion which one of the mushroom species and substrates were suitable for the 3D bio-composite formation.

5.2.2 Mycelium bio-composite in substrates bottles

In this experiment, mycelium was cultured with the substrates contained in the bottles. To avoid the contamination, the bottles with the substrates were autoclaved before adding the mushroom mycelium. After 30 days, the mycelium of *L. polychrous* and *P. ostreatus* mushrooms could grow and colonize thoroughly in the rice husk but very slowly in coconut husk bottles (Figure 5). On contrary, *F. velutipe* and *L. edodes* was unable to colonize their fibrous bodies throughout both substrates. The most effective of mycelium growth in this experiment to form the 3D materials was *L. polychrous* among the four species because *L. polychrous* was able to bind the rice husk particles and formed into 3D structures, but *P. ostreatus* could not do this (Figure 6). This experiment was successful to produce the 3D mycelium blocks.

Figure 5. Mycelium of *L. polychrous* and *P. ostreatus* (oyster) mushroom in rice husk bottles and coconut husk bottles.

Figure 6. Mycelium bio-composites derived from *L. polychrous* in rice husk.

6. Discussions and conclusions

Based on the graph of mycelium growth on the substrates (Figure 2 and Figure 3), coconut husk has a higher amount of fiber called lignocellulose influential to the growth of the mycelium in the test tubes and the particles of the coconut husk was small which could hold the moisture longer than the rick husk. Also, the morphology of coconut husk was similar to the host tree or the natural habitat of *P. ostreatus*, and it had more powder to keep the humidity for the mycelium to grow (Albuquerque et al., 2016, pp. 1767–1775; Christita, 2018, pp. 35–41). These were the reasons why *P. ostreatus* grew faster than other species. On the other hand, the rice husk could be dried up quickly bringing about less humidity for mycelium growth. An article of Chukwurah et al., (2012, pp. 8979-8985), reported that *P. ostreatus* grew on different substrates: maize straw, maize cob, palm kernel cake, sawdust, spent grain, rice bran, lime, and water. The fastest mycelia growth was respectively found in these following substrates; sawdust, palm kernel cake, and maize cob because they were known as proteinaceous nutrients to support mycelia and mushroom growth. Less than 50% of mycelial growth rate was detected in the other substrates because these waste materials lacked the protein matter or other factors

such as the structure or physical properties suitable for the mushroom to grow. So, *P. ostreatus* performed better when cultivated in lignocelluloses rich waste materials. In agreement with articles by Albuquerque et al., (2016, pp. 1767–1775); Christita, (2018, pp. 35–41), and Chukwurah et al., (2012, pp. 8979–8985), *P. ostreatus* grew better than the other three species in coconut husk because coconut husk was known as the lignocellulose substrate.

In addition, fungal growth also depends on methods and techniques in order to produce the 3-dimensional mycelium bio-composites. For instance, mycelium bricks used in construction such as a small house and teahouse are made from the combination of fungal or mushroom mycelium and agriculture wastes (Karana et al., 2018, pp. 119-136). Based on the article by Xing et al.,(2018, pp. 2-8), different species of the mushroom had different growth patterns in the substrates. Also, there are several factors to consider for the material products such as conditions for rapid mycelium growth in the substrates, rates of substrates decay, and methods to stop the colonization of the fungi and other microorganisms. The growth rate of the mushroom mycelium is one of the factors to be considered when forming the 3D bio-composites because each fungus is different in their colonization strategies. According to the article by Kishan et al., (2018, pp. 484-518), the mycelium was transferred in the brick mold for growing and leave for one week in a dark place. Then samples were dried and heated to stop the bacterial growth and let them get hardened. After the bricks got hardened, they were heated again to sterile the bricks before testing the properties. Thus, in this study, the 3D mycelium-based bio-composites successfully derived from *L. polychrous* mushroom and rice husk will be produced in a larger number and tested for the properties.

The finding of this research provides information on the mycelium-based bio-composite as an alternative material to reduce the use of nonrenewable ones including developing a new concept of green material. Even though this research does not provide the final product as mycelium brick, the mushroom species, and substrate suitable for producing 3D materials were found. Even though *P. ostreatus* mushroom grew very well in the test tubes containing the coconut husk but it could not perform the ability to produce the 3D composite. Instead, *L. polychrous* was able to keep growing in the bottles containing the rice husk and successful to give the desired 3D composites. The conditions to form the 3D materials reported in this study will be used to produce a larger number of the mycelium composites for testing mechanical properties.

7. Acknowledgements

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AN EXPLORATORY STUDY ON THE 2 X 2 ACHIEVEMENT GOAL MODEL OF UNIVERSITY STUDENTS' MOTIVATION TO EXERCISE

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Abstract: For many years, many researchers have tried to understand what motivates people to exercise. Despite the many benefits that regular exercise brings to us, many people still choose to avoid it. "The higher, the better" relationship between motivation to exercise and health have remarkable benefits for everyone, regardless of gender and educational levels. The 2 x 2 achievement goal model includes master-approach, mastery-avoidance, performance-approach, and performance-avoidance used widely to explain exercise contexts, especially in explaining why people want to approach or avoid exercise. Achievement goal theory is considered a critical motivation theory that motivates people to stick with their exercise routines. Unfortunately, only 42.4% of Thai adults met the recommended level of exercise proposed by the World Health Organization, and 33.8% had a very high level of physical inactivity. As a result, the purpose of this study was to explore the 2 x 2 achievement goal orientations among university students in longitudinal research to develop appropriate physical activity programs and promotions to satisfy university students' needs. Males reported significantly higher levels in mastery-avoidance and performance-approach than females. There is no difference in the 2 x 2 achievement goal orientations between educational levels.

Keywords: Achievement goal theory; university students; motivation; longitudinal

1. Introduction

Over twenty years, researchers worldwide commonly used the 2x2 achievement goal model to thoroughly answer why many individuals want to approach or avoid exercise (Lochbaum, Zanatta, & Kazak, 2020; Stevenson & Lochbaum, 2008). This framework calls the Hierarchical Model of Approach and Avoidance Achievement Motivation to measure achievement motivation outcomes, such as emotions and behaviors. An individual who focuses on the success of a task or improvement of a goal calls task-orientation, while an individual who focuses on winning or better performance than others calls ego-orientation. A 2 x 2

achievement goal model which described positive versus negative dimension as "approach" or "avoidance" was proposed by Elliot (1997) to measure an individual's task and ego orientations as "mastery" or "performance" orientations (Elliot & McGregor, 2001). This model has been using popularity in sports, physical education settings, and physical activity to understand achievement motivation in these contexts (Lochbaum & Gottardy, 2015; Lochbaum, Jean-Noel, Pinar, & Gilson, 2017). For example, females would endorse both mastery and performance-avoidance than males; males prefer performance approach than females; physical education classes would endorse avoidance goals more than participants competing in sports and physical activities (Lochbaum et al., 2020). The achievement goal theory is also a conceptually critical motivation theory to understand colleges' and universities' exercise motivation in educational settings, too (Zhang, Xiang, Gu, & Rose, 2016). Unfortunately, only 42.4% of Thai adults met the recommended level of exercise proposed by the World Health Organization, and 33.8% had a very high level of physical inactivity (Liangruenrom et al., 2017). That is why there is a need to understand and assess why so many participants avoid exercising, especially college and university students (Liangruenrom, Craike, Biddle, Suttikasem, & Pedisic, 2019; Nicholls, 1989). There is no research to understand applying the 2x2 achievement goal orientations among university students in a longitudinal study, particularly the differences between gender and educational levels.

2. Research Objectives

The purpose of this study was to explore the 2 x 2 achievement goal orientations among BUUIC students in longitudinal research to develop appropriate physical activity programs and promotions to satisfy university students' needs with the following questions:

1. Are there any differences between gender in master-approach, mastery-avoidance, performance-approach, and performance-avoidance?
2. Are there any differences between educational levels in master-approach, mastery-avoidance, performance-approach, and performance-avoidance?

3. Literature Review

Physical activity plays a vital role in lower the risk of chronic diseases such as stroke, cardiovascular diseases, obesity, premature death, type 2 diabetes, high blood pressure, adverse blood lipid profile, and some cancers, especially breast and colorectal cancers (Pirasteh, Hidarnia, Asghari, Faghihzadeh, & Ghofranipour, 2008). Furthermore, physical activity will improve physiological and psychological health such as strengthen muscles, bone functions, body balance to reduce the risk of falls or injuries from falls, decreased depression and anxiety levels, improved mental health, and better cognitive functions. In summary, many governments and global authorities consider physical activity are the most important activities to improve an individual's health ("National Physical Activity Plan," 2018; Thailand, 2017).

According to the Center for Disease Control and Prevention (2018) , just only 20% of adults meet the critical guidelines for both aerobic and muscle-strengthening activity, while nearly 50% of them get enough aerobic physical activity per week to meet the essential guidelines (Prevention, 2018). Unfortunately, only 42.4% of Thai adults met the recommended level of

exercise proposed by the World Health Organization, and 33.8% had a very high level of physical inactivity (Liangruenrom et al., 2017). There are many reasons to explain that, such as individual, environment, and structural. Personal reasons included his/her knowledge, awareness, and behavior of the physical activity. Simultaneously, environmental reasons mentioned city planning like the transportation system, public parks, which have more space for physical activity. Public, local, private, people, and academic sectors are part of structural reasons (Thailand, 2017).

Lochbaum, Podlog, Litchfield, Surles, and Hilliard (2013) proved that enhancing achievement goals would lead individuals to have better mental health and increase their physical activity. There have been some persuasive cases verified that exercise motivation, physical activity, and mental health are important research areas that need to study more, especially in university students' physical activity context (Adie, Duda, & Ntoumanis, 2010; Divine, Watson, Baker, & Hall, 2019; Lochbaum, Podlog, et al., 2013). Over twenty years, researchers worldwide commonly used the 2x2 achievement goal model to thoroughly answer why many individuals want to approach or avoid exercise (Lochbaum, Zanatta, & Kazak, 2020; Stevenson & Lochbaum, 2008). The achievement goal theory is also a conceptually critical motivation theory to understand colleges and university students' exercise motivation in educational settings (Zhang, Xiang, Gu, & Rose, 2016).

According to Nicholls (1989), there are two different goal orientations, such as task and ego, which anticipate individuals' competence in their success by assessing their cognitive and behaviors responses in achievement goal orientations. An individual who focuses on the success of a task or improvement of a goal calls task-orientation, while an individual who focuses on winning or better performance than others calls ego-orientation. A 2 x 2 achievement goal model which described positive versus negative dimension as "approach" or "avoidance" was proposed by Elliot (1997) to measure an individual's task and ego orientations as "mastery" or "performance" orientations (Elliot & McGregor, 2001).

There are two specific types of mastery goal orientations, such as mastery-approach (MAp) and mastery-avoidance (MAv). When individuals set MAp goals, they aim to thrive their competence to intrapersonal standards such as mastering their skills, enhancing self-referenced performance, and improving their techniques, while MAv goals seek to avoid incompetence. Similarly, performance goal orientations also have two specific types: performance-approach (PAp) and performance-avoidance (PAv). When individuals set MAp goals, they try to show their abilities concerning others, for example: perform well than others (Elliot & McGregor, 2001). In contrast, PAv goals focus on avoiding looking incompetence by doing worse than others, especially in term of persistence/effort, fear of failure, intrinsic motivation, enjoyment, and physical activity stage (Agbuga & Xiang, 2008; Lochbaum, Litchfield, Podlog, & Lutz, 2013; Lochbaum, Podlog, et al., 2013; Lochbaum et al., 2020; Morris & Kavussanu, 2009; Wang, Biddle, & Elliot, 2007). That is why there is a need to understand and assess why so many participants avoid exercising, especially college and university students (Liangruenrom, Craike, Biddle, Suttikasem, & Pedisic, 2019; Nicholls, 1989).

There is a significant decline in university students' physical participation from 18-24-year-old (Caspersen, 2000). This decline may come from the pressure of academic performance (Strong,

Parks, Anderson, Winett, & Davy, 2008), spending more time on online social networks (Maher et al., 2014), lack of intrinsic and extrinsic motivation (Divine et al., 2019), and limited intervention that met the needs of young adults (Keating, Guan, Piñero, & Bridges, 2005). While in Thailand, social support, interpersonal, and parent/family influences, and information support are the factors that are related to physical activities in adults (Liangruenrom et al., 2019). Although the primary target population group was adults (51.1%) who have problems in cardiovascular disease, diabetes, and hypertension (22%, 21%, and 21% respectively), there is no research conduct on university students' population until now (Liangruenrom et al., 2018). Moreover, Liangruenrom et al. (2018) proposed that longitudinal studies should carry on to provide robust evidence on determinants and outcomes of physical activities by using standardized measures.

According to Conroy, Elliot, and Hofer (2003), the Achievement Goal Questionnaire Sport (AGQ-S) with 12 items would be an appropriate instrument to assess student's achievement goal orientations, particularly for experimental/intervention study because of its data fit with longitudinal factor analyses in a Sport context, Physical education, and Leisure time activities. Mastery-approach, Mastery-avoidance, Performance-approach, and Performance-avoidance are four types of achievement goal orientations. Items in AGQ-S highlight four different ways that students strive for competence or avoid competence. Examples of an item on four types of achievement goal orientations:

(a) Mastery-approach: "It is important for me to master all aspects of my performance."
(b) Mastery-avoidance: "I am often concerned that I may not perform as well as I can perform."

(c) Performance-approach: "My goal is to do better than most other performers."

(d) Performance-avoidance "It is important for me to avoid being one of the worst performers in the group."

Students responded on 7-point Likert-scale items, ranging from 1 = "not at all like me" to 7 "completely like me".

Many research focused on the relationship between the 2 x 2 achievement goal orientations (master-approach, mastery-avoidance, performance-approach, and performance-avoidance) and physical activity adaptation and maintenance of university students, however previous studies failed to examine the potential importance of gender, education levels, and type of achievement goal orientations differences among them (Lochbaum et al., 2020). Thus, this current study addresses these gaps in the literature and pursues the understanding of the 2 x 2 achievement goal orientations among university students in longitudinal research with the following questions:

1. Are there any differences between gender in master-approach, mastery-avoidance, performance-approach, and performance-avoidance?
2. Are there any differences between educational levels in master-approach, mastery-avoidance, performance-approach, and performance-avoidance?

This research would help create the first phase of multiple interventions to promote and increase university students' physical activity, especially Burapha University International College. Furthermore, this is longitudinal research so that cohort university students who participated in this study will be followed up for four years from Freshman to Sophomore, Sophomore to Junior, and Junior to Senior. Students will be examined the corresponding 2 x 2 achievement goal orientations once per year during that time. The results from this research will fulfill the gap of exercise motivation literature, especially for university students, by using a longitudinal approach (Liangruenrom et al., 2019; Lochbaum et al., 2020)

4. Research Methodology

This longitudinal study used stratified sampling to collect data during a fixed time every year. There are 381 undergraduate students (age 18-23) who volunteered to participate. The author informs the students that they can withdraw from the survey anytime without any penalties. There were more female (n = 234, 61.4%) than male (n = 147, 38.6%). Students' educational levels were: 41.2% Freshman (n = 157), 21.3% Sophomore (n = 81), 23.6% Junior (n = 90), and 13.9% Senior (n = 53).

The Achievement Goal Questionnaire Sport (AGQ-S) with 12 items was used to assess students' achievement goal orientations in this study because of the popularity in explaining achievement goals in all physical activity contexts (Conroy et al., 2003). Mastery-approach, Mastery-avoidance, Performance-approach, and Performance-avoidance are four types of achievement goal orientations. Items in AGQ-S highlight four different ways that students strive for competence or avoid competence. Examples of items on four types of achievement goal orientations:

> (a) Mastery-approach: "It is important for me to master all aspects of my performance," "It is important for me to perform as well as I possibly can," and "I want to perform as well as it is possible for me to perform."

> (b) Mastery-avoidance: "I am often concerned that I may not perform as well as I can perform," "I worry that I may not perform as well as I possibly can," and "Sometimes I am afraid that I may not perform as well as I would like."

> (c) Performance-approach: "My goal is to do better than most other performers," "It is important for me to do well compared to others," and "It is important for me to perform better than others."

> (d) Performance-avoidance "It is important for me to avoid being one of the worst performers in the group," "I just want to avoid performing worse than others," and "My goal is to avoid performing worse than everyone else."

Students responded on 7-point Likert-scale items, ranging from 1 = "not at all like me" to 7 "completely like me".

Statistical analysis

SPSS 25 was used for all statistical analyses with independent factors were Gender (male and female) and Educational levels (Freshman, Sophomore, Junior, and Senior). The dependent variables were AGQ-S scale scores:

1. Confirmatory factor analysis (CFA) examined four types of achievement goal orientations measured by AGQ-S using AMOS 24.0.
2. Cronbach's reliability coefficient analysis measured Goodness-of-fit and the internal consistency reliability coefficient.
3. Two-way ANOVA with Post Hoc tests were employed to determine if there were significant differences in the 2 x 2 achievement goal orientations between gender and educational levels.

5. Results

Table 1 showed the results of CFA, such as the Chi-squared ratio (χ^2/df), root mean square error of approximation (RMSEA), the standardized root mean square residual (SRMR), and the comparative fit index score (CFI). Table 1 showed that the 2 x 2 achievement goal orientations measured by AGQ-S constructed excellent validity and reliability scores for Burapha University International College students in sport and physical activity contexts (Conroy et al., 2003; Gao, Podlog, & Harrison, 2012; Gaskin, 2016; Hu & Bentler, 1999).

Table 1   Model Fit Measure

Measure	Estimate	Threshold	Interpretation
CMIN	100.993	-	-
DF	48.000	-	-
CMIN/DF	2.104	Between 1 and 3	Excellent
RMSEA	0.054	<0.06	Excellent
SRMR	0.044	<0.08	Excellent
CFI	0.959	>0.95	Excellent
PClose	0.314	>0.05	Excellent

There was an excellent fit for the 2 x 2 achievement goal orientations to use in this study.

Cronbach's Alpha results ranged from 0.670 to 0.758 (MAp = 0.754, MAv = 0.720, PAp = 0.670, and PAv = 0.758) also proved that internal consistency was considered as "reasonable to high" (Streiner, 2003).

Table 2   Summary results of the independent sample test between gender

	Male (n = 147)		Female (n = 234)		t	P
	Mean	SD	Mean	SD		values
MAp	0.500	0.767	-0.310	0.852	0.934	0.351
MAv	0.172	0.734	-0.108	0.823	3.373	0.001

PAp	0.129	0.745	-0.810	0.780	2.588	0.010
PAv	0.071	0.750	-0.045	0.863	1.337	0.182

There were significant difference in MAv, and PAp between male (M = 0.172, SD = 0.734; M = 0.129, SD = 0.745) with female (M = -0.108, SD = 0.823; M = -0.810, SD = 0.780) conditions; t(379) = (3.373; 2.588), p = (0.001; 0.010) < .05

Table 3   Summary results of two-way ANOVA and Post Hoc Test

	ANOVA		Post Hoc test
	F	**Sig**	
MAp	1.098	0.350	There is no difference in Mastery-approach between educational level
MAv	2.503	0.059	There is no difference in Mastery-avoidance between educational levels
PAp	0.498	0.684	There is no difference in Performance-approach between educational levels
PAv	0.753	0.521	There is no difference in Performance-avoidance between educational levels

6. Discussion and Conclusion

The purpose of this study was to explore the 2 x 2 achievement goal orientations among university students in longitudinal research to develop appropriate physical activity programs and promotions to satisfy university students' needs with the following questions:

1. Are there any differences between gender in master-approach, mastery-avoidance, performance-approach, and performance-avoidance?
2. Are there any differences between educational levels in master-approach, mastery-avoidance, performance-approach, and performance-avoidance?

To answer question number 1, there were significant difference in MAv, and PAp between male (M = 0.172, SD = 0.734; M = 0.129, SD = 0.745) with female (M = -0.108, SD = 0.823; M = -0.810, SD = 0.780) conditions; t(379) = (3.373; 2.588), p = (0.001; 0.010) < .05. Males reported significantly higher levels in mastery-avoidance and performance-approach than females. For both results of mastery-avoidance and performance-approach goals, it is contrasting with Elliot (1999) finding and Stein and Bailey (1973) that females would show more failure anxious than males. The reason to explain it might be the long history in studies of individualism and collectivism, which thinking of beating or winning others than focusing on personal improvement (Lochbaum et al., 2020).

Another explanation came from Harter and Leahy (2001) about self-worth that females have lower self-worth and physical competence viewpoints than males. Besides, some research showed that the mastery-avoidance goal has not fully explored in the physical activity context (Adie et al., 2010; Baranik, Stanley, Bynum, & Lance, 2010; Garn & Sun, 2009). Female

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students will need an intervention to be aware, motivate, educate, and apply in engaging in daily physical activity.

For question number 2, there are no difference in the 2 x 2 achievement goal orientations between educational levels, and it supports the finding of Pauline (2013). It may come from the benefits of exercise that could bring to students. To encourage students' exercise motivation, the university should have the policy to provide and increase the motivational climate such as more enjoyment in fitness goals and exercise intervention on the online social network to help students to focus on their improvement than comparing with others (Dishman, McIver, Dowda, Saunders, & Pate, 2019; Maher et al., 2014). This finding will have a direct implication on university policy in physical activity interventions and programs. Moreover, all university students need a motivational program that helps them engage in routine physical activity.

The first step of longitudinal research, called the exploratory phase, aimed to identify the factors that motivate or prevent BUUIC students from engaging in physical activity. The research also showed that there had been differences between male and female students. The next step calls the intervention phase, identifying and providing the ideal environment for both genders' needs (such as challenge, goal setting, motivational climate, social support, competition, and social cognition) to engage in physical activity for BUUIC's students. This study was limited to BUUIC students only, so this study's results may not represent other faculties and colleges at Burapha University with different demographic profiles. That is why this longitudinal research's final step will expand and collect more data from faculties and colleges at Burapha University for better understanding.

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MATHEMATICS LEARNING ACTIVITIES DEVELOPMENT FOR THE KNOWLEDGE TRANSFER OF LOCAL WISDOM IN THE EDUCATION FUND PROJECT OF UTTARADIT WITH THE INTEGRATED METHOD IN ACCORDANCE WITH STEM EDUCATION

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Abstract: The purpose of this research was to develop mathematics learning activities for the knowledge transfer of local wisdom in the Education Fund Project of Uttaradit province, Thailand with the integrated method in accordance with STEM education, and to study the learning achievements and students' satisfaction towards these activities based on STEM education.

According to the results of the study, the mathematics learning activities were found to improve the students' academic achievement. The students achieved learning outcomes that were higher than the criteria, or at 80% with a statistical significance of .01. Furthermore, the students' satisfaction was at a high level

Keywords: Mathematics Learning Media for Knowledge Transfer; STEM Education; Local Wisdom

1. Introduction

The rapid economical, political, social, science and technological changes of today have directly affected the lives of the Thai people in many regions. In particular, the economic change has potentially advanced further to the industry sector, as well as the agriculture sector. The possibility of such change continuously initiates the relocation of people; they relocate from one region to another from a rural area to an industrial estate in the city. This relocation has a great social and cultural impact on people living in the provincial areas, especially the new generation. They learn about modern knowledge from technology, so they have no trust in the leadership of the older generation. Consequently, the local traditions and customs disappear, which eventually leads to the collapse of the local community. Nevertheless, the

core curriculum, which is the national curriculum, does not truly respond to the local demand, as it is vague and incomprehensive while some components are too detailed; for example, vision and desired characteristics do not cover the requirements of the school, community, and locality. At the same time, some components lack the details to implement the guidelines for unit instructional management and a learning plan or activities plans for learners' development (Nilphan et al., 2008: 37). Furthermore, there is a mechanism for expanding the urban area as a means to drive the development of the national economy. For this reason, these diverse lifestyles affect the local cultures to vanish. Thus, the root of Thai society should be revived by maintaining the knowledge or competency accumulated with life experiences, or so-called "local wisdom". It has been seen that new studies have separated students from their local community because all teaching and learning comes from a centre. As a result, some students despise the local way of life, have no pride in their own culture and community, and do not know how to utilise them. Moreover, this alienation sets the gap between the new and older generation; children do not follow the parents' occupation, or the young generation cannot adjust themselves to the community. Finally, the culture and local wisdom are abandoned and eventually disappear.

Science, technology, engineering, and mathematics (STEM) education is an instructional management approach emphasising on the use of transdisciplinary integration in which instructional activities are designed focusing on problem-solving and connecting to the daily life experience. This method of learning allows the student to resolve a problem or set a project applying the knowledge and skills of science, mathematics, and technology through an engineering design process (Aektrakul, 2015: 1). Meanwhile, a number of communities are aware of the conservation of the value of local wisdom by passing it on to future generations. Therefore, the transfer process of local wisdom is the research problem that promotes this heritage. For this reason, educational management for community members is the key mechanism for transferring local wisdom. As a result, the national curriculum is designed to be suitable for each community by means of STEM education that well responds to living among the social change coupled with local wisdom transfer to the learner for appropriate use. In addition, the awareness and conservation to make it cultural heritage is constructed through the school that sets the appropriate education for the community using the community itself as a source of knowledge, competency, and wisdom that can construct love and consciousness of local wisdom.

2. Research Objectives

1. To develop and study the learning achievement from implementing mathematics learning activities for the knowledge transfer of local wisdom with the integrated method based on STEM education in the Education Fund Project in Uttaradit province, Thailand.
2. To study the students' satisfaction towards mathematics learning activities for the knowledge transfer of local wisdom with the integrated method based on STEM education in the Education Fund Project.
This research aimed to develop a set of mathematics learning activities by applying local wisdom as the main core to set the activities and propose the content through the integrated

method based on STEM education in the basic education level before the trial with the sample group.

| Mathematics learning activities for the knowledge transfer of local wisdom with the integrated method based on STEM education in the Education Fund Project. | → | - Efficiency of learning activities.
- Learning achievement.
- Students' satisfaction towards the activities. |
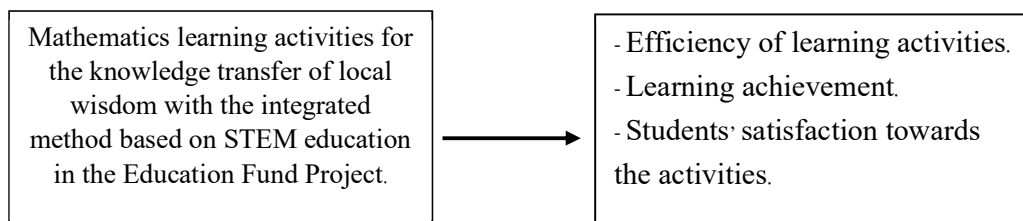
Fig 1: Conceptual Framework.

3. Literature Review

3.1 Integrated instruction

Integrated instruction refers to instruction that interweaves knowledge, concepts and skills to create holistic learning experiences in the cognitive, affective, and psychomotor domains. The instruction emphasizes both knowledge, learning process and integration, properly responding to social circumstances. It is a learning method that meaningfully connects multiple disciplines with one another and is applicable in real life situations. This can be both a teaching method and a teaching program management that unifies contents and skills from different subjects into one (Jetsadawiroj, 2003: 1). The instruction is provided with lessons that are applied to a context or a theme, which simply starts with a concept or a problem that students encounter in their real world context. The approach is intended to enable students to apply their skills effectively, specifically as follows.

1) To enable students to be aware that all learning is connected. In our lives, everything always has connections with one another. Integrated instruction is closely related to the students' life and encourages them to be more motivated to learn than traditional instruction.
2) To enable students to solve problems independently. To solve a problem, students need knowledge from various disciplines at the same time.
3) To engage students in learning purposefully and meaningfully. The instruction allows students to take part in decision-making, express opinions in teaching and learning, and gain insights into what they are learning.
4) To provide instruction according to each individual student's interest by designing activities in response to what students want to learn. It can help students to learn joyfully and effectively.
5) To enable students to transfer learned knowledge and skills, and construct relationships between contents, concepts, skills and attitudes. It helps students to understand the learned concepts deeply and systematically and enables them to transfer the knowledge and understanding from one learning experience to another.

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3.2 Concepts of integrated instruction

Integrated instruction is a teaching method that interweaves different areas of lessons together to enable learners to construct concepts on their own based on their interests, abilities and needs, and apply the concepts to create principles for real-world issues and problems. The key principles are as follows.

1) All disciplines are virtually inseparable from each other, just as the way people live in harmony with all things. Providing instruction with connected knowledge and skills will make learning more meaningful and relevant to real life.

2) Integrated instruction helps reduce overlapping, redundant contents, leaner's study time, and teacher's teaching load.

3) Integrated learning gives students the opportunity to apply their ideas, experience, abilities and skills in various ways, which creates learning experience, skill, process and knowledge simultaneously.

4) Integrated instruction helps learners to establish connection that relates concepts across various disciplines, creating a transfer of learning that allows them to value and apply what they have learned.

5) As integrated instruction reduces redundant contents among subjects in the curriculum, it helps save time to spend with shared contents and allows time for more new contents to be included.

6) Integrated instruction is provided in response to learners' abilities, helping them build knowledge, skills and attitudes, or obtain "multiple intelligence".

7) Integrated instruction is consistent with the theory of constructivism that is widely espoused in education.

3.3 Characteristics of integrated instruction

Integrated instruction involves various factors. Unique attributes of each discipline, for instance, inevitably vary contents, learning processes, instructional media and activity environments. The characteristics of the integrated instruction are listed below.

1) Content integration: a combination that links content areas by merging them into a unit or a theme.

2) Method integration: a combination of various instructional methods in a class that encompasses a wide range of teaching and learning activities such as conversation, discussion, asking questions, lectures, research and group work, field study, and presentation.

3) Integration of knowledge and learning process: such instruction that is designed to provide both knowledge and process simultaneously as inquiry process, problem solving process and concept construction process.

4) Integration of knowledge and practice: an integration that compounds practice and learning activities.

5) Integration of school knowledge and real life situations: an endeavor to engage students with more real-life related contents in order to enable them to appreciate and make sense of what they are learning.

3.4 Models of integration

There are typically four models of integrated instruction as listed below. (Academic Promotion and Development Unit: 2009: p.4)

1) Infusion integration: an instruction in which a teacher constitutes varying contents of different subjects into his/her own subject which is planned and taught by a single teacher.

2) Parallel integration: a method that at least 2 teachers of different subjects collaboratively work in planning the lessons. The instruction is co-designed to a certain degree within shared themes, concepts and problems.

3) Multidisciplinary integration: this integration similar to parallel integration in that two or more teachers of different subjects collaborate on the lesson plans to align the project or assignment within the same theme, concept and problem.

4) Transdisciplinary integration: an instruction given by teachers in different disciplines. In this method, the lesson is co-planned to determine shared themes, concepts and problems.

3.5 STEM-based instruction

The term "STEM education" refers to an interdisciplinary approach to teaching and learning where rigorous academic concepts are compounded with real-world lessons as students apply their knowledge in the areas of science, technology, engineering and mathematics in contexts that establish connections between school and real world enhancing STEM literacy and competitivity in the global economy (Margaret J. Mohr-Schroeder, Maureen Cavalcanti, & Kayla Blyman, 2015: 11). STEM-based instruction places a focus not only on memorizing theories or science and mathematics laws, but also on understanding the learned theories and laws through hands-on practice as well as developing various skills, including thinking, questioning, problem-solving, searching for information, analysing new discoveries and applying the discoveries to everyday life. STEM education is regarded as an important approach to learning that promotes essential attributes for learners in the 21st century (Siriphatrachai, 2013: pp. 49-52) as follows.

1) Cognitive skill: the ability to gain understanding of the lessons.

2) Thinking skill: the ability to develop thinking skill, especially advanced thinking such as critical thinking and creative thinking.

3) Personal attributes: team working skills and effective communication skills.

3.6 Local wisdom

Wisdom is defined as knowledge, ability, thought, belief, behavioural ability, problem solving ability and experience gained to adapt and live in the natural, social and cultural environment, which has been developed and inherited through adaptation to the settlement and cultural exchange with other groups.

Department of Water Resource. (2009: 17) defines local wisdom as the knowledge that is constructed in a physical and cultural context of interaction between indigenous people and the environment. It is the knowledge gained in a community by a group of people that has been accumulated, passed on and developed over an extended period of time. Local wisdom is similar to scientific knowledge in that it has been proven, experimented and developed systematically. However, local wisdom is different from scientific knowledge as it is specific to a location. Local wisdom can be classified into 4 categories as follows.

1) Local wisdom related to morals, thoughts, and beliefs, which is considered the basic principle of knowledge inheritance.

2) Local wisdom related to art, culture and tradition that entails the ways of life that have been practiced.

3) Local wisdom related to local occupation that is based on self‐reliance principles and has been developed over time.

4) Local wisdom related concepts, practices and modern technology that have been adapted and applied in the community to suit the environment and living conditions.

Principles of local wisdom transfer

1) Transferring local wisdom to children deals with direct transfer through parental or family instruction, and indirect transfer through storytelling and play.

2) Transferring local wisdom to adults involves both direct and indirect transfers. As adults are regarded experienced in a variety of life and work circumstances, direct transfer is usually done through rituals observed like weddings and funerals, or through such publications as books, leaflets and brochures, while indirect transfer generally occurs during attending traditional performances and local entertainment activities with the contents and verses incorporating knowledge of local traditions and moral principles which is part of local wisdom.

The research study developed mathematical learning activities based on infusion integration of contents through a STEM-based model to connect knowledge through local wisdom, with each unit taught along with practice in problem-solving and concept construction activities.

4. Research Methodology

The Education Fund Project was established by King Rama IX as the last royal initiated project which aims to return productive citizens into the society. There are 155 joining schools in Thailand, 3 of which are in Uttaradit Province.

The sample population comprised high school students in the academic year 2017 in the Education Fund Project of Uttaradit under the Uttaradit Primary Education Area Office 2 that consisted of Ban Huai Khom School, Ban Huai Yang School, and Ban Bo Bia School.

The sample group was 52 high school students from Ban Huai Khom School, selected by cluster random sampling.

Research tools

Two kinds of tools were used in the research: for the experiment and for data collection, which were as follows:

1. The tool for the experiment was composed of seven units of mathematics learning activities for the knowledge transfer of local wisdom with the integrated method based on STEM education in the Education Fund Project of Uttaradit province.

2. The tool for the data collection comprised a learning achievement test and satisfaction test.

Data collection

1. A forum to exchange information with people in Nam Pat and Ban Khok districts, Uttaradit was organised. The documents of knowledge and local wisdom were arranged for analysis and to design the learning activities.

2. Learning activities were created from the contents for the middle school level based on Mathematics 2008 to be the local wisdom learning activities, which were the wisdom of production, career, or belief, and wisdom of living by integrating STEM Education. The local wisdoms were then analysed and synthesized to determine ones that appropriately aligned the students' interests and the STEM-based learning process as detailed in Figure 2 and Table 1.
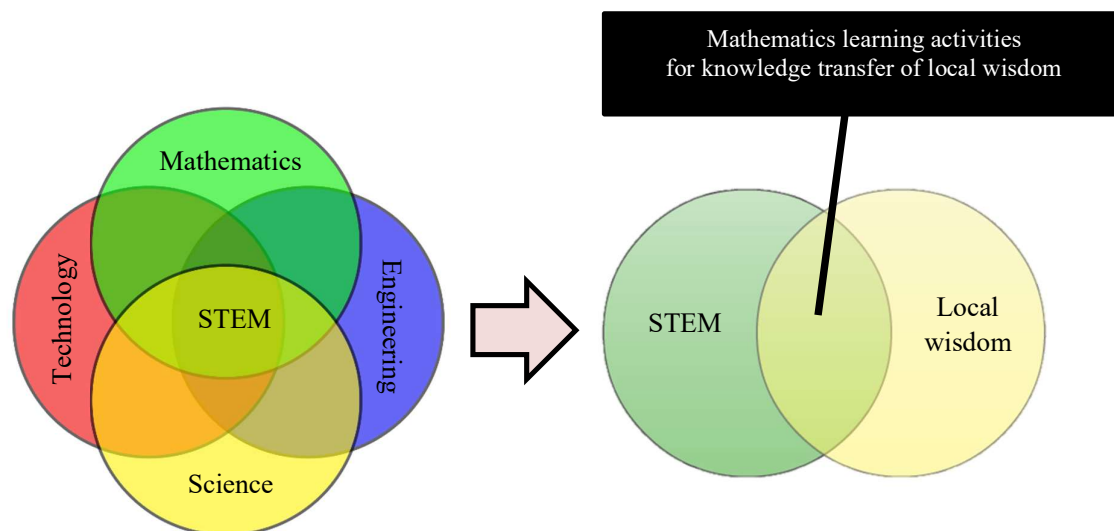
Fig 2: Designed mathematics learning activities through local wisdom with the integrated method of STEM education.

Table 1: Details of the mathematics learning activities through local wisdom with the integrated method of STEM education.

Unit	Sciences	Mathematics	Technology	Engineering
Rainbow Rice Noodle (Mi Phan)	Natural colour	Ratio and colour mix proportion.	Natural colour extract	Use of natural colour
Water Borneol	Structure, components, and properties of water borneol	Measuring	Borneol, camphor, and menthol extraction	Creating an interesting and attractive scent
Weaving Fan	Bamboo strips properties	Measuring, two-dimensional geometry, and geometric change	Appropriate use of material	Creating a beautiful pattern
Geometric Hopscotch	Throwing an object	Measuring the length and geometric space	Skill of using measuring tools	-
Amazing Wind Wheel	Kinetic energy, gravitational potential energy, and energy conservation rule	Measuring the angle and length and creating two-dimensional geometry	Having skills of using appropriate tools for measuring, adhering, and drilling work accurately and safely.	Creating and designing a wind wheel according to the engineering process and transfer to the drawing for production

Changing Coin to Money	Components of a coin	Weight and value of Thai coins	The use of the relationship between the weight of the coin and its value	Design ratio of the weight and value
K-Kite	Kite balance from the wind energy	Calculating the space of the kite, and symmetry for problem solving	Research on kite samples and how to make a kite from the Internet	Positioning of wood in a vertical and horizontal line that supports appropriate flotation

3. Learning achievement tests for seven units and a satisfaction evaluation form were created. Each achievement test consisted of 10 points.

4. A trial of the learning achievement test and satisfaction evaluation were carried out with students in Sriphanommat Pittayakorn Municipality School, Lap Lae district, Uttaradit province to find the quality for improvement before implementing for data collection.

5. A one group pre-test post-test design experiment was conducted with the sample group and data collection was undertaken for statistical analysis.

Table 2: One group pre-test post-test design experiment.

Group	Pre-test	Treatment	Post-test
Experiment	T_1	X	T_2

T_1 refers to the pre-test before learning.
X   refers to the activities.
T_2 refers to the post-test after learning.

The researchers collected the data from the test scores of the sample group and analysed the data to find the estimation of the education information of the target group for statistical analysis to determine the difference in academic achievements before and after the instruction and the students' satisfaction.

5. Results

1. The examination of mathematics learning activities for the knowledge transfer of local wisdom by integrating with STEM education illustrated that the total score from doing the exercise in the learning units was E_1 / E_2, which accounted for $85.49/85.85$ and was higher than the criteria of E_1 / E_2. Thus, it was presumed that the lesson had a higher efficiency than the criteria of 80/80.

Table 3: Results of the efficiency of mathematics learning activities for the knowledge transfer of local wisdom at Ban Huai Khom School, Nam Pat district, Uttaradit with the integrated STEM Education.

Unit	Exercise of the Learning Unit			Post-test			Efficiency of the Process - E_1 / E_2
	Full Marks	Mean (n=10)	Efficiency of the Process - E_1	Full Marks	Mean (n=10)	Efficiency of the Process- E_2	
1	10	8.50	85.00	10	8.53	85.53	85.00/85.53
2	10	8.38	83.75	10	8.69	86.88	83.75/86.88
3	10	8.38	83.75	10	8.75	87.50	83.75/87.50
4	10	8.97	89.69	10	8.56	85.63	89.69/85.63
5	10	8.59	85.94	10	8.44	84.38	85.94/84.38
6	10	5.47	84.69	10	8.72	87.19	84.69/87.19
7	10	8.56	85.63	10	8.41	84.06	85.63/84.06
overall	70	59.84	85.49	70	60.09	85.85	85.49/85.85

2. The comparison of the achievement of the students in the sample group learning with the mathematics learning activities for the knowledge transfer of local wisdom with the integrated STEM education showed that the average score of the post- learning of the sample group was overall higher than pre-learning and by each unit with a statistical significance of .01.

Table 4: Comparison of the results between the learning achievement before and after learning.

Unit	Full Marks	Pre-test		Post-test		t	p
		$\overline{X}$ (n=20)	S.D.	$\overline{X}$ (n=20)	S.D.		
1	10	3.41	1.16	8.53	0.98	-23.930	.000*
2	10	3.75	1.07	8.69	1.06	-16.781	.000*
3	10	3.59	1.19	8.75	1.11	-17.291	.000*
4	10	3.44	0.88	8.56	1.16	-17.457	.000*
5	10	3.44	1.19	8.44	1.16	-17.607	.000*
6	10	3.59	1.16	8.72	1.20	-16.002	.000*
7	10	2.53	1.14	8.41	1.04	-17.910	.000*
Mean		3.39	1.11	8.59	1.10	-18.14	.000*

*p < .01

Table 2 shows that the students had higher achievement after the instruction than before the instruction in each of the 7 units, with the average score of 8.59. This means that the constructed activities were able to significantly improve the students' achievement at the set statistical threshold 0.01.

3. The survey on the learners' satisfaction towards the mathematics learning activities for the knowledge transfer of local wisdom with the integrated STEM education indicated that the students' satisfaction was at an excellent level ($\bar{X}$=4.52, S.D. = 0.51) and at a high level for each aspect. The top three high scores were the consistence of the knowledge transfer of the activities, STEM and local wisdom ($\bar{X}$=4.63, S.D. = 0.50); the effective connection of the activities ($\bar{X}$= 4.59, S.D. = 0.49), and the appropriateness of the content to the activities $\bar{X}$ = 4.59, S.D. = 0.56.

6. Discussion and Conclusion

1. The efficiency of the developed learning activities was E_1 / E_2, which was higher than the criteria. This was a result of the coordination with the teachers in the school by working in the field, organising activities, and designing an activities manual based on the school's demand. The appropriate activities and media were created to fulfil the need of the school and students. The mathematics learning activities were designed from an abstract idea to be a concrete activity and transferred through the media to the receivers. This is in line with Asanok (2017) who stated that learning media referred to the material or any approach that the teacher applied to teaching and learning for the most efficient learning. It was found that the use of media and instructional management integrated with local wisdom with STEM to connect the subjects' content was at 85.49/85.85. In taking the learning activities into consideration, it was found that there was a difference from the traditional learning approach; learning from the teacher and focusing on the subject content was insufficient for learning at the present time. The activities of each unit emphasised on integrated practical mathematics learning through local wisdom, which the learners had learnt from their predecessors. Therefore, the students were enthusiastic, interested, and surprised that all this local wisdom was applicable for the classroom. This is consistent with the Department of Agricultural Extension 2016: 3) which stated that local wisdom originated from the life experiences through the process of studying, observing, analysing, and resulting in the knowledge. Such knowledge was not classified into separate fields. That being said, local wisdom was the foundation of the modern knowledge supporting the learning, problem-solving, management, and self-adjustment. Local wisdom was the knowledge generally existing in society, the community, and the learners themselves. If there was research and study, the local wisdom would possibly be acceptable, transferred, and developed for the future generation.

2. With regard to the students' achievement after receiving the STEM-based integrated instruction through mathematics learning activities for knowledge transfer of local wisdoms, it was found that the post-test scores were significantly higher than the pre-test ones at a statistical level of 0.1. It appeared to be the result of hands-on activities that allowed the students to gain and apply knowledge from practice. The finding is congruent with Chaumklang (2013, 6-7), stating that despite human's limited memory and processing capacity, learning activities that offer a variety of activities and play potentially enhance student's processing memory to function more efficiently. This is considered a crucial factor in learning and solving problems in various subjects. The activities designed for this study in particular are believed to encourage students to apply their knowledge in related practical situations where they require processing

memory to do multiple tasks in thinking, analysing, and utilising a lot of information simultaneously. This agrees with several studies Saengpromsri, Nuangchalerm and Chantiratikul, 2015: 401- 402; Chawanapaisarn, Varasunun and Arunyanart, 2017: 297), finding that students who received STEM- based instruction had better understand and higher achievement than before the instruction at statistically significant levels of 0.01 and 0.05 respectively. It was also found that a significant factor in learning was combination learning that integrated knowledge from four different subjects to solve a problem by creating a novel lesson or activity that could obviously allow students to apply their knowledge better than learning each separately (Plengwattana, 2013: 19-20). In addition, a variety of presentations and methods were implemented; for example, a range of technology was utilised to consolidate knowledge prior to practical sessions in designing wicker patterns, pinwheels, kites and recipes. This fosters creativity to create new things based on existing local wisdom that can give them a supporting guide for their future career and thinking skill development.

3. The learners' opinion on the learning activities was at a high level ($\overline{X}$ = 4.52, S.D. = 0.51). In considering each matter, the learners had a high level of opinion in all aspects. The teacher and the learners should take part in constructing learning and integrated instructional management. This confers with Thammawithikul (2011) who stated that good learning was the learning activities that both the teacher and learners participated to form the learning of what they wanted to know. Then, there was the problem-solving learning by brainstorming and using various techniques; such as, a forum, discussion group, and role play which focused on the learners as the learning centre who participated in all steps of the learning. Questions and various techniques were used as the media to allow the learners to do activities and develop the work to relate to their real life. In addition, the environment should be set to encourage the learners to have self- learning, be eager to learn and take action. The key characteristics of participatory learning are 1) the instructor and the learners join in the activities, 2) the learners are the learning centre, and 3) the learners are involved by taking action, so they are satisfied and happy to learn. This research gave the opportunity for the learners to plan for self-learning. For example, the Rainbow Rice Noodle activity allowed the learners to design the desired food applying mathematical knowledge to calculate the food ratio, scientific knowledge to dye the noodles with natural colour, and technology to produce natural colour. From the activity, the learners were happy and enjoyed cooking.

Likewise, the water borneol activity gave the opportunity for the learners to design the special scent using mathematical knowledge to measure, set the ratio, and integrate it by utilising scientific knowledge about the structure, components, and properties of the water borneol, as well as the engineering and design knowledge to create the package. The learners were happy and prepared for learning.

Furthermore, Ban Huai Khom School implemented the integrated STEM education to design the instructional management for the Mathematics and Sciences Department. After the activities, the learners were able to apply STEM knowledge to the academic activities. Many activities were the integration between local wisdom and STEM, which had a connection with working and daily living. This was consistent with Siripatrachai (2013: 49-56) who reported

that STEM activities helped the students to create the connection between the four subjects and life and work. STEM education not only focuses on theory recitation or scientific and mathematic rules, but also creates understanding in those theories or rules through practice coupled with the development of thinking, questioning, solving problems, as well as data searching and analysis skills, and being able to utilise or integrate the findings to daily life. This is one of the alternatives to promote significant skills for learners in the 21ˢᵗ century.

Ban Huai Khom School, Nam Pat district, Uttaradit implemented the integrated STEM education and the local wisdom designed by the researchers as the model to develop integrated STEM activities with other qualities or knowledge, such as the sufficiency economy philosophy, ethics and morals, disciplines, and other related aspects. Currently, cooperation with the Uttaradit Primary Education Area Office 2 has been initiated for the Ban Huai Khom School to be a model school to train STEM education for other schools in the region. It is thus aimed to design a set of activities integrating eight subject departments based on the core curriculum.

Recommendations

1. A research study on the comparison of the achievement of a learning group applying the traditional teaching method and a group applying other teaching methods should be conducted.

2. Activities and lessons could be the model of the development of the integrated learning activities for other subjects.

3. The Education Fund School is located in a remote area, so the implementation of technology to communicate or online supervision is a crucial communication channel between the research and people in the area or the school.

4. The STEM-based knowledge transfer activities were found effective in encouraging the students' creativity in learning activities; hence, mathematical creative thinking should be a focus of further study in different contexts.

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PRACTICAL ASPECTS OF TEACHING ART FUNDAMENTALS THROUGH DIGITAL ILLUSTRATION

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Abstract: As a part of the Digital Drawing teaching strategy in Prince of Songkla University International College, the aim of this research is to investigate the efficiency of learning art fundamentals through digital illustration techniques relying on tutorial-based classes and hands-on learning systems. Practical aspects of given class assignments which put the main emphasis on commercial digital illustrations in combination with art fundamentals as well as strong and weak points of this approach are presented. Techniques used in class assignments should provide fundamental knowledge of digital art linked with the needs of character design, game assets and concept art creation which represent the key point of this course.

Keywords: Digital drawing, Digital illustration, Art fundamentals, Digital Techniques

1. Introduction

With the advancement of digital technology and the rapid development of digital graphic business demand, the courses of art majors pay more and more attention to the arrangement of digital illustration courses. As a connection course between basic courses and professional courses, as well as a practical consideration in the employment of students, we should pay attention to cultivating students to understand the commercial illustration market, deeply grasp and flexibly use various software technologies, grow rapidly in actual project needs and mainstream style learning, master the learning method and continue the development of art [1].

In a digital age, art teachers feel the need now more than ever to advocate for their programs. A digital arts curriculum can serve as a powerful advocacy tool [2]. Technology is increasingly being recognized as an essential learning tool for promoting the social, linguistic, and cognitive development of young students [3].

To Art teachers and other professionals, the following is an important topic: the effects of the new technology on artistic creativity. Does use of the new technology act as an aid to a child's artistic development, or is it an obstacle? Does it improve creative art work, or not? [4].

In Teacher Education, psychomotor skills form a very important set or skills that need to be acquired by the student teachers to satisfy overall teaching and present employability skills requirements. Most of the research in teacher Education has dealt with Cognitive and Affective domain [5].

In this paper is presented hands-on system learning by implementing art fundamentals into techniques used for digital imagery creations. Simplified set of drawing exercises is created according to complexity of tasks that will progress from guided response through basic proficiency ending with independently created final artwork piece. Efforts are made in developing concept of exercises with limited number of implemented art fundamentals where each of them produces effect of satisfaction for aesthetically pleasing accomplished task and therefore, motivation for the further challenge. This type of motivation is driving force for psychomotor skills development and raising the bar of standards for teacher education as well.

Research, therefore, aims to develop a new concept of the Digital Drawing classes where the main emphasis is put on disciplines related primarily to digital illustration used in animation and concept art. Compiling all art fundamentals into a single assignment or exercise did not give desired results in terms of aesthetic and software usage standards in industry which was previous practice of this course. Due to limited time in one semester, attention should not be dedicated to complex tasks of mastering anatomy, perspective and composition, but rather focusing on rendering techniques of a single motive that include observational drawing, line work, lighting and values and color harmonies. Dedicating exercises for each of those fundamentals separately is a focused practice that provides more tangible results gradually progressing to complex tasks.

2. Research Objectives

While free drawing is of primary importance in character design for animation and concept art, this research is focusing on starting point in learning digital techniques processes and tools to build foundation for the further development in visual design. Techniques cannot replace free drawing skills entirely, but they can increase efficiency and motivation in drawing studies, reduce difficulties at the beginner's stage and provide valuable experience through satisfactory results.

Towards this end, the following goals will be achieved:

- Applying strategy of teaching art fundamentals through set of exercises that are complement each other in linear progression of tasks complexity
- Developing assignments related to digital illustration used in concept art that will provide more practical knowledge of digital tools usage and give motivation for further development in visual design
- Providing tutorials (teaching demonstrations) and hands-on system learning (one on one consultations) simultaneously in order to enhance quality of the artworks made in class and increase interactivity and student's engagement in class activities

- Breaking down complex tasks (quality) into a set of simplified exercises (quantity) to provide better understanding of fundamental knowledge in practical purposes and manageable way of achieving desired results

2. Literature Review

It is illustrated images that capture the imagination, that remain with the viewer and that inextricably tie moments in one's personal history with the present. From the moment that small children are introduced to illustrated books through to their admiring record and CD sleeves of their teens and early twenties, illustrations play a part in defining important moments and periods in time. On a grander scale, it is fair to say that illustration has recorded man's achievements, interpreting them in a way not possible before the birth of photography. Contemporary illustration may work in less majestic surroundings, but its roots within the magazine racks, bookshelves and record collections of our homes stand as testament to the importance we place on the art of the discipline [6].

"Chahua" in Chinese is similar with illustration in English. As for its' exposition, illustration can be expounded into case, example, explanation, iconography and illustration. It is an art form that expresses some things, explains objectives, narrates a certain process, describes realms of fantasy. Based on digital and new media technology, digital illustration is an art that integrates human rational thinking and artistic inspiration through digital methods. With the development of information technology, digital illustration art is now permeating into all aspects of life [7].

2.1 Digital illustrations

Computer illustration or digital illustration is the use of digital tools to produce images under the direct manipulation of the artist, usually through a pointing device such as a tablet or a mouse. It is distinguished from computer-generated art, which produced by a computer using mathematical models created by the artist. It is also distinct from digital manipulation of photographs, in that it is an original construction "from scratch". (Photographic elements may be incorporated into such works, but they are not necessarily the primary basis or source for them.) [17]

We can investigate the digital illustration artworks in two main captions according to their process; such as created with vector-based software (Adobe, Illustrator, Corel Draw, etc. software) and created with pixel-based software (such as Adobe Photoshop, Art Rage, Procreate, Corel Paint, Gimp, etc.). Vector-based productions are like mathematical formulas; they have a feature which the results don't change and any loss will occur even if the size of the artwork will change. On the other hand, the pixel-based software forcing artists to make a choice at the beginning of the process about which size will the artwork exhibited and printed or at least it must be a close size to ideals. Against the pixel-based productions have a flexible feature in the context of functions, they might occur some problems called pixelations which appears like boxes that we actually don't have to see and the reasons that make them appear are starting to work with small sizes and then deciding to make it bigger or printed as big sizes. The real power of these produced digital illustrations increased gradually via graphic-tablets.

The artist who uses the tablet can easily create the desired illustration in a digital environment by drawing on a screen or an apparatus attached to the screen as a drawing with a pen. [9].

With the expansion of the commercial needs of digital illustrations and the development of digital technology, art majors in many colleges have offered courses such as commercial illustrations and digital illustrations, and some universities have set up new majors. The commercial application of illustrations is becoming wider and wider, and the emerging digital technology updates are changing with each passing day. As such a traditional art professional course with the characteristic of new era, it has strong practicality and high speed of knowledge update frequency, so it is inevitable to face with more problems in the teaching process [8].

Line art

Drawing with lines is a skill that can be learned with intention and practice. On a basic level, drawing with lines helps you communicate with the 65 percent of people who are visual learners. Practicing drawing with lines can enhance creativity and alter brain. Dartmouth College psychologist Alexander Schlegel demonstrated this in a study by scanning students' brains before and after they took a three-month course in observational drawing or painting. As a result of the consistent practice, the researchers found that the brains of the students literally evolved in the areas that support creative thinking [2].

Line-art illustrations are effective artistic tools for conveying shapes, shading, and materials of complex objects. A variety of techniques have been developed to illustrate static and opaque 3D objects in line-art styles [10].
Line art rendering of freeform shapes has had significant attention in recent years. The attempt to create aesthetic and pleasing synthetic line art pen-and-ink illustrations has been surprisingly successful. This non-photo-realistic rendering technique stands in contrast with traditional computer graphics rendering methods, such as ray tracing and radiosity, that strive for a complete photo-realism [11].

Lighting and shading

Objects are seen through the action of light which they reflect to the eye in different degrees and of different colors, and every object appears lighter on one side, darker on the opposite side, and throws a shadow upon some other object. Objects are visible because of contrasts of light and dark, each one appearing either lighter or darker than its surroundings, or appearing lighter than the background in one part and darker in another. If two objects of the same color reflect light equally to the eye, they appear of the same value, and if any part of one is in front of the other, its outline in this part cannot be seen [12].

Objects are seen under very different illuminations; they may be exposed to direct light, either sun light, moon light, or any artificial light, and this light may be strong or weak; or they may be seen under the diffused light of a gray day, or of a room with shaded windows, or of a star light night. The direct light may come from one source or from several, and the diffused light

may be strong or weak, though to a less extent than direct light.

It is evident that the effects produced by these different lights must be so numerous and so varied that to formulate rules for the production of light and shade drawings is impossible. But by study of the effects certain principles may be discovered which will help the student of light and shade just as the study of the principles of free—hand perspective aids in the study of outline drawing [12].

Vector graphics

The advantages of vector graphics in terms of typically small storage costs and high reproduction quality are widely known not only with respect to print but also on-screen.
However, when vector graphic illustrations are processed (import, export, and manipulation in vector graphics packages such as CORELDRAW), potentially attached information in form of text files about what is depicted will most certainly get lost. Thus, it is of great benefit if this additional information can be embedded within the graphic itself. The embedded information has to be stored in such a way that it does not get lost when applying common geometrical transformations. For example, typical transformations used in vector graphics processing such as translation, rotation, scaling, and even partial zooming must not destroy the information embedded within the graphic. The additional information should also not get lost when changing from one standard format to another (e. g., PDF to POSTSCRIPT) [13].

3. Research Methodology

Learning digital illustration requires a solid knowledge of art fundamentals combined with understanding of the software tools. For that reason, these two components should complement each other as an integral part of assignments tailored to cater needs for animation, game art, concept art, graphic design or purely for digital illustration.
Assignments are divided in two basic categories: bitmap and vector graphics. Bitmap section is then divided into three sub-categories that implement following art fundamentals:

1. Line work
2. Lighting and values
3. Color and texture

To increase efficiency of focused practice in limited time conditions, art fundamentals that require more advanced drawing skills and great amount of self-study (anatomy, perspective and composition) are excluded from teaching units. Focused practice in digital drawing classes includes basic skills of creating a single visual motif (for example a piece of fabric) gradually, from line work to full rendered and colored object. Each set of exercises are related to the corresponding tasks from art fundamentals and software knowledge in linear manner – from the easiest to more complex tasks. By the end of each section, students are able to apply knowledge from the previous exercises together in final assignments and later to the final project. Sight-size methodology approach is used in each task that is based on details extraction from the given image reference.

3.1 Making marks and line stroke exercises

Introducing students with basics of observational drawing, digital drawing tools and functions, brush settings, layer use and navigation through Adobe Photoshop interface is covered in the first set of exercises that are focusing on line work. In first exercise, students are required to trace given drawing reference in order to enforce creating controlled and accurate lines using pen tool in Adobe Photoshop. At the same time, this was introduction with the pen tablet and software tool so it is important for starting phase to be released from any pressure of creative problem solving and memorizing multiple software functions at the beginning. Tracing faded lines od given illustration, gives an effect of satisfaction with achieved result similar to coloring book (figure 1).
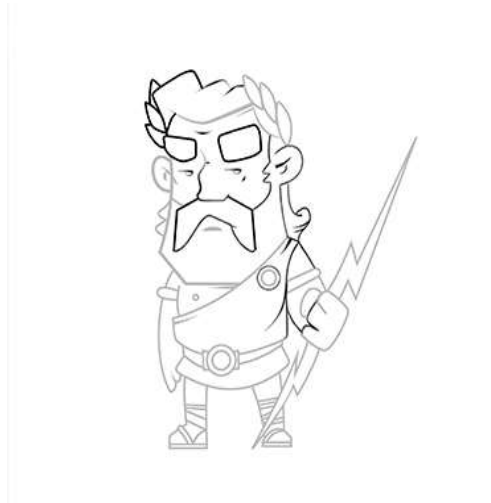
Fig. 1: Exercise 1 – tracing line drawing using pen tool in Adobe Photoshop.

3.2 Observation and geometrical sketch

Observational drawing is crucial for animation, even if drawing itself does not figure in the final outcome of a film project. It is not merely concerned with the accurate representation of something that is seen, but a process of recognition and record. Observation is, in essence, the process of learning to see [14]. At this point, students are getting introduced with brush tool and brush settings which will be the most frequently used in digital illustrations. Also, it is the start of observational stage where we are focusing on capturing the main proportions of the human head and face features. Reference image of human face is set by side and blank canvas page is created with identical dimensions of the image. Measuring distance from the head parts and the edge of the page facilitates capturing the main proportions of the head, but still not heavily relying on guides like in case of using modular mask. Starting with simple geometrical forms, we are creating rough volume on top of which we build up additional details. Lines will be thicker and darker in areas of deep and occlusion shadows and thinner and brighter in areas affected by light source. Limitation by using only lines prevents inclination towards aesthetics

of rendering and blending details and keep the main focus on line quality which is the main condition for believable drawing. (Figure 2).
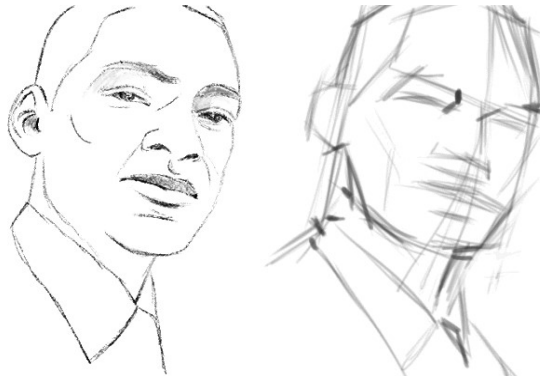

Fig. 2: Traced drawing from the reference (left) and geometrical sketch (right).

Accuracy in replicating the reference image is not of crucial importance and with that in mind, we are reducing risk of stiffening lines which are, more then often, result of efforts to achieve likeness with the reference. Essential points that should be adopted from this exercise are:

1. Capturing rough volume of the main masses
2. Using fast line strokes
3. Avoiding uniformed lines

Capturing rough volume of the head and torso parts sets proportions and guidelines for additional visual elements which we build with fast and smooth line strokes that create sharpness in details. Lastly, by placing dark line accents that are mainly located in areas of eyes, ears, nose and connections with the fabric of the clothes, we indicate cast and occlusion shadows that help creating illusion of three-dimensional forms (figure 3).

Fig. 3: Example of uniformed, decorative lines (left) and variety of lines that describe volume and different surfaces in final sketches from Exercise 2.

Translating image into line drawings requires a great amount of practice regardless of observational skill. A single line should replace a shadow to suggest volume or underlying structure. This is the part where understanding anatomy takes place and for that reason, students are allowed to trace reference image in order to memorize important locations and type of lines they will use to describe certain elements of the face before they start drawing by observation. Images that are faded are usually lacking middle values created by diffuse lighting that allow us to read volume/roundness of the forms. On the other side, over saturated or images that are lacking dark and light contrasts provide insufficient amount of visual information required for details emphasis. Therefore, it is a good practice to use desaturated images with full range of values from black to white as a reference (figure 5).

Fig. 4: Example of reference image with full range of values from black to white (Left) and image with faded middle values.

3.3   Indication of three-dimensional forms

When creating illusion of three-dimensional forms, we indicate light sources and areas with absence of light (shadows). Fourth exercise focuses on lighting and shading by using smooth gradients that can be achieved most efficiently with soft brush tool. The exercise file consists of three identical stylized heads with different light source indicated with blue arrows (figure 6). Scenes are set to be under artificial indoor light that creates one light source and clear shadows that are easy to identify.

Light indoors has a very different character from that found outside, the biggest difference being that falloff is a significant factor indoors. Falloff affects all man-made lights and light coming from windows, but in sunlight (either direct or diffused by cloud) it is not noticeable because the sun is so far away. When human beings are in control of the light source there is an added twist in that the light is often designed for a specific purpose [15].

Students are required to render all heads according to the light source using soft brush tool that is pen pressure sensitive and allows creating smooth gradient efficiently.

Basic types of light representation that should be evident in artworks are:
- Specular reflection that occurs in area where light source hitting the object with the highest intensity
- Diffuse light - usually in area of transition from specular reflection to shades
- Diffuse reflection light bounced from other environmental objects (I.E. table)

Basic types of shadows that we should identify in artworks are:
- Cast shadow
- Form shadow
- Occlusion shadow
- the darkest parts of the shadow are usually at the points of contact
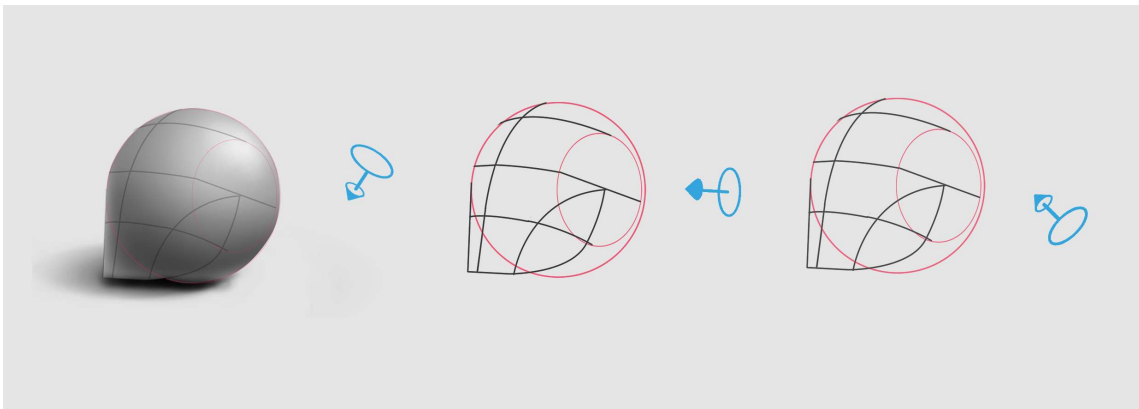
Fig. 5: Exercise 4, example (on the left) for using soft brush tool and locating lights and shades.

At this stage understanding of value range is of crucial importance as it will affect color quality in later phase. Important points we take into consideration when learning lighting and values are:
•   Focal point is created by values of drawing or painting
•   Light against dark creates a high contrast which immediately draw human eye and, by this way, creates a focal point of interest
•   Illusion of depth is created by values (I.E. landscape scene where objects in front are in low value key (darker) and far in distance in high (lighter) value keys
•   Illusion of three-dimensional forms is created by lower and higher values

3.4 Blending, rendering and coloring

Blending and rendering exercises include applying practice from lighting and shading through rendering surfaces with different quality. Starting with blending rough transitions from dark to light in order to achieve smooth gradients, we have opportunity to use other blending tools

besides Soft Brush such as Smudge tool and Mixer Brush tool. This type of blending techniques is applied in exercise number 5. (figures 6).

Fig. 6: Example from exercise 5 – blending rough transitions from dark to light color values into smooth gradients.

Fifth exercise does not require free drawing and it is purely introduction with blending tools used widely in digital illustrations. Besides tools introduction this is an indicator of how students perceive realistic transitions from rough indication of shades in drawing to fully rendered images in digital painting (figure 7).
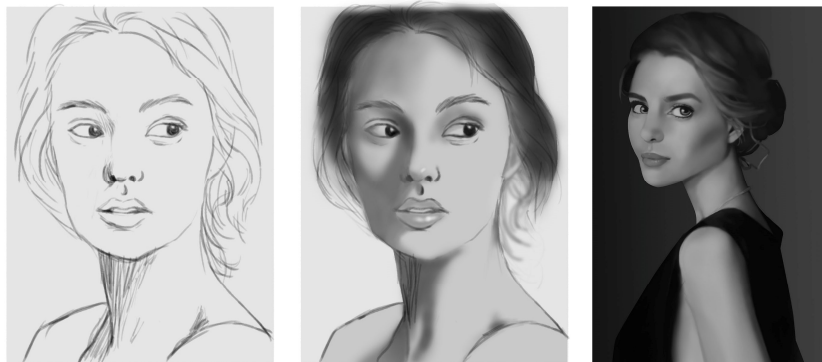
Fig. 7: Transition from line drawing (left - exercise 3) through rough indication of shadows (middle – exercise 6) to fully rendered digital painting (right – exercise 7).

Exercise number 11 requires using hard brushes that could be customized for rendering rough surfaces such as stone textures. It represents transitional phase from observational drawing and relying on reference image to formulaic drawing (from imagination). In this assignment information about student's progress is more evident due to challenge of selective detail

extraction from the reference image. Also, this exercise made a clear difference between three types students based on skill level and participation:

1. Students with previous drawing experience
2. Students without previous experience who mimic teaching demonstration
3. Students without previous drawing experience that face difficulties in extracting details from the reference image or in following teaching demonstrations

Paint patches are placed next to each other to simulate rough transitions (figure 8). Keeping brush strokes loose and color picking from the local area, we gradually build a structure that suggests randomness we can find in objects from the nature. Starting with large brush tips at the beginning, we establish the main source of light, places covered in deep shadow and middle values. Reference image serves purpose only as a rough guideline for determining light values and shape of the stone.
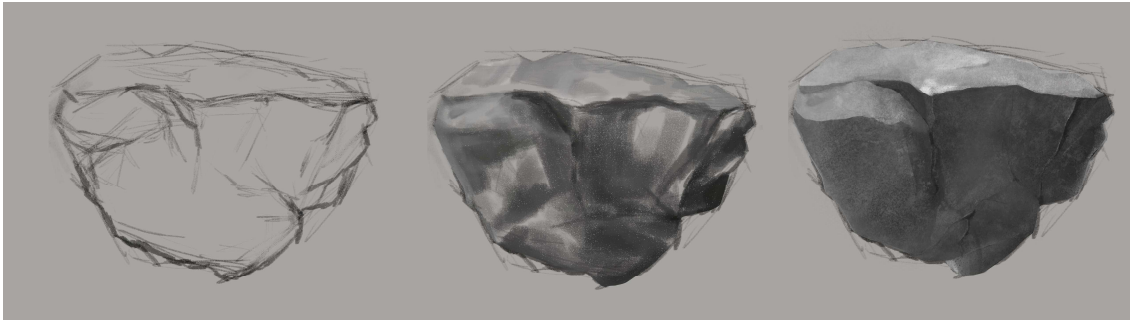
Fig. 8: Exercise 11 – process of painting rough materials with customized rough brush tool.

3.5 Vector pictorial style

Even though we have available functions and tools for realistic representations of visual elements, the ability to create precise, scalable and layered images is the main reason why vector-based software is widely used in industry.
Digital illustration vector imagery is composed of shape objects that are composed of "data points," called "vertices"; or in Inkscape, "nodes," which are placed in 2D space, by using X, Y coordinates. Lines, arcs, or curves then connect the vertex points together [16].

The final set of exercises (from 12 to 14) is introduction with vector software Adobe Illustrator and pictorial style of illustrations often called clip art. Exercises 12 and 13 are crafted specifically for the purpose of converting traditional drawings or bitmap images to vector graphics. During this process, basic tools and functions are introduced (figure 9).
Simplicity of this exercise is in focus on multiple functions in single tool using default keyboard shortcuts for increasing speed and efficiency in graphics creation. For example, pen tool can be converted into direct selection tool (Ctrl key) and curvature tool (Alt key). This exercise,

besides basic functions, utilizes pen tool on the way that forces students to get used to using shortcuts and understand principles of line points (anchors) manipulation.

Depending on pictorial style of individual artist, line work can be a highly visible part of illustration and often represents a visual element that define appearance of forms and their relationship contributing significantly to image clarity. In 2D animation, line work helps to read visual elements quickly leading viewer's eye towards focal point (action). Line work is referring on contour line that suggests three-dimensional forms and perspective which is different than outline that only represents a contour of the overall shape (silhouette). Second part of this assignment is dedicated to shapes manipulation and ability to create stylized illustrations by using basic geometrical shapes only (circles and rectangles). Grayscale reference images (figure 9, in the middle) served as a reference for replicating forms of the faces with additional color swatches for utilizing eye dropper tool to sample colors from them. Ability to break down complex forms into more simple geometrical shapes is required to successfully accomplish this task and it is heavily connected with Gestalt Principles and the Law of Prägnanz (Good figure law of simplicity). Human eye tends to reorganize complex shapes into simpler components which is applied as a method of image creation in this task (figure 9, on the right). Gestalt principles are crucial for creating professional page layout in graphic design as they appear constantly in different combinations (usually not all of the principles in one artwork).

Manipulating with line thickness using width tool is transitional phase of enhancing line work in digital illustrations which is the main emphasis in exercise 13. Line thickness or line weight is often referring as line quality and it plays crucial part in suggesting light source, occlusion shadows (fabric folds or limbs connections in character design) and three-dimensional forms as mentioned previously. Line quality, besides providing higher level of readability also enhances appearance of illustration making visual elements more dynamic and natural which is the most evident with cartoon style of imagery especially for suggesting the movements of the characters.

Translating complex forms from the photo image to simplified and clean geometrical shapes is the next challenge that students will face in exercise number 14. Task consists of a photograph converted into illustration on the half way done. Students need to complete illustration by mimicking pictorial style of the finished part (figure 10). It is opportunity to apply all functions learned in previous exercises including: line work, shapes manipulation, coloring and ability to simplify complex forms (Prägnanz or law of simplicity).

In line work, variety of thickness needs to be obtained similarly as in given reference image taking, at the same time, into consideration the main light source and curves smoothness. Shapes manipulation includes color blocks (base color), indication of shades and highlights. In both of these categories' simplification is required in order to achieve desired appearance of the artwork.

Completing successfully all given tasks, students will be equipped with the basic skill set needed for creating digital artworks for variety of purposes. Illustrators in general, are in great

degree interested in creative sensibility filtering through imagery and using different digital or analogue techniques. Today, job of illustrator, includes dealing with personal, symbolic and conceptual language rather than just expression of writer's ideas. Because of many changes that happened in this field, affected mainly by development of digital technology, there are opportunities available to illustrators in terms of self-expression.
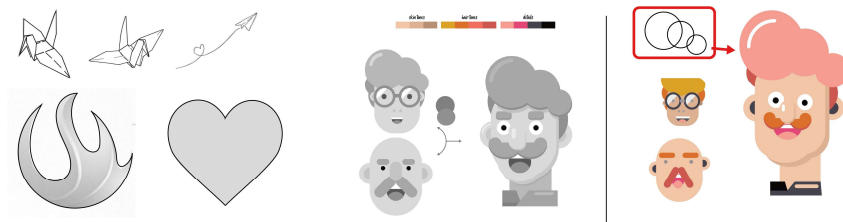
Fig. 9: Exercise 10 – basic tools and functions in vector-based software.
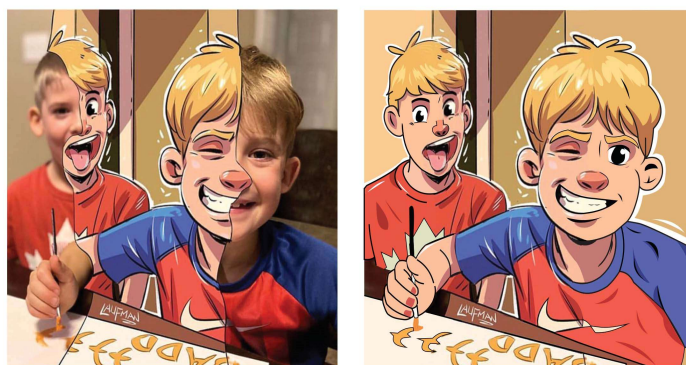
Fig. 10: Exercise 14 – advanced illustration techniques and mimicking pictorial style.

3.6 Progress Checkpoints and preliminary reviews as tools for data collection and comparative analysis

Progress checkpoints are quick one-on-one consultations during practical work in classes where student has opportunity to address specific problem, ask for advise or additional demonstration of process. Those checkpoints provide information about each individual that include:

- Understanding the objective of the exercise
- Understanding software tools and functions in given task
- Ability to apply process of graphic creation based on given tutorial
- Free drawing skill level acquired before taking course
- Student's overall engagement in class activities

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In first week of classes, information is recorded (in form of notes) for each category in order to determine average speed of class demonstrations. For example, if collected data show higher level of understanding software tools and functions, tutorials will exclude excessive time dedicated for repeating certain processes and will move faster to the next step.

Progress notes are taken in each class for tracking linear progression from the first exercise to the last one (figure 11).

Student ID: 6311610010 Exercise No. 3

Quality of line:
- Line smoothness is evident
- Barely visible variations in line thickness and intensity, no any contrast to indicate occlusion shadows (eyes or mouth for example)
- Cross-hatched lines for shadows make 3D forms look flat

Student's feedback:
- Too smooth pen tablet surface makes it difficult to control line strokes

Offered solution on student's feedback:
- To increase resistance of pen tablet surface, paper on top can be taped in
(without disturbing sensors of pen tip) simulating, on that way, traditional pen on paper technique
- Demonstration on the spot of creating rough sketch (on top of student's drawing)
based on simplified geometrical shapes using pen pressure settings to create more variations in line intensity

Lecturer's conclusion:
- Student understood the objective of the exercise, but still not used to pen pressure settings
- Hesitation to make darker and higher intensity lines
- Capturing proportions on satisfying level - room for improvemens

Student ID: 6311610010 Exercise No. 6

Quality of line:
- Line smoothnes is evident, but needs better control to describe three dimensional forms (too chaotic in hair section)
- Variety in line thickness and brightness evident in areas of occlusion shadows (chin, clothes connections, eyes)
- Cross-hatched and straight lines for shadows make 3D forms look flat

Lecturer's conclusion:
- Student understood the objective of the exercise and is able to create variation of thickness and line intensity
- Capturing proportions on satisfying level

Fig. 11: Progress notes. Example of student's progress.

Preliminary reviews are assignments submitted for feedback before the final evaluation. Feedback session include artworks corrections on the spot (in online class) along with verbal explanations and advises to demonstrate process of enhancing clarity and aesthetic. One-on-one session is provided for each student based on individual preferences of graphic styles or issues encountered during learning process. Such feedbacks should reduce chances of making errors in practical works, clarify objectives of given tasks and most importantly, encourage students to increase quality of work according to their capabilities.

4. Results

According to the quality of produced artworks (excluding the final project), we can classify improvements by following categories:

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- Quality of line
- Range of values (illusion of three-dimensional objects by adding lights and shades)
- Rendering quality
- Use of color

Fig. 12: Progress from exercise number 2 (on the left) and exercise number 3 (on the right) in quality of line and observation.

Quality of line or line width the best indicator of drawing progress which is evident with 8 students out of 13. (figure 12). Improvements in line, we can see in variations of thickness where thicker and darker stroke occurs in areas with occlusion shadows and those less affected with the light source. That leads us to the second category where understanding of the basic brush settings and observational skills in terms of capturing light and dark areas takes the place. At this stage, 13 students showed good understanding of lighting and shading in exercise 4, but that number dropped to 6 in exercise 7 where they need to apply lighting and shading to more complex forms (features of the human face). Dropping number of successfully accomplished assignments in exercise 7 is affected greatly with the lack of anatomy knowledge which disturbed their focus from the value range. Rendering in fifth exercise is completed successfully by 11 students while, in the same category, this number dropped to 7 in exercise 11 where the main focus was painting rough material using hard brush tool. Keeping random brush strokes and adding high and low intensity contrasts was the most difficult part as we cannot rely heavily on the image reference, but rather on extracting visual information which provide the highest readability (clarity) of our painted object giving, on that way, impression of three-dimensional sharp forms. Finally, in use of color, 13 students proved a solid understanding of color harmonies and basic techniques of coloring digital portrait painting.

Teaching digital illustration or digital art in general is evolution in which teaching strategies mature, adapt and innovate, due to groups with different interests and ways of thinking in each semester. Also, the students present different levels of prerequisites, which assume the

conceptual demand of the subject and teacher has to propose examples adapted to each group, address their explanations in such a way to achieve the greatest possible understanding of the topics covered.

4.1 Evaluation

Rubric score system is created based on four categories listed above and each section puts emphasis on different criteria depending on types of tasks in each assignment (figure 13). On that way evaluation process provides fair amount of time that students need in order to improve their skills in each section by gradual linear progression.

Quality of line criteria need to be fulfilled by identifying efforts for achieving variety of lines. This requirement involves only one art fundamental – line. Smoothness and variations of line thickness and intensity applied consistently in the whole artwork would be requirement for the final project. In exercises section, this requirement needs to serve purpose only as an evidence of proper tool settings usage and it carries one point.

Excluding all other art fundamentals, range of values needs to provide an evidence of proper tools settings and ability to indicate source of light and areas of shadows. It does not require free drawing skills, and students can focus only on importance of value range to achieve illusion of three-dimensional forms.

Rendering quality refers on the way how lights and shadows are applied on specific surface. After deeper understanding of basic lighting, attention needs to be dedicated to transitions from light to dark and how those transitions will appear on different materials (smooth or rough surface for example). This stage involves polishing previously acquired skills adding more variety of tool usage.

Use of color is a section limited only to basic understanding of color harmonies and different ways of adding color to previously finished black and white artworks. Criteria is formed to provide an evidence for proper tools usage and coloring techniques knowledge that will be needed for the final project.

Rubric criteria follow these four sections from the first exercise to the final project where all knowledge partially learned needs to be applied in one artwork. The most obvious difference from the previous Digital Drawing grading criteria is creativity requirement. Creative process is completely excluded from the grading criteria due to following reasons:
- A solid amount of technical skills is needed in order to apply them in creative processes
- Learning creative processes is a great distraction during software training as students cannot keep the same amount of focus in both areas
- Creative processes will be learned in advanced subjects such as Drawing for Animation or Principles of Layout and Idea Generation where students will not have enough time to learn software, but rather applying skills that are already acquired in Digital Drawing subject

Evaluation screens limited to criteria mentioned above provided more measurable parameters in estimating student's efforts regardless of their skill level. Comparing to the previous evaluation practices, these criteria leave less space for subjectively driven decisions of evaluator which is often a common issue in visual design subjects.

Concept	**Exercise 1:** The file contains faded illustration. Students are required to trace given illustration reference in order to enforce creating controlled and accurate lines using pen and brush tool. All bullet points should be fullfilled for the full score. **Exercise 2:** The file contains reference photography (portrait). By observing reference, students are required to capture basic proportions using variety of lines depending on light source. Students are allowed to trace over the reference as a warming-up exercise in order to better memorize proportions and type of line strokes they use. All bullet points should be fullfilled for the full score. **Exercise 3:** The file contains 3 image references and one of them is already finished to serve as example of drawing process. Students should apply knowledge from previous two exercises by creating observational drawing using only lines. This exercise is for self-practice without supervision. All bullet points should be fullfilled for the full score.

Exercise 1	a) Quality of line 1% • Quality of line should be achieved by using variety of different line thickness that will give dynamic and playful look and feel of the drawing. • There should be attempt of achieving smoothness in line strokes • Lines should be as continuous as possible by avoiding jagged and uniformed lines and overlapping lines.	b) Execution 1% b) Execution: • Artwork is fully accomplished (all parts of the artwork are visible) • Artwork is neat (no smudges, rough edges or confusing sufficient parts) and follows given instructions on tool usage
Exercise 2	a) Quality of line 1% • Quality of line should be achieved by using variety of different line thickness and brightness that will give natural, dynamic and fresh look and feel of the drawing. • There should be attempt of achieving smoothness in line strokes. • There should be minimum two layers - layer 1: geometric/rough sketch, layer 2: final sketch	b) Execution 1% b) Execution: • Artwork is fully accomplished (all parts of the artwork are visible)
Exercise 3	a) Quality of line 1% • Quality of line should be achieved by using variety of different line thickness and brightness that will give natural, dynamic and fresh look and feel of the drawing. • There should be attempt of achieving smoothness in line strokes. • There should be minimum two layers - layer 1: geometric/rough sketch, layer 2: final sketch	b) Execution 1% b) Execution: • Artwork is fully accomplished (all parts of the artwork are visible) • Artwork follows given instructions on tool usage (layers arrangement)

Concept	**Exercise 4:** The file contains three identical objects (stylized heads) with different indication of the light source (blue arrows). Students are required to render all objects according to the light source using soft brush tool with pen pressure settings. All bullet points should be fullfilled for the full score. **Exercise 5:** The file contains three portrait images with very rough transitions of dark and light values. Students are required to convert rough transitions into smooth gradients using blending tools and create more realistic representation of the faces (focusing on skin gradients primarily). All bullet points should be fullfilled for the full score. **Exercise 6:** Return back to the file from exercise 3 where students created drawings using only lines. Now they are required to render those drawings (paint over) applying lighting and blending skills from previous two exercises. One drawing is finished to serve as example of painting process. This exercise is for self-practice without supervision. All bullet points should be fullfilled for the full score.

Exercise 4	a) Indication of three dimensional forms 1% • Using soft brush strokes with brush settings (on pen pressure), student managed to indicate illusion of three dimensional forms by creating specular and diffuse reflection, occlusion, cast and diffuse (round) shadows	b) Execution 1% b) Execution: • Artwork is fully accomplished (all parts of the artwork are visible) • Artwork is neat (no smudges, rough edges or confusing sufficient parts) and follows given instructions on tool usage (selection tools and brush settings)
Exercise 5	a) Indication of three dimensional forms 1% • Using soft brush strokes with brush settings (on pen pressure), student managed to indicate illusion of three dimensional forms • Using soft brush and blending tools, student managed to convert rough transitions to smooth gradients	b) Execution 1% b) Execution: • Artwork is fully accomplished (all parts of the artwork are rendered and blended according to given instructions)
Exercise 6	a) Indication of three dimensional forms 1% • Smooth gradients from dark to light tones indicate skin surface and illusion of three dimensional forms	b) Execution 1% b) Execution: • Artwork is fully accomplished (all parts of the artwork are visible) • Artwork follows given instructions on tool usage (layers arrangement)

Fig. 13: Rubric assessment criteria for the first 6 exercises.

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6. Discussion and Conclusion

According to the final outcome of accomplished assignments, we can identify a strong point of hands-on learning system in Digital drawing classes. Breaking down a complex task into several small and simplified ones gave solid results in understanding process of digital imagery creation. Common types of exercises regarding art fundamentals include individual dedication to each fundamental such as line, color, light and value etc. More than often, those fundamentals are taught through generic or abstract forms (for example sphere, cube, cylinder) in order to emphasize a specific objective of study. Even though this approach has proven results in art studies, in Digital Drawing classes we need to adapt to the following circumstances:

- Limited time of study (one semester)
- Need for digital assets creation (games, animation, VFX)
- Different student's profiles (majority is not interested purely in art)

Considering mentioned circumstances, teaching strategy needs constant adjustments and improvements to keep up to date with high demands of creative industry and understanding digital tools. Moreover, keeping student's motivation through simple but effective assignments can provide better connection with the nature of study (in this case digital media). Rather then a separate art subject detached from other design disciplines, Digital Drawing can offer approaches of learning art fundamentals directly through character design, game assets creation or concept art focusing on representational applied art such as digital illustration.

Weak point we encountered with this learning system is too large gap between level of complexity in certain exercises. For example, in exercise 6, students are required to render roughly lights and shades in line portraits they did in exercise 3. Rough rendering does not focus on any detail, but rather locating basic types of shadows and light accents. From this point, creating a fully rendered and high polished portrait is too big challenge for students who do not have previous drawing experience. It resulted with parts of artworks that can be perceived as unfinished, too rough or sketchy (figure 14). Room for improvements in complexity of exercises is less evident in exercise 11 where students basically need to use customized brush tool during the whole process. Instead, exercise 10 could provide more opportunities of using hard brush to make more smooth transition tool setting differences (figure 15).
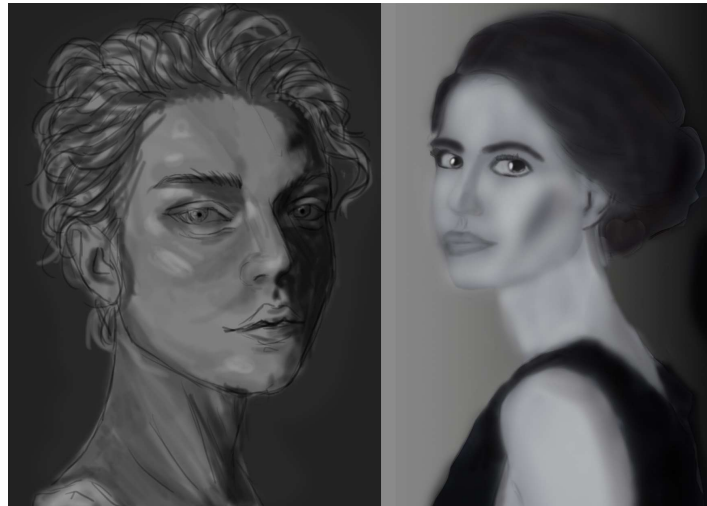
Fig. 14: Dropping quality of artworks due to large gap in tasks complexity.
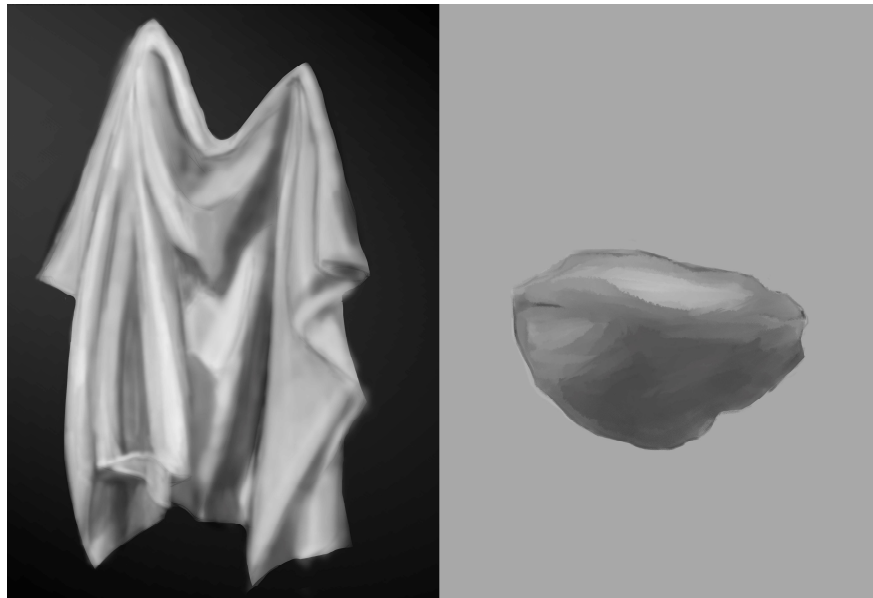
Fig. 15: Transition from using soft and hard brush for painting different materials.

Digital Drawing is a complex discipline that is developed based on professional preferences and therefore it can differ depending on professional needs of each individual. For example, in the set of tutorials related to illustration for character design anatomy knowledge is of primary importance while for industrial design purposes, those tutorials will put emphasis mainly on understanding of perspective and product design. Digital illustration tutorial-based classes with hands on experience is one of the ways to overcome difficulties in learning free drawing

providing, at the same time, an introduction to universal software tools widely used in other design disciplines in further studies and in industry.

6.1 Misconceptions about focused practice

The word focus, at first glance, means a singular place we would like to be at some point in the future. The future might be a year or a couple of years from now. The word focus might also imply that there are many distractions, as we are focusing on one thing inferring to things we have a specific point that we're trying to reach and we inherently know that we have to downplay or maybe even ignore many other prospects.

Having a focus is not the same thing as knowing the direction to take due to non-linear direction in art practice. Preparing to become an animator in the film industry, for example, is a focus, but from there, if we draw the straight line and limit ourselves strictly by focusing primarily on animation tools, we run the risk of unconsciously shutting out any turns we might have to take along the way. It is very restrictive thinking about preparation for a particular job we are trying to obtain in the future in industry as the process of learning to be an animator, as mentioned, requires fundamental drawing skills rather than learning animation software which is often perceived as a career goal by students. Creating a professional looking motion graphic requires a high level of graphic design skills that, again, requires fundamental knowledge of principles of design rooted in principles of art. The concept of digital media curriculum, therefore, should include a multidisciplinary approach to teaching visual communication fundamentals and providing a basic skill set required in the creative industry.

Setting sights on concept art job is the most evident misconception. First and most often mistake is disbalance between investing time and energy in learning the software (I.E. Photoshop and Zbrush) and studying visual communication. Software is ephemeral part of the learning tools as it is changing faster from year to year and, software knowledge itself will be outdated in near future. Ability to communicate ideas visually is essential skill that separates one artist from others regardless on tool usage in process. That leads us to another most common mistake which is disbalance in resources of study. While studying concept art by referencing other concept artists, is a part of learning process towards skills and techniques, it should not be our primary focus as we would run a great risk of replicating existent art feeding our brain with old ideas. Being able to incorporate life experiences and things we observed and analyzed in the world around us is the fundament of creating new original designs. Constant process of renewing visual library, recalling interesting visuals to combine into one whole or to initiate an idea as a starting point of visual research is in the essence of being a concept artist. It involves growing in system of beliefs creating a personal, unique approach to visual communication while developing skill set in learning new software and that approach creating pictorial style that employers in industry are searching for. Designs of a concept artist should convey meanings that fit in the context of our world and understand the subject matter through literature and personal cultural experiences which is not possible to be delivered by a teacher.

The concept of digital media curriculum should include multidisciplinary approach to teaching visual communication fundamentals and providing a basic skill set required in creative industry. Digital drawing class strategy is trying to establish connection between theoretical understanding of principles of art and practical aspect of those principles applied in digital illustration.

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TOURISM AND HOSPITALITY

INTERNATIONAL TOURIST AWARENESS AND PARTICIPATION IN SOLID WASTE MANAGEMENT: A CASE STUDY OF PHUKET, THAILAND

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Abstract: Tourists generate waste and contribute to the challenges in solid waste management (SWM) at a destination. The study aims to determine the level of awareness and participation in SWM of international tourists using Patong town municipality (Patong TM) in Phuket, Thailand as a case study. The study methods included a survey questionnaire distributed to 384 international tourists and observations of tourist behaviors on SWM awareness and participation in 5 key tourist attractions in Patong. The descriptive statistics, Pearson correlation, and Chi-square were used to analyze the quantitative data. The qualitative data was analyzed using content analysis. The findings revealed that the awareness level of international tourists was high while the participation level was medium. However, the observations showed that, very few tourists conducted positive SWM behaviors such as carrying a cloth bag, using reusable containers or separating waste before disposal. The study found a significant difference in SWM awareness of the international tourists from different regions, and visit frequency. There was a significant difference in SWM participation of the international tourists from different education, age and nationality groups. There were weak correlations between SWM awareness and participation statements. This suggests awareness on SWM alone does not necessarily produce a desirable action or behavior change. Destinations should increase engagement of the tourists in SWM by providing behavioral controls such as rules on waste disposal, incentives for reusable containers, sorting waste bins, water refill stations, and environmental interpretation signage to promote responsible and sustainable consumption.

Keywords: Waste Management, Phuket, Tourist, Awareness, Participation

1. Introduction

Solid Waste Management (SWM) is essential for good health and wellbeing of a country's income, especially those that rely heavily on tourism. Effective SWM helps reduce the negative environmental impacts from human activities such as the spread of diseases, groundwater and surface water contamination (Gregory, 2008, p. 2013 – 2015), soil degradation, death of flora and fauna (Becherucci & Seco Pon, 2014, p. 1351), flooding due to the blockage of proper drainage (Islam *et al.*, 2016, p. 29 - 31), and the increase of greenhouse gas emission. This is especially important for the quality and sustainability of the tourism destinations. However, managing solid waste (SW) is complicated by rapid urbanization, population growth, changing of consumption patterns, increase in standard of living, especially in Thailand (Koasol, 2009, p. 399). The tourism industry itself is a major part of the cause of population increases in Thai key tourist destinations (Polnyotee, 2014, p. 650 - 655; Polnyotee & Thadanitil, 2015, p. 90). According to Amornvivat *et al.* (2016, p. 14), the number of where, n is the sample size ts rose from 14.1 million in 2009 to 35.4 million in 2017. As the tourism industry contributed 10.4% to the National Domestic Product (GDP) (World Travel and Tourism Council, 2018, p. 5), the industry continues to be promoted by both national and local government, despite the environmental pressures and problems brought with its expansion. Since 2009, Thailand SW generation increased dramatically from 15.7 million tons to 26.85 million tons in 2016, equating to 1.14 kg/ person/ day (Simachaya, 2016, p. 1). In addition to the waste generation by local households, a high number of tourists lead to high waste production as one tourist produces at least one kilogram of waste per day (Mateu-Sbert *et al.*, 2013, p. 2589 - 2590). Thailand has yet to address several existing SWM challenges such as littering and poor SW separation (Polnyotee, 2014, p. 91), poor disposal, the lack of reduce, recycle and reduce (3Rs) implementation (Simachaya, 2016. p. 3). These problems are further exacerbated by the lack of financial support for the SWM infrastructure, leading to insufficient dustbins, trucks, employees, awareness campaigns as well as technology (Department of Cleanliness and SWM Patong TM, 2018, p. 27 - 31). Despite the fact that 64% of municipal solid waste (MSW) in Thailand is organic and 30% is recyclable waste (Cherdsatirkul, 2012, p. 9), the lack of awareness and participation by the public hampers the separation and potential utilization of these items. This highlights the role of an individual in reducing SW at source. In order to reduce SW, the stakeholders in SWM must be involved in separation and recycling (Chongvisal, 2018, p. 28). Tourists, as the producers of SW should be engaged to contribute to better SWM at the destinations. However, no academic literature has focused on the role and perceptions of international tourists on SWM at Thai tourist destinations. We focus on the awareness and participation of tourists in SWM using Patong town Municipality (Patong TM) in Phuket, Thailand as a study area. Three aspects support the significance of this study. Firstly, the tourism industry is the one of the biggest contributors to SW in Thailand (Polnyotee & Thadanitil, 2015, p. 91). Secondly, the number of tourists is likely to increase environmental problems in tourism destinations (Koasol, 2009, p. 399; Polnyotee, 2014, p. 91). Finally, Phuket is a major international tourist destination and can be used as a realistic case study area for the Thai tourist industry.

2. Research Objectives

The objective of the paper was to identify the level of awareness and participation in SWM of the international tourists in Patong area of Phuket Province.

3. Literature Review

In some destinations, the number of tourists exceeds the number of residents by as much as ten times causing overwhelming waste and traffic congestion during the peak tourism season (Polnyotee, 2014, p. 650-652). The increase in tourism leads to an increase of SW generation that creates difficulties for environmental protection (Polnyotee and Thadanitil, 2015, p. 90 - 92). A previous study found a positive relationship between tourism activities and SWM challenges (Shamshiry *et al*., 2011). SWM challenges are caused by both tourists and residents in the destinations. A study conducted by Mateu-Sbert *et al*. (2013) at Menorca Island in Spain estimated that a 1% increase of the international tourists led to an increase in SW generation by 0.28%. SWM challenges refer to the obstacles that hinder the management of the generation, separation, storage, collection, processing, treatment, transfer, as well as disposal of SW. The improvement in the SW generation, separation, and storage requires direct participation of the public including tourists.

SWM problems consist of both technical and social aspects. The technical problems often entail the lack of resources for appropriate disposal methods, the physical and geographical barriers for collection and transportation of SW, the composition of SW, the chemical properties of certain types of SW which are difficult to recycle, or the cost-effective techniques for material recovery. The social challenges include lack of waste reduction campaigns, poor policy on the use of plastic bags and other disposable materials, the lack of awareness, negative selfish environmental attitudes ('Not in my back yard': NIMBY), the lack of SW separation, inefficient storage, collection and poor public participation (Wangbua, 2015, pp. 49 - 61).

The study conducted by Paghasian (2017, pp. 7 - 10) indicated that the awareness levels affect the effectiveness of municipal SWM in most developing and middle-income countries. In addition, households were 67.33% more likely to segregate waste if the government enforced the law (Maskey, 2018, p. 7). In Thailand, there are several laws and regulations for SWM such as Thailand Constitution, Public health Act. B.E.2535 (C.E. 1992), Enhancement and Conservation of national environmental quality Act. B.E. 2535. (C.E. 1992), Municipality Act. B.E.2496 (C.E. 1992), and Sub – District council & local administrative organisations Act. B.E.2537 (C.E. 1994) (Pollution Control Department, 2015, p. 14). A study conducted by Desa *et al.* (2011, p. 646) in Malaysia with sample size of 589 respondents; showed that 64% of the respondents demonstrated high awareness level on SW while 63.8% were with high knowledge on SWM, however, 57% demonstrated low level of practice in SWM. The study attributed the negative attitude as the reason behind the low participation rate. This highlights the disconnection between knowledge and action and the notion that knowing something does not necessarily increase the sense of personal responsibility toward the issue (World Bank, 1998). It is difficult to change people's attitudes and social values if it is seen as a trade-off between comfort and environmental conservation (Desa *et al.*, 2010, p. 646). The studies conducted by

Madrigal & Oracion (2017, p. 49) showed that people from high education level, who were female and from older age groups were more likely to show high level of awareness about SWM. However, these personal factors and awareness can also be influenced by external factors such as social norms, legislation, and the physical environment.

This paper examined Theory of Planned Behavior (TPB) (Ajzen & Driver, 1991, p. 186) which attempted to comprehend how personal behaviors are formed. TPB stated that personal behaviors resulted from the attitude towards the behaviors (personal factors), social factors (subjective norm) and perceived behavioral controls. TPB can be used to elucidate the ecological behavior and environmentally friendly practices including SWM action such as waste recycling (Strydom, 2018, p. 9), separation (Xu *et al.*, 2017) and attitude (Eagly & Chaiken, 1993, p. 459 - 466). It postulates that the behaviors resulted from the intention which is influenced by the attitudes towards the target behavior, subjective norms and perceived behavior controls. Behavioral achievement depends on both the intention and ability which are interrelated to one another. Attitudes refer to the individual's subjective evaluation of the behavior of interest while subjective norms relate to the social pressure stemming from the people of importance to the person (LaMorte, 2019; Xu *et al.*, 2017). Perceived behavioral controls describe the person's perceptions of the difficulty or ease in performing a particular task which can be influenced by the actual control the person feels they have such as upon resources (Xu *et al.*, 2017). In this paper, to examine the role of awareness and participation of international tourists in SWM, the adaptation of TPB was employed as a research framework (Figure 1).
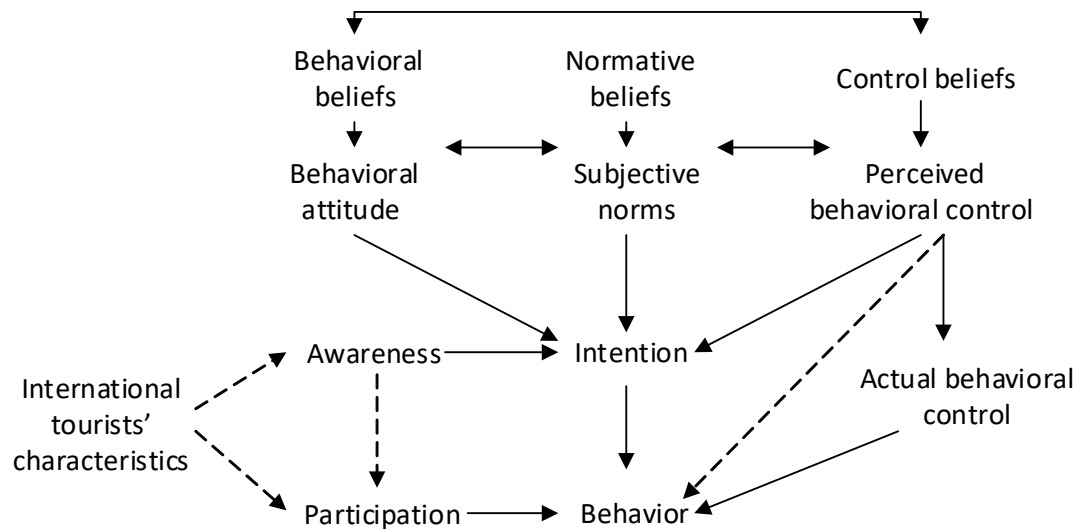
Figure 1. Research theoretical framework based on TPB adapted from LaMorte (2019)

The understanding of the relationships between tourist characteristics, demographic factors and the awareness and participation in SWM can help the local authorities at the tourist destinations strategically engage the tourists in the decision-making and planning for better SWM.

4. Research Methodology

The study was guided by the testing of three research hypotheses. Hypothesis 1, H_0: There was low level of SWM awareness and participation by the international tourists in Patong. Hypothesis 2, H_0: There was no significant difference between demographic factors and level of awareness and participation in SWM of the international tourists. Hypothesis 3, H_0: There was no significant relationship between awareness and participation in SWM of the international tourists.

4.1 Study area and sample

Patong TM is on the west coast of Phuket province in southern Thailand. It is a famous tourism destination. It is popular for swimming, water recreations and water activities such as snorkelling, wind – surfing, and water skiing (Polnyotee & Thadanitil, 2015, p. 90). Patong TM covers an area of 16.4 km^2: the registered population of approximately 20,000 people. However, this official data did not take into account the workers casual residents, those who commute from other areas, expats and tourists. In 2018, Patong TM generated the average of 189 tons of SW per day (Department of Cleanliness and SWM Patong TM, 2018, p. 17-21).

This study used a questionnaire and observations to collect both quantitative and qualitative data. The methodology was adapted from similar studies (Agwu, 2012, p. 87; Ma *et al.*, 2018, p. 338). The target population was the international tourists in the Patong area. However, there was no official record on the number of tourists visiting Patong so the sample size was calculated using a formula for an unknown population (Daniel, 1999).

$$n = Z^2 * P * (1 - P) / C^2$$

where, n is the sample size to be estimated, Z is the value on the Z table at 95% confidence level (95% Z score = 1.96), P is the percentage picking a choice or response (for example 80% = 0.8), and C is the estimated sampling error required (4% = 0.04).

A survey was conducted with 384 international tourists visiting major attractions in Patong through a convenience sampling during July – November 2018. The data collection period covered both low and high tourism seasons. Data was collected on both weekdays and weekends at various time slots to avoid temporal biases. Five key tourism attraction sites were selected based on their popularity to tourists. The key attractions covered in this study were Patong Beach, Kalim Beach, Bangla Road, Jungceylon Shopping Centre and Banzaan Fresh Market (Figure 2). The supplementary information on tourist behaviors was collected by inconspicuous observation.
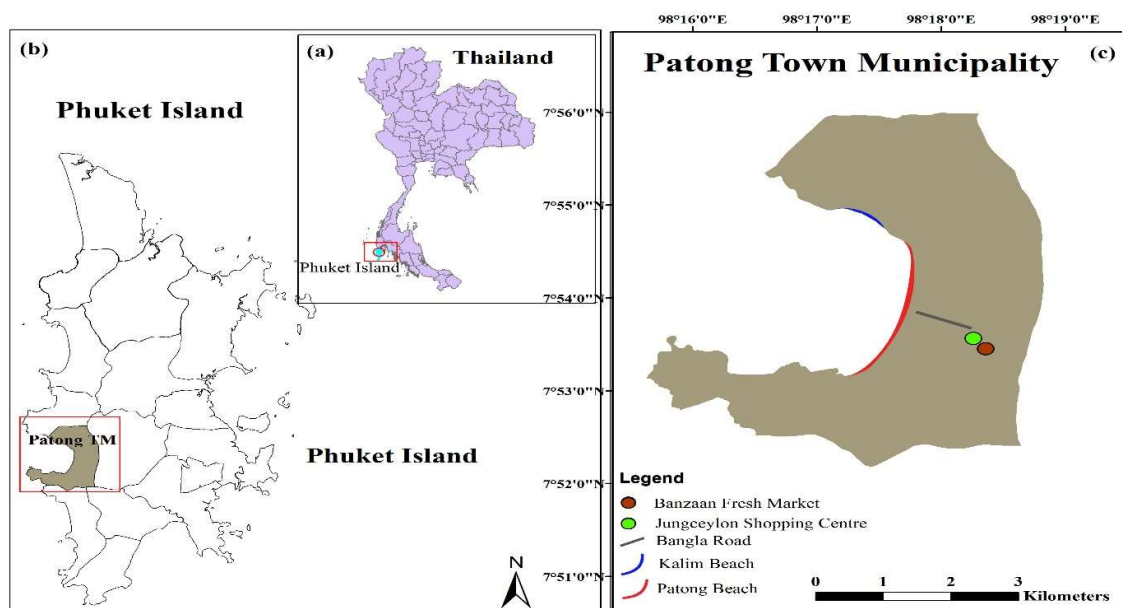
Figure 2. Maps showing the location of Patong TM. (a) Thailand map, the red box indicates Phuket Island; (b) Phuket Island, the red box shows Patong TM; (c) Patong TM, the location of the study areas.

An effort was made to collect the samples in proportion to the area size, when possible, with the exception of Banzaan Fresh Market having more samples than Bangla Road and Kalim Beach. This was due to the physical setting of the market as a building which resulted in a high density of population when the market was open (Table 1).

Table 1. The description of the study sites, sample and area size

Area	Description	Observed area (m2)	Sample size
Patong Beach	A beach with hotels, restaurants, bars, food vendors, sun beds, swimming areas, and recreational activities	125,611	144
Jungceylon Shopping Centre	A shopping mall with 200 retail stores, Robinson department store, Big C supermarket, banks, beauty salons, restaurants, and SF cinema.	6,320	80
Bangla Road	An entertainment precinct of 400 meters long with a lot of bars, market stalls, street performances, nightclubs, discos, food vendors and tailor's shops	3,578	50
Kalim Beach	A rocky beach popular for water sport activities and snorkeling with some restaurants, street food vendors and a night market.	3,148	50

Banzaan Fresh Market	A building with stores selling fresh food items such as meat, fruits, seafood, Thai sweet, and dry goods.	2, 315	60
	Total	**140,972**	**384**

In the questionnaire, there were four sections**.** The first part enquired demographic information such as gender, age, nationality, education, number of visits to Patong**.** The nationality was later grouped into regions of origin to facilitate the analyses**.** The second part asked whether the respondents had seen SWM campaigns or signs in their hotels, beaches, tourist attractions, facilities, or social media**.** The third and the forth part used a 5 - point Likert scale (Likert, 1932, p. 15 - 20) to measure awareness and participation levels. This was done through the rating of proxy statements with a number ranging from 1 (strongly disagree or never) to 5 (strongly agree or always) (Agwu, 2012, p. 88; Likert, 1932, p. 15 - 20).

The descriptive statistical analyses namely frequency, percentages and average were used for demographic information and the overall rating of the SWM awareness and participation (Babaei *et al.*, 2015, p. 96). For the purpose of interpretation, the awareness and participation levels were grouped into five categories according to the average score as following 1.00 – 1.80 = very low, 1.81 – 2.60 = low, 2.61 – 3.40 = fair, 3.41 – 4.20 = high and 4.21 – 5.00 = very high (Sunarto *et al.*, 2014, p. 68). These ranges facilitated the classification of the respondents into five levels of SWM awareness and participation. Chi-square (χ^2) was used to test significant difference between demographic variables, awareness and participation level, and Pearson's correlation was conducted to compare the awareness and participation variables (Paghasian, 2017, p. 6 - 7). The interpretation of the significance of the relationships was shown by the p-value and the strength of the correlation. A p-value of less than 0.05 ($p < 0.05$) was regarded as statistically significant (Bluman, 2008, p. 359).

5. Results

5.1 Sample profile

The profile of 384 respondents are summarised in Table 2. The majority of the respondents were female (54.69 %). Most respondents were below 30 years old (53.91 %), followed by people from the age of 41 to 50 (15.63 %), 31 to 40 years old (15.36 %) and above 50 (15.10 %). The largest number of respondents had a bachelor degree (32.81 %), followed by graduate degree (25.00 %), high school or lower (24.74 %) and diploma (17.45 %). More than half of the respondents were first-time visitors to Patong (68.23 %), followed by those who had visited 2 to 3 times (22.92 %), and 4 times or more (8.85 %). Most of the respondents were from Europe (including Russia) (52.60 %), followed by those from Asia (27.08 %), America (8.85 %), Africa (5.99 %) and Australasia (5.47 %).

Table 2. Survey respondent profile

Category	Number	Percentage
Gender		
Male	174	45.31
Female	210	54.69
Age		
≤ 30	207	53.91
31 - 40	59	15.36
41 - 50	60	15.63
> 50	58	15.10
Education		
≤ High school	95	24.74
Diploma	67	17.45
Bachelor degree	126	32.81
≥ Graduate degree	96	25.00
Region of Origin		
Africa	23	5.99
America	34	8.85
Asia	104	27.08
Australasia	21	5.47
Europe	202	52.60
Number of Visit		
First visit	262	68.23
2 – 3 times	88	22.92
≥ 4 times	54	8.85

5.2 The SWM awareness of international tourists

5.2.1 Level of SWM awareness

The survey results showed that the average scores ($\bar{x}$) for awareness statements ranged between 3.79 to 4.14 and the overall average was 3.95 (Table 3). The descriptive statistical analysis indicated high awareness level on SWM among the respondents.

Table 3. The rating for SWM awareness statements by international tourists

Awareness statements	$\bar{x}$*	SD	Level
Aw 1: Solid waste is a problem in Patong.	3.79	1.25	High
Aw 2: Every person is responsible for proper separation and disposal of waste.	4.14	1.20	High
Aw 3: Solid waste is a serious problem in the ocean.	4.01	1.36	High
Aw 4: People should use their own cups when buying take away drinks	3.89	1.30	High

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Aw 5: Single-use plastics such as bottles and straws should be banned in Patong	3.92	1.28	High
Overall average	**3.95**		**High**

* Score of 1 represents strongly disagree, and 5 represents strongly agree.

5.2.2. Observation on SWM awareness

The observation of the SWM behaviors of the international tourists focused on the behaviors of carrying reusable items such as bottles, cups, food containers, and bags and sorting the rubbish when an opportunity to dispose of it arose. For example, when a tourist put the recyclable containers into the correct sorting bins provided he or she was counted as demonstrating SWM awareness. The observation revealed that the tourists showing positive SWM awareness were 11,638 (50.08%) out of 23,236 total observed samples.

5.3 The participation in SWM of international tourists

5.3.1. Level of participation in SWM

The descriptive statistical analysis showed that the average scores ($\bar{x}$) for participation statements ranged between 2.84 to 3.43 with the overall average score of 3.12, which was interpreted as medium level. However, the rating of a statement about SW separation before disposal (Pt 3) was high ($\bar{x}$ = 3.43) (Table 4).

Table 4. The rating of SWM participation statements by international tourists

Participation statements	$\bar{x}$	SD	Level
Pt 1: I remind my family and friends to reject single-use plastic.	3.10	1.43	Medium
Pt 2: I reject plastic bags when I buy things.	3.13	1.92	Medium
Pt 3: I separate solid waste before disposal.	3.43	1.37	High
Pt 4: I carry a reusable bag/ bottle / cup.	3.24	1.35	Medium
Pt 5: I participate in community clean-up activities.	2.84	1.44	Medium
Pt 6: I take my own bag when I go shopping.	2.96	1.49	Medium
Overall average	**3.12**		**Medium**

*Score of 1 represents never and 5 represents always

5.3.2 Observation of participation in SWM

From 23,236 observed individuals, 10,531 *(45.32%)* were seen with reusable bags, 663 *(2.85%)* carried reusable containers and 444 *(1.91%)* took waste to the sorting bins *(*Figure 3*).* This shows that there is a positive potential for a policy to reduce disposable items such as a plastic bags as almost half of the tourists oberved carried their own bags.
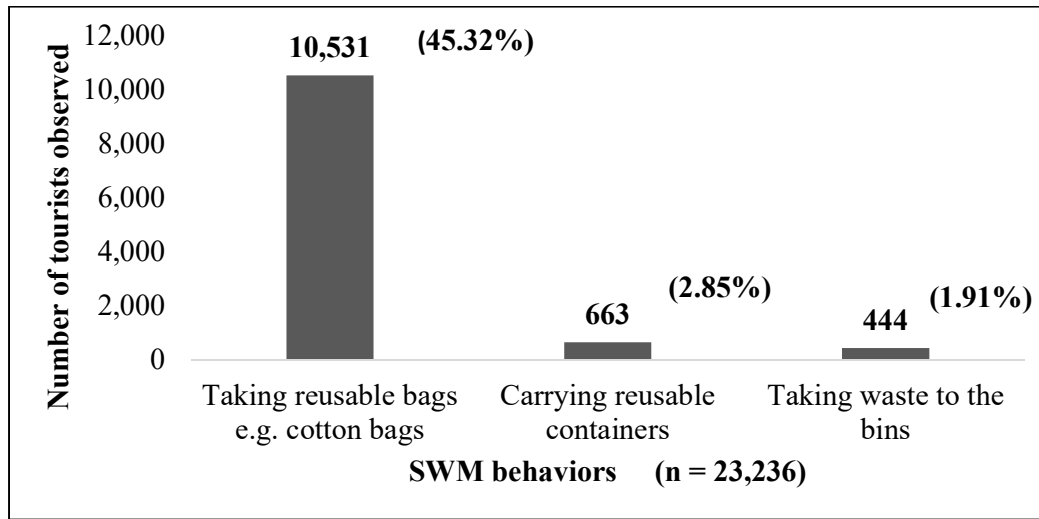
Figure 3. The observed SWM behaviors of international tourists in Patong TM

5.4 Influence of demographic factor on awareness, and participation in SWM

The summary of the awareness and participation level of the international tourists according to the demographic groups were presented in Table 5.

Table 5. The awareness and participation level by demographic parameters

Demographic variable	Parameter	Awareness level		Participation level	
		x̄	Rank	x̄	Rank
Gender	Female	4.05	1	3.20	1
	Male	3.96	2	3.09	2
Age	≤ 30	3.99	3	3.14	3
	31 - 40	3.76	4	3.34	2
	41 - 50	4.02	2	2.55	4
	> 50	4.31	1	3.62	1
Education	≤ High school	4.02	2	3.08	4
	Diploma	3.88	4	3.24	1
	Bachelor degree	4.13	1	3.15	3
	≥ Graduate	3.93	3	3.16	2
Number of visits	First visit	4.05	1	3.01	3
	2 – 3 times	4.02	2	3.13	1
	≥ 4 times	3.68	3	3.09	2
Region of origin	Africa	3.65	5	3.57	1
	America	4.17	2	3.04	5
	Asia	3.82	4	3.08	4
	Australasia	4.24	1	3.29	2

Europe	4.11	3	3.14	3

5.4.1 Demographic factor and awareness in SWM

The chi-square analysis showed that gender group, age group, and education level did not yield statistically significant differences in the level of SWM awareness (Table 6). However, the number of visits and regions of origin appeared to pose a significant difference in the awareness level on SWM. Tourists who were first time visitors showed higher level of awareness ($\bar{x}$ = 4.05) than other groups, for example, those who have been to Patong 4 times or more ($\bar{x}$ = 3.68). In addition, tourists from Australasia region reported higher awareness level ($\bar{x}$ = 4.24) than other regions, for instance, those from Africa ($\bar{x}$ = 3.65) or Asia ($\bar{x}$ = 3.82).

Table 6. Test of independence between demographic characteristics and SWM awareness level

Demographic factors	x^2	df	Critical value	Result of hypothesis of test
Region of origin	30.37	16	26.30	Statistically significant
Gender	4.23	4	9.49	Not significant
Age	17.24	12	21.03	Not significant
Education	7.48	12	21.03	Not significant
Number of visits	15.61	8	15.51	Statistically significant

H₀: There was no significant difference between demographic characteristics and SWM awareness of international tourists.

5.4.2 Demographic factor and participation in SWM

The analysis indicated that the age, education and region of origin can affect the participation level in SWM (Table 7). On average, the respondents above 50 years reported higher participation level in SWM ($\bar{x}$ = 3.62) than other age groups especially those who were 41 – 50 years old ($\bar{x}$ = 2.55). The participation level also varied with education level. For instance, the respondents with a diploma reported higher level of participation in SWM ($\bar{x}$ = 3.24) than those with high school education or lower ($\bar{x}$ = 3.08). In addition, region of origin showed a significant difference with the participation level. African reported higher participation in SWM ($\bar{x}$ = 3.57) than respondents from other regions, for example, America ($\bar{x}$ = 3.04). This result is consistent with the finding in the study conducted by Agwu (2012, p. 90).

Table 7. Test of independence between demographic characteristics and participation level in SWM

Demographic	x^2	df	Critical value	Result of hypothesis of test
Region of origin	30.69	16	26.30	Statistically significant
Gender	6.20	4	9.49	Not significant
Age	36.68	12	21.03	Statistically significant
Education	25.23	12	21.03	Statistically significant

Number of visits	5.22	8	15.51	Not significant

H₀: There was no significant difference between demographic characteristics and participation of international tourists in SWM.

5.5 The relationship between SWM awareness and participation

Pearson's correlation analysis showed positive relationship between some awareness and participation statements. The highest correlation was between "SW is a serious problem in the ocean and sea (Aw 3)" and "I remind family and friends to reject single-use plastic (Pt 1)" (r = 0.221; p < .001). The lowest correlation was between "Single-use plastics should be banned (Aw 5)" and "I participate in community clean – up activities (Pt 5)" (r = 0.105; p = .040) (Table 8). The study was consistent with the finding by Strydom (2018, p. 11 - 13) which found that the attitude had less influence on recycling behavior. This indicated the weak correlation between awareness and participation (Cohen, 1988).

Table 8: The relationship between SWM awareness and participation statements.

Statement	Aw 1	Aw 2	Aw 3	Aw 4	Aw 5
Pt 1	0.076	0.126*	0.221 **	0.198 **	0.202 **
Pt 2	0.179 **	0.149**	0.213 **	0.131 **	0.179 **
Pt 3	0.138 **	0.038	0.210 **	0.141 **	0.137 **
Pt 4	-0.020	-0.069	-0.069	0.108 *	0.060
Pt 5	-0.051	-0.132**	0.026	0.080	0.105 **
Pt 6	0.027	-0.086	0.120 *	0.099	0.074

*Correlation is significant at the 0.05 level **Correlation is significant at the 0.01 level

6. Discussion and Conclusions

6.1 The international tourists' awareness in SWM

The awareness of the international tourists on SWM was high ($\bar{x}$ = 3.95) both in terms of a local problem (the perception of waste problem in Patong) and a global issue (marine litter affecting the ocean). The findings of this study are consistent with the previous studies (Agwu, 2012, p. 89; Paghasian, 2017, p. 7 - 10). However, it noteworthy that self-reported information in the survey may not reflect what people do in reality as the behaviors can also be influenced by the physical contexts and norms which can either promote or inhibit the inherent intention of the individuals. Indeed, there is a need of using cross-examination methods in evaluating awareness and attitude. In this study, an observation of 23,236 visitors was conducted in attempt to provide supplementary information on the level of awareness in SWM. The observation results showed that more than half of the observed tourists carried their own bags (50.08%). While this may not necessarily be influenced by SWM awareness, it indicates the opportunity for waste reduction strategies such as a ban or a surcharge on a disposable plastic bag. The results show that a large proportion of respondents agree with the SWM awareness statements. The statement that *"AW 2: Every person is responsible for proper separation and*

disposal of waste" were rated with the highest average scare (4.14) indicating that tourists are aware of their role in SWM. The awareness of the extent of solid waste problem in the ecosystem and a tourist destination is shown in *"Aw 3: Solid waste is a serious problem in the ocean"* ($\bar{x}$ = 4.01) and *"Aw 1: Solid waste is a problem in Patong"* ($\bar{x}$ = 3.79). In terms of a solution, there were positive responses towards waste reduction policies as demonstrated by the rating of the statements *"Aw 4: People should use their own cups when buying take away drinks"* ($\bar{x}$ = 3.89) and *"Aw 5: Single-use plastics such as bottles and straws should be banned in Patong"* ($\bar{x}$ = 3.92).

The global trend in environmental movements could contribute to the increased knowledge and attention on sustainability and environmental issues. In addition, the popular use of communication technology especially social medial such as Facebook, Instagram, YouTube, Line, and Twitter have increased the accessibility of information and the spread of environmental messages. The findings suggest positive societal values towards waste reduction and separation which can be used to support the SWM policies at tourist destinations.

6.2 The international tourists' level of participation in SWM

In contrast to the reported high SWM awareness level, the overall participation in SWM of the international tourists were medium. This finding was in line with the previous studies conducted in India (Agwu, 2012, p. 89; Chongvisal, 2018, p. 30 - 34) and the Philippines (Paghasian, 2017, p. 7 - 10). The statement which received the highest average score was *"Pt 3: I separate solid waste before disposal"* ($\bar{x}$ = 3.43). This shows that the international tourists could help increase waste separation at source if encouraged to do so. The reasons for lower scores on other statements such as *"Pt 4: I carry a reusable bag/ bottle / cup"* ($\bar{x}$ = 3.24), *"Pt 2: I reject plastic bags when I buy things"* ($\bar{x}$ = 3.13), and *"Pt 6: I take my own bag when I go shopping"* ($\bar{x}$ = 2.96) could be due to the inconvenience and limited physical factors such as the SWM facilities and services. For example, the shops and supermarkets staff may put things in a plastic bag or containers before asking if they were needed. Carrying one's own containers also require a preparation and commitment. *"Pt 1: I remind my family and friends to reject single-use plastic"* ($\bar{x}$ = 3.10) reflects the individuals' expectation of their social circle in reducing waste. The statement with the lowest average score was *"Pt 5: I participate in community clean-up activities"* ($\bar{x}$ = 2.84). It is noteworthy that the last statement can be influenced by both the lack of activity and the lack of interest.

Public participation remains the challenge in SWM. For the international tourists from various backgrounds, language and different norms add more barriers to the practice. The lack of supportive conditions could further hamper an effort towards effective SWM. The SWM facilities is not limited to bins and disposal infrastructure but also include sorting bins, environmental signs and campaigns, water refill stations, alternative containers or packaging materials which could help promote zero waste behaviors. In Patong TM, many of these facilities were absent. For example, some international tourists carried reusable containers but there were no water stations to refill. At Kalim Beach, there was a lot of litter due to the absence of dustbins and no incentive was present to encourage tourists to behave otherwise. The presence of littering and other forms pollution around tourist attractions and the local people's

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behaviors towards SWM can also influence the views and actions of the tourists towards waste. This can be described by the broken window theory, which states that the occurrence of unlawful events is influenced by visible signs of unlawful activities having already taken place (Wilson and Kelling, 1982, p. 4 - 6). Furthermore, tourists tend to use their holiday for a break from their usual responsibilities, which may extend to environmental obligations (Whitmarsh *et al.*, 2018, pp. 7 - 10) hence lead to poor participation on SWM.

6.3 Influence of demographic factor on awareness, and participation in SWM

The chi-square results revealed that there was no significant difference between the age and awareness of the international tourists on SWM. This implies that the age of international tourists does not affect the level of their awareness of SWM. In addition, there was no significant difference between education and awareness level of international tourists on SWM. This shows that having a higher or lower education level does not affect the awareness level. Similarly, the results revealed that there was no significant difference between gender and awareness of international tourists on SWM. Being female or male does not affect the awareness level. The number of visits showed a significant difference, although marginally, with the awareness level on SWM. Unfortunately, it appeared that the level of awareness tends to decrease with an increase in the number of visits. Tourists who visited Phuket for the first time showed higher levels of awareness on SWM than the return visitors. This suggests that return visitors may have become used to the level of mediocre cleanliness and littering found in Phuket. In addition, there was a significant difference with the awareness level of international tourists on SWM among different nationalities. International tourists from Australasia exhibited higher awareness levels on SWM than other countries. This might reflect a carry-over of their habits when visiting beaches at home.

Some of the findings in this study were different from the past studies in terms of age, gender and education awareness of SWM (Madrigal & Oracion, 2017, p. 49). The differences could be caused by several factors. Firstly, the knowledge on environmental conservation has spread throughout the societies regardless of age, gender and education level as information on environmental condition can be found both through social and traditional media channels. Social media is an especially powerful tool for spreading such messages as it has been reported that 57% (4.388 billion) of the world population used internet and about 45% (3.48 billion) were active on social media (Kemp, 2019). Secondly, the promotion of Sustainable Development Goals (SDGs) in many countries has led to a global trend toward environmental conservation and sustainability. For example, in 2015 a total of 193 countries member adopted the agenda of transforming the world towards more environmental conservation and sustainability (UNDP, 2015).

On the contrary, the present study reflects a significant difference between age and participation level in SWM. The respondents aged above 50 years showed higher participation level in SWM than those between 31 -40, 41 - 50 and ≤ 30. The results in this study were similar to the findings in Singhirunnuson *et al.* (2012, p. 45) which showed a significant difference between age in recycling of SW. This previous study found that respondents with older groups were more likely to participate in recycling of SW. This suggests a link between older people with

environmental concern because they have experienced the effects of poor environmental conditions such as poor SWM in their lifetimes. Another possible factor could be due to lifestyle and living conditions as older people may have more time and control over where they will buy grocery or get food from and hence and prepare their own containers and bags or avoid going to the places that do not provide the services and facilities that meet their demand. There was a significant difference between education and participation level of international tourists in SWM. For education, respondents with a diploma, a bachelor and graduate degree showed higher participation in SWM than those with high school education or lower. This is in line with the increase attention in environmental issues in formal education. The differences according to region of origin showing that tourists from Africa and Australasia showed higher participation in SWM than those from Asia, Europe and America could be due to the different priority of SW in the national policies of the countries in these regions. Also, the numbers of respondents from Africa and Australasia were fewer compared to those from the other regions.

Some of the findings in this study are different from the past studies. For example, a study by Agwu (2012, p. 89) in Nigeria on the issues and challenges of SWM practice showed that there was a difference between gender and participation. In the work of Singhirunnuson *et al.* (2012, p. 45) in a Thailand community on household recycling behavior and attitude toward waste bank projects both showed that there was a gender difference in separation and recycling behavior. The reasons for the difference could be caused by different context between two studies (home and holiday contexts). Situation factors such as availability of SWM facilities and policy that played a great role in participation in SWM (Ajzen & Driver, 1991, p. 185 - 187). The roles of an individual member may change based on the context due to the fact that holiday is for leisure therefore people may be free from normal obligations (Whitmarsh *et al.*, 2018, p. 1).

6.4 Relationship between awareness and participation SWM

Pearson correlation was used to determine whether there was a significant relationship between awareness and participation of the tourists in SWM. Based on overall awareness ($\bar{x}$ = 3.95) and participation ($\bar{x}$ = 3.12), the results showed that there was no statistical significance in overall awareness and participation statements on SWM. However, there was a statistically significant correlation among some individual items in awareness and participation statements. The analysis based on individual items awareness and participation indicated that international tourists with a high awareness of the SW problem were likely to *"reject single-use plastic and separate SW before disposal"*. The positive response towards the statement that "*Every person is responsible for proper separation and disposal of waste*" showed a correlation with the statements that the individual *"reminds family and friends to reject single-use plastic"*; and *"rejects plastic bags when buying things"*. International tourists who were aware of *"solid waste as a serious problem in the ocean and sea"* were likely to *"remind family and friends to reject single-use plastic"*, *"reject plastic bags when buying things"*, *"separate solid waste before disposal"* and *"take their own bags to shop"*. Moreover, international tourists who said they *used their own cups when buying takeaway drink* were likely to *remind family and friends to reject single-use plastic*, *reject plastic bags when buying things*, *separate solid waste before disposal* and *carry reusable bag/ bottle/ cup*. International tourists who agreed that *"single-use*

plastics should be banned" were likely to *"remind family and friends to reject single-use plastic"*, *"reject plastic bags when buying things"*, *"separate solid waste before disposal"* and *"participate in community clean – up activities"*.

These findings were supported by previous studies such as a research conducted by Agwu (2012) demonstrating a significant relationship between awareness and practices on SWM. Other research conducted by Abbas and Sigh (2014, 1757 - 1758) in India also revealed a relationship between awareness and participation in environmental conservation. However, there was also a negative correlation (inverse relationship) between some statements of awareness and participation. International tourists who stated that proper separation and disposal of waste was an individual responsibility tended to not participate in community clean–up activities. It signifies the notion that knowing one's responsibility does not necessarily influence one to participate in community wide initiatives.

Overall, the findings supported TPB, which explained the contribution of situation factors (behavior control) for participation. The intention towards the participation will work effectively if there is behavior control. SWM participation of international tourists depends on many factors including the availability of supportive SWM facilities. For example, international tourists can have their own bottles but there is no place to fill water. This indicates that although some international tourists may be aware and willing to reduce waste, the lack of infrastructure can be an obstacle. The external behavior controls such as location and availability of facilities are necessary for promoting positive SWM practices (Ajzen & Driver, 1991). The results suggest that being aware of SWM does not necessarily influence to take actions. The findings were consistent with previous studies conducted by (Agwu, 2012, p. 90; Abbas & Singh, 2014, p. 1756 - 1759). The attitude – participation in SWM can be observed where there is enough supportive facilities. The weak link between awareness and participation in SWM found in this study indicated other influencing factors such as situation factors. There are other variables than proposed by TPB in participation in SWM). It was noteworthy that the negative relationship was observed between the rating of a statement that proper separation and disposal of waste was an individual's responsibility (Aw2).

6.5 Conclusion

The level of awareness in SWM of the international tourists in Patong area of Phuket Province is high while the participation is medium. Hence, Hypothesis 1 which stated that poor SWM is caused by low level of awareness of the international tourists about SWM was rejected. In terms of Hypothesis 2, the null hypothesis was rejected as there was a difference in awareness level according to region of origin and visit frequency. The participation level showed a significant difference among region of origin, age and education segments. The results show that region of origin is the demographic variable which can affect both levels of awareness and participation in SWM. On the contrary, gender shows no effect on neither awareness nor participation. Lastly, Hypothesis 3 was rejected. Although the overall score of awareness and participation showed no significant relationships, the score of individual statements revealed relationships between some attitudes and behaviors. Some awareness statements which represent certain attitudes were more likely to be in line with positive SWM participation. For

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example, people who agreed that *"Single-use plastics such as bottles and straws should be banned in Patong"* are more likely remind others around them to reject a single use plastic. However, the participation or the behavior may not be achieved even with the positive SWM intent if the behavior controls are not established or visible. This finding is supported by TPB that behaviors are influenced by the intent which are shaped by specific attitude, social norms and perceived behavioral control.

This study found that in the context of international tourists in Patong TM, Thailand, the awareness level was not a strong predictor of participation in SWM. There is a need for external or physical supportive conditions to enforce and promote desirable SWM behaviors such as visual campaigns, signage, waste separation bins, water refill stations and incentives for tourists to reduce SW especially single use plastics. The participation in SWM of a dynamic and multicultural population in a tourism destination may be influenced more effectively through behavior control such law enforcement and sufficient provision of SWM infrastructure than the subjective norms and personal awareness. This highlights the difficulties in predicting the behaviors of the periodic population through the personal factors alone in a tourism context. Further investigation should be done to identify the variables underlying SWM behavior in different contexts. This study recommends that introducing incentives for returning containers after use or the promotion of reusable cups, bags or food containers through a discount or vouchers at the shops and restaurants positively engage tourists in desirable SWM behaviors. It is found that the awareness (attitude) is not sufficient to indicate the actions if measured by the indirect method or verbal declarations of opinions as it allows for a judgement of value rather than actual behavior and may not reflect the originality of response. Further study or additional steps should be done to supplement the findings from verbal or self-reported evaluation of awareness by using direct observations and measurement of the specific target behaviors.

Patong could improve the operation of its SWM and tourism image through better engagement of the tourists and the public in positive SWM behaviors. The following guidelines provide some preliminary steps to increase the awareness and participation of the international tourists in SWM.

- Providing SWM education to international tourists through notifications via mobile phones. This could be achieved through a tourist SIM card or free WI-FI services.
- Improving facilities and infrastructure such as bins by using colours and labels to support separation of waste, and having designated smoking areas, water refill stations, and promotional posters and signs to promote reduction of single-use items.
- Introducing incentives for returning containers after use or the use of reusable cups, bags or food containers through a discount or vouchers at the coffee shops and restaurants. A simple refund is usually effective.
- Introducing strong education campaigns aimed at changing attitude and raising awareness on SW problem by creating a sense of responsibility, promoting a sense of ownership of the problem among international tourists and the local operators.

- Implementing laws and increasing enforcement against littering and making rules and regulations visible in multiple languages. The presence of authority can encourage international tourists and tourism stakeholders to participate in positive SWM practices.

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FACTORS AFFECTING INTERNAL TOURISM EXPENDITURE IN THE PHILIPPINES AS THE BASIS FOR A TOURISM ENTREPRENEURIAL BUSINESS OPPORTURNITY MODEL

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Abstract: Tourism is one of the prime contributors to economies although its role is complex and it is composed of several sectors whose success is inter-dependent. The purpose of this study was to investigate and gather data as represented by tourists' consumption of products and services in the year period 2014 2018, as the basis of an entrepreneurial business opportunity model. Secondary data were analyzed using a retrospective study approach, which compared the performance of different sectors of the tourism industry. Based on the results within the five-year period, domestic tourism contributed a higher share of internal tourism expenditure than inbound tourism. The expenditure on products and services by domestic tourists was ranked as follows: 1) miscellaneous, 2) travel agencies and other reservation service, 3) Shopping 4) accommodation services for visitors, 5) food, beverage and restaurant services, 6) entertainment and recreation services, and lastly, 7) transport services as the lowest contributor. Nevertheless, inbound tourism expenditure also contributes significantly to overall tourism expenditure in the Philippines and to the country's economy. Based on the results of the study an entrepreneurial business opportunity model of tourism was constructed as a guideline for existing and aspiring entrepreneurs within the industry.

Keywords: Tourism, inbound tourism expenditure, domestic tourism expenditure, internal tourism expenditure, tourism entrepreneurial business opportunity model

1. Introduction

The Philippines is one of the highly recognized Asian countries that are rich in natural resources that catch the attention of the travelers around the world as it offer treasures such as the World Heritage List properties that relate the history of the Filipino people as this illustrate how Filipino creativity grew into a different national architectural design namely; Tubbataha Reef National Marine Park, the Rice Terraces of the Philippine Cordilleras, the Historic Town of Vigan, the Puerto Princesa Subterranean River National Park, and the Baroque Churches of the

Philippines – Santo Tomàs de Villanueva in Miag-ao, Iloilo; San Agustin in Paoay, Ilocos Norte; Nuestra Señora dela Asunción in Santa Maria, Ilocos Sur; and San Agustin in Intramuros, Manila. Likewise, the Philippines can claim as Asias Beach Capital with crystal blue waters of both the Chia and Pacific Ocean to name a few; Boracay, Pagudpud, Mactan Island, Panglao and many more as mentioned by the Department of Tourism (tourism.gov.ph n.d).

The Philippine tourism, maintain its attractiveness to multi-cultural travelers around the map as it generates number of tourist arrivals from in the last five years. These tourists came all the ways from Korea, China, USA, Japan, Taiwan, Australia, Canada, United Kingdom Singapore and Malaysia who enjoyed the beauty of nature and the hospitality of the Filipinos. Thus, the presence of tourists opens the door of opportunities to the existing and aspiring entrepreneurs in the tourism industry who are engaged in the products and services within the industry. These entrepreneurs come in different sizes in terms of capitalization that equates to the number of job opportunities created to the communities as the means of livelihood of people who serve quality service to the tourists. These tourists both domestic and international are the backbone in giving business opportunities to the entrepreneurs.

However, just like the other products and services in most industries the creation of entrepreneurial business opportunities in the travel and tourism will always be dependent on the entrepreneurs commitment in serving quality products and services that complements other important factors to serve the tourists that will make them happy and delighted and bring beautiful memories back home. Thus, the industry player as entrepreneurs should work hand in hand, as products and services are interdependent packaged and offered as one product the failure of one affects the other and vice versa. It is in this context that the succeeding pages will show the results of the study showing how Philippine tourism achieved its objectives in a five-year period by looking at the performance of each factor specifically as contribution to the Internal Tourism Expenditure and the economy in general.

Therefore, entrepreneurs assert their efforts to update themselves as to the latest trends in the tourism industry adapt new changes and work in one direction in order to maintain its competitiveness as compared to other regions as well as give a greater contribution to the success of everyone. Thus, this study gives a general view on the significant contribution of every player in the sustainability and the creation of business opportunity within the travel and tourism industry.

2. Research Objectives

In reality, there are no set of qualifications neither experiences required to anyone who may engaged themselves in any business venture for as long as there is commitment and passion to succeed, anyone has freedom to join the bandwagon in the world of entrepreneurship. However, it takes a lot of effort and compassion to succeed in any endeavor that one may take as they will learn along the process. There are lot of stories of successful entrepreneurs who started from scratch but because of continuous efforts and open-mindedness the skills needed were honed through tough times as they experience and learn the ups and downs on the performance of business and learn to innovate and formulate strategies to meet the needs and wants of the

customers through the changing demands in the market.   In the world of travel and tourism as a service oriented industry, where every component grasps the significance on the existence of every player where the success of one is the success of all. This study however, aims to develop a "Tourism Entrepreneurial Business Opportunity Model" to aid the entrepreneurs particularly the new entrants in sharing insights and show a clearer understanding on how the travel and tourism factors or components in the business operation, as specifically it aims to:

1. To give a general view and show the complexity as well as the interdependence on how each industry player as factors affect one another.
2. To give a clearer picture how tourist consumptions on by products and services either both domestic and inbound expenditure affects the internal expenditure as the sum total of tourism industry's contribution to the economy.
3. To discuss the results of the study that led to the formulation of the Tourism Entrepreneurial Business Opportunity Model.

3. Literature Review

Tourism as a System

Tourism is quite complex, and is composed of and supported by several components, which make it more attractive and marketable when products and services are packaged together. According to Ritchie and Crouch (2003) "what makes a tourism destination truly competitive is its ability to increase tourism expenditure, to increasingly attract visitors while providing them with satisfying memorable experiences, and to do in a profitable way, while enhancing the well-being of destination residents and preserving the natural capital of the destination for future generations". "As a system, it is a group of interrelated, interdependent and interacting elements that together form a single functional structure, and the tourism industry is the sum of the industrial and commercial activities that produce goods and services or wholly mainly for tourist consumption" (Weaver & Lawton, 2006). "Travel industry represents a "broad church", comprising organizations that provide a diverse range of services such as, but not limited to, transport (air, land, sea and space), accommodation, food and beverage, recreation and attractions, information and booking services (such as travel agents, and advice sites such as TripAdvisor), tour guiding and events, and destination marketing" (Robinson, Fallon & Crotts, 2016). In addition to this context (Chon & Sparrowe, 2000) said that components of hospitality and tourism are interrelated, without attractions and hospitality establishments, there is usually no popular destination.

The innskeep model adapted by Libosada & Bosangit (2007) provides a bigger picture describing the composition and operation of tourism as a business, the components of which include:

a) Tourist attractions and activities which provide the main motivation for tourists to visit a certain destination.

b) **Accommodation,** which refers to lodging facilities where tourists can stay including hotels, resorts, pension houses, apartelles and other similar form of lodging such as bed-and-breakfast and homestays;

c) Other tourist facilities and services, which include food establishments, postal facilities, medical services, banking and money exchange services, retail shops, craft and souvenir shops, and personal services like hair dressing;

d) Institutional elements, a component which is not very visible to tourists but ensures that all other components are present and provide excellent tourism services, including education and training of personnel working in tourism establishments, marketing and promotion of tourist destinations, and standards and regulatory mechanisms for tourist facilities and services. The government sector, tourism agencies and tourism associations are responsible for this component, which has the broader responsibility of unifying all the other elements to ensure that they work towards providing a high quality tourism experience for visitors, as well as ensuring that unpleasant tourism experiences are at a minimum.

e) Other infrastructure, which refers to hygienic water supplies for drinking, and washing, adequate electrical power, proper waste disposal and adequate telecommunication facilities to allow tourists to keep in touch with their homes, all of which are essential for tourists. This infrastructure supports tourism facilities such as hotels, restaurants and others, in catering to the needs of tourists, and should be in place before tourist facilities are developed.

f) Transportation, which provides access to a destination including transportation by air, land (road and rail) and sea. It includes the vehicles or means of conveyance relevant to each form of transport, all or only some of which may be available at a destination. Transportation is a vital part of a tourist's trip and is generally, the first step of a tourism experience when the tourist begins his/her journey.

g) Business model, a paradigm by which certain institutions organizations or groups of organizations comprising major players in the tourism industry generate revenues and profits.

Tourism as a Business Sector

Tourism industry according to Vanhove (2011) "is an economic sector in general comprises firms that produce the same products or services, or the same group of products and services and/or are based on the same materials thus, the inseparability of services is an important characteristic". According to the World Travel and Tourism Council (WTTC, n.d) the direct contribution of travel and tourism (T&T) to the economy reflects the internal spending by domestic and inbound tourists for business and leisure purposes, with the most obvious and

tangible benefits of tourism being income, foreign exchange earnings, tax revenue, and the generation of employment (Benavides, 2001). Tourists' expenditure creates business opportunities, and meeting tourists' demands strengthens and aids the efficiency of the services provided by the T & T industry. Anything that is spent by either inbound or domestic tourists that has of monetary value generates revenue as it triggers to a more economic activities resulted to a job opportunity within the community. Thus, as the WTTC (n.d,) note, jobs are generated directly through employment in hotels, travel agents, airlines and other passenger transportation services as well as in restaurants and activities associated with the leisure industries directly supported by tourists. Further, as the United Nations World Tourism Organization (UNWTO; n.d.) has noted, T&T industries are largely labor intensive and provide jobs, income and experience for many people, which contribute to their social inclusion and personal development. On the other hand, the concept of the multiplier is used in the travel industry to encompass the direct secondary effects of visitor expenditures on an economy (Gee, Makens & Choy, 1989).

The tourism business is composed of industry players of different sizes who provided a variety of services aimed at satisfying tourist demands and making of every tourist's stay memorable from the time of their arrival to their departure. Many industry players are small and medium enterprises (SMEs) who invest their resources, aiming not only to earn a profit but also to make their existence relevant to society. Their presence creates employment, contributes to national development through the payment of taxes, and improves the local facilities by building infrastructure projects implemented by the government sector. Moreover, factors such as, friendly tourist policies, peace order and security, quality products and services will always encourage tourists to return often to a destination.

According to Katz and Green (2001), small enterprises employ 50 or less while medium enterprises have from 51 to 500 employees, with both types of enterprise being independent and owner-managed. In the modern era, many SMEs are innovators who think of new ideas and efficiently deliver products and services. As innovators, they are more open to introducing and adapting to change, as well as being sensitive to the needs of the community. In the tourism sector, they provide quality products and services to tourists through a variety of types of business, including hotels, restaurants, various forms of transportation, souvenir and other types of shops, and other establishments which make a tourist's stay memorable, by providing a high level of customer satisfaction, with the aim of achieving repeat business. Successful entrepreneurs think long-term and adopt a sustainable approach to the particular area in which they operate, and are able to offer good service to the community and the society in general. Further, as Getz, et. al. (2004), noted, small owner-operated businesses provide most of the services which attract visitors' spending.

Anyone who owns a business is an entrepreneur, including the owner of small businesses, and it is important for both existing entrepreneurs who have been operating within the tourism industry, as well as new entrants to keep abreast of developments in the tourism business. As noted above, the various components of the tourism industry are inter-dependent and new ideas can lead to new business opportunities (Katz & Green, 2001).

Tourism entrepreneurs should be aware of important indicators, such as the number of tourist arrivals and, most importantly, tourists' reasons for and behavior in spending money during their stay, before making any major business decisions.

Inbound tourists are people not permanently residing in a specific country destination. They may travel as individual travelers or in groups, for leisure or for business purposes. As Davidson (1994) noted, business tourism in which people travel for reasons related to their work represents one of the oldest forms of tourism, with man having travelled for this purpose of trade since very early times. On the other hand, during a tourist's visits, he/she will spend money for basic needs, availing her/himself of products and services, while taking time to appreciate the beauty of and attractions at the destination as a tourism product. According to the World Tourism Organization, the measurement of numbers of inbound visitors can provide information about expenditure that permits the estimation of the economic impact of tourism at both national and local levels.

On the other hand, domestic travelers are people who live permanently in a country and use the products and services offered at a locality within that country. For instance, domestic travelers may be people spending time with their family at the weekend or dining at a restaurant, or may be representatives of business organizations conducting business meetings in tourism facilities, such as hotels and restaurants. All these activities entail tourism expenditure by visitors which represents the amount paid for the acquisition or the consumption of goods and services, including those imported into the country and sold to visitors for personal use during tourism trips, or purchased to be given away as gifts, and includes expenditure by visitors themselves, as well as expenses paid or reimbursed by others (UNWTO, 2010).

Over recent decades, T&T and the increasing numbers of tourist arrivals have unquestionably been major contributors to developing economies, with public and private sectors working together to support tourism by providing quality services to both inbound and domestic tourists, including accessibility to transportation, infrastructure projects and the development of hotels, restaurants and other tourism facilities. In addition, the implementation of policies to ensure peace and order at tourist destinations leads to the sustainability of T&T. The number of tourists determines the level of economic activity in the tourism business, and large numbers of tourists will result in fully booked hotels and restaurants and will in turn lead to industry players who provide quality services to meet their business objective, which is to earn income. As (Archer, 1977) tourism is a catalyst by which to generate income.

Summing inbound and domestic tourism expenditure results in the internal tourism expenditure that represents the value of tourism through the performance of business activities and the contribution of tourism to the economy. Internal tourism expenditure comprises all tourism expenditure of visitors, both resident and non-resident, within a particular economy. This indicator provides the most comprehensive measurement of tourism expenditure in an economy and is important for entrepreneurs in making decisions in a sustainable business undertaking. In a way, tourism expenditures depends to the demands which refers to the "total number of persons who travel, or wish to travel, to use tourist facilities and services at places away from their places of work and residences (Mathieson & Wall, 1982).

Tourism in the Philippines

Spending by tourist arrivals in the Philippines is economically significant. According to the Department of Tourism (tourism.gov.ph, 2019), tourism in the Philippines reached a new milestone in 2019 with 8,260,913 visitor arrivals, representing an increase of 15.24% compared to 7,168,467 in 2018 thus achieving the target of 8.2 million set by the National Tourism Development Plan, 2017-2022. As well as being rich in natural resources, which makes the Philippines an attractive tourist destination, the country has put in place a variety of policies and facilities to support tourism and to enhance productivity and sustainability in the tourism sector. In 2019 the key inbound tourist markets were Korea, which generated 1,989,322 arrivals (an increase of 22.48 % over 2018), China, with 1,743,309 arrivals, (a substantial growth of 38.58 % compared to 2018), the USA with 1,064,440 arrivals (an increase of 2.90 % over 2018). Japan with 682,788 arrivals (an increase of 8.07 %). The Taiwanese market also showed substantial growth of 35.01 %, with 327,273 arrivals in 2019. Australia, Canada, and the United Kingdom all posted growth rates in 2019 and remained reliable sources of visitors. Australia provided 286,170 arrivals with 2.27 % growth. Canada contributed 238,850 arrivals with a 5.48 % increase, while the United Kingdom supplied 209,206, representing a 4.06 % increase. Finally among the top ten markets were ASEAN neighbors Singapore and Malaysia, with Singapore providing 158,595 arrivals and Malaysia 139,882. In addition, there were more than 100,000 visitors from both India and Germany.

The study reported in this paper retrospectively analyzed the contribution of T&T to the Philippine economy based on internal tourism expenditure, comprising inbound and domestic tourism expenditure as its major components, representing the contribution of tourism to the Philippine economy for the five-year period, 2014-2018. The study was based on data published by the Philippine Statistics Authority (PSA), based on which a business model of tourism was created, the results of which will benefit the decision-making by stakeholders in the tourism sector as well as contributing to the academic literature relating to T&T.

4. Research Methodology

The methodology adopted in this study entailed the collection of secondary data, which was then analyzed to identify significant factors in the contribution of tourism to the Philippines' economy. According to Donnellan and Lucas (2013) secondary data analysis "refers to the analysis of existing data collected by others", which "affords research the opportunity to investigate research questions using large-scale data sets that are often inclusive of under-represented groups, while saving time and resources".   "…refers to the analysis of existing data collected by others…", which "…affords researchers the opportunity to investigate research questions using large-scale data sets that are often inclusive of under-represented groups, while saving time and resources."

 Retrospective study was applied to review five-year data relating to tourism expenditure in the Philippines during 2014 and 2018, which was grouped into a) inbound tourism expenditure b) domestic tourism expenditure, summarized as c) internal tourism expenditure, representing the total contribution to the Philippine economy. As Salkind (2010) noted "A retrospective study

design allows the investigator to formulate hypotheses about possible associations between an outcome and an exposure and to further investigate the potential relationships." "A retrospective study design allows the investigator to formulate hypotheses about possible associations between an outcome and an exposure and to further investigate the potential relationships.

The internal tourism expenditure was categorized by the products or services to which it relates, as follows: 1) accommodation services for visitors 2) food, beverage and restaurant services 3) transport services 4) travel agencies and other reservation services 5) entertainment and recreation services 6) country-specific tourism services, including shopping, and 7) miscellaneous.

The data for the five-year period, 2014-2018 for both inbound and domestic tourism expenditure were then analyzed based on that classification in order to of identify the main contributions to tourism income for the benefit of stakeholders in the tourism business. Further, the 2018 list of establishments recorded a total of 1,003,111 business enterprises operating in the country. Of these, 998,342 (99.52%) are MSMEs and 4,769 (0.48%) are large enterprises. Micro enterprises constitute 88.45% (887,272) of total MSME establishments, followed by small enterprises at 10.58% (106,175) and medium enterprises at 0.49% (4,895). Whereas, it is distributed into different sectors such as; (1) Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles (461,765); (2) Accommodation and Food Service Activities (144,535); (3) Manufacturing (116,335); (4) Other Service Activities (66,162); and (5) Financial and Insurance Activities (46,033). These industries accounted for about 83.62% of the total number of MSME establishments (dti.gov.ph, n.d).

5. Results

According to the data recorded by the Philippine Statistics Authority (2019), the contribution of the tourism industry to the Philippine economy was estimated to be 12.7 % in 2018. The tourism direct gross value added (TDGVA) serves as an indicator to measure the value-added of different sectors of the tourist industry in relation to the tourism activities of both inbound and domestic visitors in the country, and amounted to PhP2.2 trillion in 2018, which was 14.3 % higher compared to the previous year's figure of PhP1.9 trillion. This includes inbound tourism expenditure within the Philippines, which declined by 1.6 % in 2018, to PhP441.4 billion from PhP448.6 billion in 2017.

In contrast, domestic tourism expenditure grew by 21 %, from PhP2.6 trillion in 2017 to PhP3.2 trillion in 2018. Domestic tourism expenditure represented 24.9 % of the household final consumption expenditure (HFCE) in 2018.

The following tables present the categorized tourism expenditure over the five-year period, 2014 to 2018.

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Table 1
Inbound Tourism Expenditure
2014 – 2018
(Millions PhP)

Consumption by products and services	2014	2015	2016	2017	2018	Total	Rank
1.Accommodation services for visitors	80,448	91,551	81,163	103,376	113,143	469,681.00	1
2.Food, beverage and restaurant services	60,203	69,357	74,560	116,835	105,059	426,014.00	2
3. Transport services	52,657	60,296	70,805	91,524	100,119	375,401.00	3
4.Country-specific tourism services including shopping	46,419	42,145	39,243	63,870	48,087	239,764.00	4
5.Entertainment and recreation services	30,818	36,157	39,719	64,102	63,969	234,765.00	5
6. Miscellaneous	4,358	3,087	3,791	7,376	8,381	26,993.00	6
7.Travel agencies and other reservation services	1,991	3,896	2,418	1,478	2,670	12,453.00	7
Total Inbound tourism expenditure	307,712	342,646	351,418	512,663	505,397	1,785,071.00	-

Sources of basic data: Philippine Statistics Authority. arrival cards from the Bureau of Immigration, visitor sample survey and meeting, incentive, convention, exhibitions survey of the Department of Tourism (2014-2018)

As shown in Table 1, over the five-year period, accommodation services for inbound visitors' showed the highest contribution of over 26.31 %, with the highest absolute figure being in 2018, providing a 22 % contribution. Secondly, food, beverage, and restaurant services contributed almost 23.87 % over the five-year period, with the highest absolute contribution being in 2017 with a 23 % contribution. The third highest category of expenditure was in respect of transport services, which contributed 21.03 % in the five-year period, with the largest absolute contribution being in 2018 amounting to 20 % of total expenditure that year.

In contrast, the lowest contribution during the five-year period was from travel agencies and other reservation services, which contributed less than 1 %, with only a 0.29 % contribution in

2017. Miscellaneous expenditure accounted for 1.3 % during the five-year period, its lowest contribution being in 2016 of 1.1 %, which was considerably less than entertainment and recreation services which contributed over 13.15% with their lowest contribution being in 2014 of 10 %.

The fact that during the five-year period, accommodation services ranked as the highest revenue contributor by inbound tourists shows that the efforts exerted by the hospitality sector to promote itself and to provide high quality services were successful in attracting more overseas tourists to book rooms during their stay. However, this result does not show the occupancy distribution in various categories of hotels and other types of accommodation. In addition, according to World Tourism Organization (1996) refers to "international tourism receipts as encompassing all consumption expenditure, or payments for goods and services, made by international tourists (stayovers and excursionists) for their own use or to give away".

Table 2
Domestic Tourism Expenditure
2014 to 2018
(Millions PhP)

Consumption by products and services	2014	2015	2016	2017	2018	Total	Rank
1-Miscellaneous	502,477	633,272	754,882	949,701	1,150,223	3,990,555.00	1
2- Accommodation services for visitors	293,977	374,988	445,897	560,206	681,421	2,356,489.00	2
3-Country-specific tourism services including shopping	206,365	259,907	312,208	388,647	463,886	1,631,013.00	3
4-Transport services	144,677	179,327	210,714	265,318	325,605	1,125,641.00	4
5-Travel agencies and other reservation services	95,278	118,750	140,169	175,287	211,397	740,881.00	5
6-Food, beverage and restaurant services	80,365	103,117	123,877	156,550	192,535	656,444.00	6
7-Entertainment and recreation services	80,674	101,388	120,469	149,125	175,102	626,758.00	7
Total domestic tourism expenditure	**1,484,487**	**1,872,137**	**2,228,685**	**2,793,959**	**3,375,271**	**11,127,781.00**	**-**

Sources of basic data: Distribution of regional travelers and meeting, incentive, convention, exhibitions Survey of the

Department of Tourism (DOT) and household survey of domestic visitors by the DOT and Philippine Statistics Authority (2014-2018)

As shown in Table 2, for domestic tourist expenditure during the five-year period, expenditure categorized as *miscellaneous* ranked highest at almost 35.87 %, with its highest absolute contribution in 2017 accounting for 33.99 % of total expenditure. Accommodation services for domestic visitors accounted for over 21.17 %, with the highest absolute contribution being in 2018 giving a contribution of 20 %. Thirdly, Country-specific tourism services including shopping contributed almost 15 % of total expenditure with their highest absolute contribution being in 2018 when they contributed 13.7 % of total domestic expenditure.

On the other hand, the lowest contributor over the five-year period was entertainment and recreation services, contributing less than 5.6 %, with their lowest absolute contribution in 2014 contributing 5.4 % of that year's total domestic expenditure. Meanwhile, food, beverage and restaurant services also contributed around 6 %, with its lowest absolute contribution in 2014 equating to 5.4 %. Finally, travel agencies and other reservation services contributed almost 6.66 % with their lowest absolute contribution accounting for 6.4 % of total domestic tourist expenditure in 2014.

Table 3
Total Internal Tourism Expenditure
2014 to 2018
(Million PhP)

Consumption by products and services	2014	2015	2016	2017	2018	Total	Rank
1-Miscellaneous	506,835	636,359	758,673	957,077	1,158,604	4,017,548.00	1
2-Accommodation services for visitors	374,425	466,539	527,060	663,582	794,563	2,826,169.00	2
3-Country-specific tourism services including shopping	252,785	302,052	351,451	452,517	511,973	1,870,778.00	3
4-Transport services	197,334	239,623	281,519	356,842	425,724	1,501,042.00	4
5-Food, beverage and restaurant services	140,567	172,474	198,436	273,385	297,594	1,082,456.00	5
6-Entertainment and recreation services	111,492	137,545	160,188	213,227	239,071	861,523.00	6
7-Travel agencies and other reservation services	97,269	122,646	142,587	176,765	214,067	753,334.00	7
Total internal tourism expenditure	1,792,199	2,214,783	2,580,102	3,306,622	3,880,667	12,912,850.00	-

Source: Sources of basic data: Distribution of regional travelers and meeting, incentive, convention, exhibitions survey of the Department of Tourism (DOT) and household survey of domestic visitors by the DOT and Philippine Statistics Authority (Note: Internal tourism refers to inbound tourism and domestic tourism together) (2014-2018).

As shown in Table 3, when inbound and domestic expenditure were totaled, the miscellaneous category was the highest contributor over the five-year period accounting for over 31 %, with its highest absolute contribution in 2018 amounting to almost 30 %. Similarly, accommodation services for visitors provided almost 22 % of total expenditure with the highest absolute contribution accounting for over 20 % in 2018, while country-specific tourism services including shopping contributed almost 15 %, their highest absolute contribution accounting for over 13 % in 2018.

Meanwhile, the lowest overall contributor to the five-year tourism expenditure figure was travel agencies and other reservation services which contributed less than 6 % with their lowest absolute contribution in 2014 accounting for 5.4 % of total tourist expenditure that year. Similarly, entertainment and recreation services contributed less than 7 %, with their lowest absolute contribution in 2014 being only 6.2 % of expenditure that year. Finally, expenditure on food, beverage and restaurant services amounted to 9 %, with the lowest absolute contribution in 2014 accounting for 7.8 % of total tourist expenditure for that year.

In summary, combining inbound and domestic tourism expenditure on products and services over the five-year period, 2014-2018 shows consistently high expenditure on accommodation services since accommodation is a basic human need and is therefore essential for travellers of all types regardless of whether their purpose in travelling is business or leisure**.** Thus, both the government and private sectors should work together to improve the accommodation facilities and formulate policies to sustain business in the tourism industry including a recognition that because of the interdependence of services within the tourism sector improving the accommodation sector will bring benefits to other sectors of the industry**.**

Table 4
Comparison of Inbound and Domestic Expenditure
2014 – 2018

Consumption by products and services	**Inbound tourism expenditure by sector 2014-2018 (Million PhP)**	**ITE % share to internal TE 2014 - 2018**	**Domestic tourism expenditure by sector 2014 – 2018 (Million PhP)**	**DTE % share to internal TE 2014-2018**	**Internal tourism expenditures by sector 2014 – 2018 (Million PhP)**
1- Accommodation services for visitors	469,681.00	17	2,356,489.00	83	2,826,169.00
2-Food, beverage and restaurant services	426,014.00	39	656,444.00	61	1,082,456.00

3-Transport services	375,401.00	25	1,125,641.00	75	1,501,042.00
4-Travel agencies and other reservation services	12,453.00	2	740,881.00	98	753,334.00
5-Entertainment and recreation services	234,765.00	27	626,758.00	73	861,523.00
6-Country specific tourism services including shopping	239,764.00	13	1,631,013.00	87	1,870,778.00
7-Miscellaneous	26,993.00	.7	3,990,555.00	99.3	4,017,548.00
Total Expenditure	**1,785,071.00**	**14.00**	**11,127,781.00**	**86.00**	**12,912,850.00**

Table 4 presents a comparison between inbound and domestic tourism expenditure. The data shows that domestic tourism expenditure was the greatest contributor to overall tourism with an 86 % share over the five years studied. Moreover, based on the types of products and services consumed, domestic tourism accounted for 99.3 % of the miscellaneous category of spending not classified specifically into any of the other groupings. Similarly, domestic travelers accounted for 98 % of expenditure on travel agencies and other reservation services and 87 % of country-specific tourism services particularly shopping, since undeniably, Filipinos love to shop. Meanwhile, 83 % of expenditure on accommodation services was accounted for by domestic tourists. The lowest contributions from domestic tourism were for food, beverage and restaurant services with 61 %, entertainment and recreation services with 73 % and transport services with 75 %.

Conversely, inbound tourists contributed 14 **%** of the total expenditure and 39 **%** of the expenditure on food, beverage and restaurant services, followed by 27 **%** of the expenditure on entertainment and recreation services, and 25 **%** of that for transport services, which made up the top three headings of expenditure by inbound tourists**.** On the other hand, Expenditure on country-specific tourism services including shopping with 13 **%**, travel agencies and other reservation services at 2 **%**, and the miscellaneous expenditures category accounting for less than 1 **%** were the three lowest categories**.**

6. Discussions

Based on the information summarized in Table 5, the following implications can be drawn in respect of the seven sectors highlighted.

1. Accommodation services for visitors

Based on the data presented, domestic expenditure on tourist accommodation at 83 % was higher than that of inbound tourists, which accounted for only 17 % of the total. This is probably because during the five-year period studied, there were large numbers of meetings, incentive conferences and exhibitions (MICE) which entailed providing many rooms to accommodate delegates and attendees at these activities, most of whom would be domestic travellers. Clearly, there are opportunities for entrepreneurs to invest in hotels, and other accommodation facilities capable of mounting meetings and conferences, or located in the areas in which exhibitions and other public business oriented gatherings take place. Further, in the tourism business, hotels are a major source of income and support a large number of jobs in this sector which account for a large proportion of overall employment in tourism (Swarbrooke & Horner, 2001).

Accommodation services provide places for visitors to stay while they are away from home, which should be safe and clean regardless of which category of accommodation they fall under, and should also cater to travellers with a wide range of budgets. A recent trend in tourism introduced by the ASEAN Tourism Standards (n.d.) is the home stay, an alternative form of furnished accommodation generally located in a house, which provides guests with the opportunity to experience the lifestyle of local communities and the families within them, while also offering them access to other tourist attractions.

2. Food, beverage and restaurant services

Based on the results, domestic tourism expenditure accounted for 61 % of this category, while inbound tourists contributed 39 %. In common with the accommodation sector, the high domestic proportion of expenditure on food and drinks may be associated with travelling in respect of MICE functions, since many travel packages catering to non-government organizations and corporate functions may require food etc. to be catered for separately. According to Chon & Maier (2010)," patrons enjoy variety of cuisines, including food cooked and served in styles from around the world such as Chinese, Indian, Malaysian, Thai, French, Italian, Cajun, Japanese, American, and Mexican, as well as variety of ethnic fusion cuisines".

While food and beverages are a basic human necessity, in the tourism industry *food* often refers to different cuisines offered by restaurants regardless of size, which offer either local or international food. Restaurants operating at tourist destinations employ people in order provide quality food and excellent service to a specific target market, and thus aim to earn a profit. Entrepreneurs engaged in operating restaurants and bars however need to be aware of trends in entertainment and dining in order to maximize their opportunities to make a profit.

3. Transport service

Based on the results presented, domestic tourism accounted for 75 % of the expenditure on transport services for the five years studied, compared to 25 % for inbound tourists. Again, the number of tourists attending MICE functions necessitates the provision of transportation to

groups of attendees, which is often packaged along with accommodation, meals, and tours and other services provided by host organizations. According to Swarbrooke and Horner (2002), air transport contributes the majority of revenue, and airlines employ tens of thousands of people in many countries. Likewise, road transport is a major source of revenue for taxis and car hire companies. Public transport, while an integral sector of the tourism industry, must also provide services, but these are not solely dependent upon tourism demand (Holloway, 2002).

Entrepreneurs engaged in the transportation sector may also specialize by providing unique forms of transportation to carry tourists within destinations, which tourists may hire individually or in groups.

4. Travel agencies and other reservation services

Based on the results presented, domestic tourists account for 98 % of expenditure under this heading with inbound tourism contributing only 2 %. Given the complexity of handling group bookings, using the services of a travel agency has traditionally been seen as the securest and safest way of arranging travel, with the travel agent attending to all the detailed requirements of people on group tours, in addition to catering to those seeking a more personalized service. Moreover, thousands of people in the tourism business are employed in travel agencies or other forms of specialist intermediaries which are a source of relatively well-paid employment in the industry (Swarbrooke & Horner, 2002).

However, in relation to the current trends of travel arrangements where everything is accessible in terms of the applicability of internet and modern technology is of greater advantage for travelers where it gives them more options along with comfort and speed in their decision making process. In this competitive scenario, entrepreneurs managing the traditional travel agencies and reservation services should upgrade their facilities, equipped themselves with knowledge and skills to adapt this trend without setting aside the quality and personalize service as benefit offered to maintain the good relationship and attract more the travelers as customers and the industry's end users. Likewise, Tour operators referred to as ground operators normally provide services at the destination only and do not package or market transportation to or from destination, their services normally cover hotel transfers, overnight accommodations, sightseeing, and sometimes special arrangements, which are usually collectively referred to as land arrangements (Gee, et. al, 1989). As part of this factor, according to Page (2009), "Tour operating and retailing tourism products to consumers are key parts in the production, selling and distribution of tourism services in which organized by small some independent tours operators who specialize in certain segments".

5. Entertainment and recreation services

Based on the results presented, domestic tourism accounts for 73 % of this category of internal tourism expenditure, as compared to inbound tourism which contributes 27 %. The entertainment and recreation sector of the tourism industry offers a variety of activities and attractions to visitors, including cultural shows and concerts and many other activities which help tourists to enjoy their stay at a destination. Entrepreneurs in the entertainment industry

build connections and manage talent in such a way as to display the cultural authenticity of each region and to create employment while also earning a profit.

6. Country-specific tourism services including shopping

Based on the results presented, domestic tourism accounted for 87 **%** under this heading as against inbound tourism which contributed only 13 **%.** Tourists like most people love shopping**.** According to Holloway **(**2002**)**, shopping is often combined with other forms of leisure in the design of attractive shopping malls, which can attract huge numbers of visitors who may be willing to spend several hours enjoying an environment which encourages them to spend money**.**

Entrepreneurs, who engage in this sector, may be involved in either retailing or wholesaling and particularly include those who operate souvenir shops, boutiques and other outlets where tourists can buy local products**.** These businesses, therefore, seek to earn a profit by catering to the purchase choices made by travellers**.**

7. Miscellaneous**:**

This category includes other products and services consumed by tourists outside of the six more specific categories which go together to form the overall tourism product**.** Based on the data presented, domestic tourism gave a highest contribution to internal tourism expenditure under this heading contributing 99**.**3 **%** of such expenditure as compared to 0**.**7**%** from inbound tourism**.** According to UNWTO **(**2010**)** miscellaneous as they call it as **"**others, refers to non-tourism-related consumption products comprises goods and services that cannot be associated with any of the explicitly mentioned purposes of the preceding categories, such as newspapers and magazines, current health care products and occasional health services**"** which are consumed by tourists.

Therefore, results show that under this category gave a highest share to the tourism internal expenditure as contribution to the economy within the five-year period in general. It is in this context that further study shall be undertaken in order to identify and maximize the full potential of these sectors as contributors thus it gives more opportunities to the aspiring and existing entrepreneurs in the tourism industry.
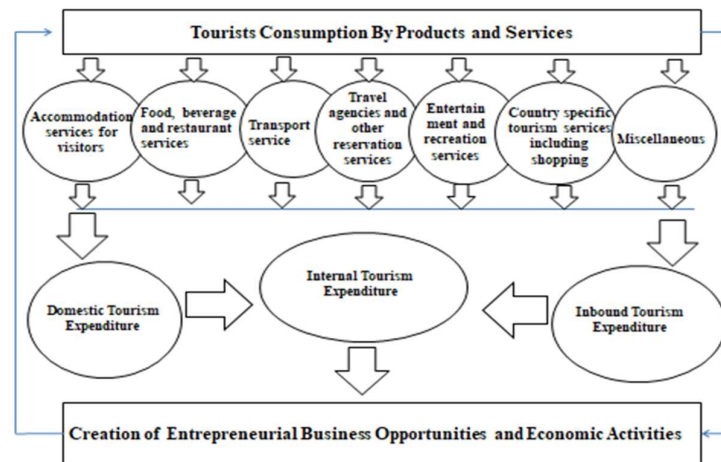
Figure 1
TOURISM ENTREPRENEURIAL BUSINESS OPPORTUNITY MODEL

Figure 1 illustrates the entrepreneurial business opportunity model developed in this on a retrospective study approach anchored to the Philippine Statistics Authority and the Department of Tourism reports. The model was formulated following an analysis of data relating to tourism expenditure covering the five-year period, 2014 – 2018 in the Philippines. In totality, this model is a construct that shows the operational interdependence of each industry player in achieving its business objectives.

7. Conclusions:

The findings of this study compared inbound and domestic tourist expenditure, which, summed together, represent the overall internal tourism expenditure in the Philippines. The data obtained was categorized into seven groups based on tourist expenditure for the consumption of products and services in certain industry sectors as follows: accommodation services, food, beverage and restaurant services, transport services, travel agencies and other reservation services, entertainment and recreation services, country-specific tourism services, particularly shopping, and a miscellaneous category to cover all other tourist expenditure not falling within one of the other six categories. While the model breaks tourist expenditure down into its various components, it also recognizes the interdependence of tourists' consumption of products and services within different sectors of the industry.

While the tourism entrepreneurial business opportunities model provides a guideline for new or existing entrepreneurs in the tourism industry, success within this sector will always be dependent on the aggressiveness, and creativity of the entrepreneurs who manage business ventures. Moreover, the level of tourists' consumption will always relate directly to the level of tourist arrivals and this more general indicator of success tourism will dictate the extent of the opportunities which tourism offers to those engaged in this business sector.

Finally, according to Getz, et. al. (2005), "quality is a major issue in the family business sector, considering specific aspects of the owner's motives, goals and family dynamics. There are many inherent factors that act against quality of business and service in family business in tourism and hospitality."

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ACADEMIC THEORIES AND IMPLEMENTATION OBSTACLES TO DEVELOP AGE-FRIENDLY TOURISM IN PHUKET, THAILAND UNDER THE NEW NORMAL ERA

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Abstract: In order to explore new ideas for reviving the tourism in Thailand under the new normal, this article carries out qualitative research on developing age-friendly tourism at Phuket. The idea of active ageing, which was proposed by the World Health Organization, and the theory of public finance, the incentive theory, and the stakeholder theory, have been used to elaborate the academic causes for this development initiative. The research shows that: on the one hand, current outdated paradigm of reviving tourism is not only difficult to be applied due to the Covid-19 epidemic, but could limit the capacity to seize innovative opportunities. On the other hand, as Thailand has entered an ageing society, the elderly is becoming an essential force in tourism activities and consumption; it is feasible to create a society where the contribution of older people generally outweighs social investments. Based on this, and after pointing out the existing implementation obstacles at Phuket and proposing corresponding countermeasures, the authors conclude that the Thai government should take the new normal as an opportunity to change their negative stereotypes about the elderly, push a supply-side reform of tourism industry, construct an integrated, elderly-centered service system, and then in the long run, build Phuket into a demonstration base integrating tourism, with elderly care and medical care by developing age-friendly tourism at Phuket, Thailand. This article also aims to lay a theoretical foundation for this innovative development, meanwhile, provide practical reference for Thailand to adapt to the profound consequences brought about by the ageing population.

Keywords: Phuket; active ageing; age-friendly tourism; new normal

1. Introduction

It goes without saying that the covid-19 pandemic, as an invisible, unconventional yet ferocious enemy, has inflicted heavy losses on Thailand's tourism industry. Phuket is in an even worse situation because the island's economy used to be almost exclusively reliant on a steady stream of international tourists. Recently, the "Safe and Sealed" campaign, which aimed to re-open Thailand's borders to international tourists seeking long-stay holidays, has been planned to kick off this October 1st at Phuket (Boonkong and O' Connor, 2020). However, Judd comments that a number of prominent physicians and some advisors to the Ministry of Public Health and the Centre for Covid-19 Situation Administration(CCSA) strongly opposed opening Thailand to tourists in any way, shape or form. This undoubtedly has made the future of Thailand's tourism industry even more confusing. Also according to the media reports, in order to attract more medical and wellness tourists, the Public Health Ministry and the Tourism and Sports Ministry have joined forces to discuss the proposal to fund Phuket province 3 billion Baht. If the proposal is approved eventually, Phuket will be built as an international medical hub; then strengths in both the tourism and medical sectors of the island would be combined to help the economy, and society as a whole recover from the devastation of the pandemic (Taylor, 2020). It seems that the government departments have realized the necessity of the integration of the medical industry and the tourism industry.

The authors think that there is still an important group that is overlooked by the government and relevant decision-making departments that is the older people, especially the elderly population in Thailand. Actually, older people are frequently stereotyped and marginalized as being burdens not only in Thailand but all over the world. It is expected that Thailand will become a complete aged society in 2021 and 20% of its population will be the elderly (Haque, 2016). The elderly should be given sufficient attention, and industries related to them should be supported to adapt to shifts in the age structure. Social change is ongoing and unpredictable, transformative approaches are badly needed. For example, the goal of building an age-friendly world, requires a transformation of health systems away from disease-based curative models and towards the provision of integrated care that is centered on the needs of older people (World Health Organization, 2016). Therefore, as foreign tourists' back to Thailand cannot be certain of success, building Phuket into a demonstration base integrating tourism, elderly care and medical care introduces an alternative. This article analyzes the academic theories and implementation obstacles of developing age-friendly tourism in Phuket, discusses the required integrated service system, and motivational strategies. Actually, age-friendly tourism means that the tourism industry is organized around older people's needs and preferences, and that services are age-friendly and coordinate closely with the older person. In addition, this article also provides practical reference for Thailand to adapt to the ageing society.

2. Research Objectives

Currently, Phuket is eager to reopen to foreign tourists to help stimulate the local economy, which has been hard hit by the pandemic. From a longer-term and broader perspective, Thailand has another serious problem: this country only has a very short time to prepare a response to demographic change (Punyakaew, Lersilp, & Putthinoi, 2019). However, as Dr.

Margaret Chan, the former Director-General of World Health Organization (WHO) stated, with the right policies and services in place, population ageing can be viewed as a rich new opportunity for both individuals and societies. In that case, the research questions of this article come out as follows:

1. Can domestic tourists (especially the elderly) be an alternative of international tourists?
2. What are the constraints of developing age-friendly tourism at Phuket?
3. What are the roles of the government and other sectors (such as tourism sector, medical sector, elderly care sector, real estate sector and so on) during this mega project respectively?
4. How to develop age-friendly tourism at Phuket and will it help Phuket both survive the pandemic crisis and get prepared for economic and social restructuring caused by the ageing society?

Therefore, this article aims to look into the academic causes of developing age-friendly tourism at Phuket, Thailand; to study and discuss how the government and other stakeholders can work together to make the age-friendly tourism a new economy growth point

3. Literature Review

Since this article is about developing age-friendly tourism by placing older people at the center of service delivery, this literature review will primarily focus on the idea of active ageing and Thailand's medical tourism, which are closely related with this article.

3.1 Active ageing

The idea of active ageing emerged as an attempt to bring together strongly compartmentalized policy domains in a coherent way (Walker, 2002). According to *Active ageing: a policy framework* released by WHO in 2002, active ageing is the process of optimizing opportunities for health, participation and security in order to enhance quality of life as people age. The policy framework requires action on three basic pillars: health, participation and security (World Health Organization, 2002). It emphasizes the need for action across multiple sectors and has the goal of ensuring that "older persons remain a resource to their families, communities and economies" (World Health Organization, 2016). This framework will need to transcend outdated ways of thinking about ageing, foster a major shift in how we understand ageing and health, and inspire the development of transformative approaches. It is worth noting that the word "active" refers to continuing participate in social, economic, cultural, spiritual and civic affairs, not just the ability to be physically active or to participate in the labor force (World Health Organization, 2002).

In the context of the aging of the population, research on active ageing has gradually received widespread attention from international academic circles. As the idea of active ageing was initially put forward for providing a sound basis for industrialized countries to respond to the challenges presented by population ageing, so scholars from developed countries have done detailed studies on the genesis, evolution and connotation of the concept of active ageing. For example, findings from Walker (2002) clearly indicate that the concept of active ageing could be traced back to the "successful ageing" in the early 1960s, then the concept resurfaced in the United States in the guise of "productive ageing", and the new concept of active ageing began

to emerge in the 1990s under the influence of the WHO. Lassen and Moreira (2014) explored how contemporary active ageing policies have been articulated by drawing on two different sets of political and epistemic grounds and stressed the potentials in substituting old age with late life, and the effects that active ageing policies have in the world. They also examined the questions whether the formats of active ageing should be made to co-exist, or whether the diversity and comprehensiveness enable a local adaptation and translation of active ageing polices.

As the world's largest developing country, China has already entered an aging society, Chinese scholars pay more attention to the related public policy research and practical exploration on active ageing. Pang and Niu (2019) pointed out that it is necessary to take the government as the leading role and reconstruct the existing public policy system to achieve the goal of active ageing, and enhance the systematism pertinence and feasibility of China's older-related public policies, enable the formulation and implementation of policies to be organically integrated with the sustainable development of social economy and coordinated development. As Wang and Xu (2014) argued, to achieve the strategic objectives of active ageing, it is necessary to mobilize all social forces and thoroughly nurture and explore social capital; and by remodeling social capital to promote the restructuring of resources, network, and other normative elements for the senior citizens' social capital, people can build multi-dimensional social support system for them and realize the shift from "aging population" to "active ageing". It has been argued that such problems of pension services in China as the imbalance of supply and demand of pension services, the single content of pension services, the overlap of competent departments, the inadequate operation of pension service market and the shortage of specialized teams need to be solved from the perspective of active aging, that is, a multi-dimensional pension service model should be designed based on the differentiated needs, including the construction of an aging pension estimation system, the multi -dimensional pension service supply system, the pension service supply regulation system and service support system (Bian & Li, 2019).

The pace of recent population ageing in Thailand is faster than other Asian countries and even far faster than developed countries in the West and proportion of elderly (aged 60 and over) is projected to approach more than 30% within next three decades in Thailand (Knodel, Prachuabmoh, & Chayovan, 2013). So the topic of active ageing has also aroused the interest of some Thai scholars. For example, by identifying significant determinant factors of active ageing and estimating the active ageing level properly in the broader cultural context of Thailand, Haque, Soothorndhada, Hunchangsith and Kanchanachitra (2016) found that active ageing level of elderly yet to be improved in Thailand and policy should be focused for elderly to fulfill health needs, to promote longer working lives, to arrange a lifelong learning program, and to improve financial/economic conditions. In addition, Punyakaew, Lersilp and Putthinoi (2019) investigated the active ageing levels and time use patterns of an elderly population attending the Community Elderly School in a suburban village of northern Thailand; they concluded that active ageing was at the moderate level and as to the measures of time use, there was significant difference between males and females. Their research results also showed that more time spent on leisure and social participation would improve satisfaction and quality of life for elderly people in the moderate and low active ageing levels.

To understand the overall situation of Thailand's ageing society, the authors have also consulted some relevant documents. In the brochure by National Health Security Office, Thailand (2015), it is said that by the year 2030 the proportion of elderly in the Thai population is expected to increase to 15 percent, in 2050 nearly one third of Thailand's population will be age 60 and over. Findings from Helpage International (2013) clearly indicate that Thailand's demographic profile has changed radically in recent decades but the fundamental traditions of society remain in place, that is, many Thais continue to work into old age, sometimes earning an income, but often helping their family without being paid. The study by World Health Organization (n.d.) identifies that living with older parents, showing respect and taking care of them are considered normal way of family life and are highly commended in Thailand, and unfortunately, research on the migration of older persons in Thailand is extremely limited.

3.2 Thai medical tourism

"Medical tourism" refers to a vacation that involves traveling across international borders to obtain medical services. It usually includes leisure, fun, and relaxation activities, as well as wellness and health-care services (Heung, Kucukusta, & Song, 2010). Liu, Su and Su (2009) claimed that medical tourism is a sustainable tourism development concept and be able to stimulate regional investment, promote infrastructure construction, and promote the all-round development of local society. Specific to the Thai context, the medical tourism industry was forecasted to contribute approximately 16% per year to the growth of the tourism sector in Thailand during 2017-2020 (KPMG, 2018). Kaewkitipong (2018) also contended that in the 2017-2018 E-Health Strategy Plan by the Ministry of Public Health, Thailand has planned to become ASEAN's medical hub and also to promote the medical tourism industry. According to Connell (2013), in Thailand, medical tourism is largely concentrated in Bangkok, Phuket, and Chiang Mai, and the biggest provider is Bumrungrad International Hospital, which accounts for nearly a quarter of all medical tourists to the country.

Given the importance of Thai medical tourism, related studies have come into being, and most of them focus on analyzing the competitiveness of the industry and improving its efficiency. For instance, by providing a clearer picture of the Thai medical tourism supply chain, Kaewkitipong (2018) pointed out a lack of collaboration and integration among the stakeholders in Thai medical tourism, and an inactive role of travel agencies in aggregating information from all stakeholders, linking medical service providers with tourism service providers. The author also suggested that an intermediary like a travel agent or a medical tourism facilitator can play an important role in integrating the two independent sets of services together by becoming a one-stop hub for medical tourists. Kantavongvan, Un-thong and Kaosa-ad (as cited in Kaewkitipong, 2018) discussed factors contributing to the competitiveness of the Thai medical tourism industry, while Srisomyong (2018) identified the competence of Thai medical tourism providers. Besides, Alberti, Giusti, Papa and Pizzurno (2014) analyzed the formation of the Thailand Medical Tourism Cluster and the competitiveness policies for it. Harryono, Huang, Miyazawa and Sethaput (2006) claimed that healthcare providers, international transportation, hotels, and agents/operators should be identified as core providers or suppliers of Thai medical tourism.

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Generally speaking, it can be seen that existing research on active ageing and Thai medical tourism has been widely concerned by the academic circles and has made good progress, but interdisciplinary research is still scarce and in the context of Thailand, till now no research has paid attention to integrating tourism sector, elderly care sector and medical care sector. Therefore, this study will begin to fill this void by investigating the academic causes, constraints and motivational strategies to develop age-friendly tourism at Phuket, Thailand under the new normal. In addition, as Thailand has a very short time to prepare a response to demographic change, so economic and social restructuring, including collaboration of all sectors, will need to support the elderly society and respond to this situation (Punyakaew, Lersilp & Putthinoi, 2019). This article could provide practical reference for Thailand to adapt to the ageing society as well. Besides, in August, 2020, Deputy Phuket Governor Pichet Panapong, who is a major player in the country's economic rehabilitation efforts, told the Bangkok Post that Phuket tourism in the Covid-19 era would focus on health and wellness instead. The governor also added that Phuket's location could be used as a selling point of a medical plaza project which would feature a long-term care center for foreign patients who can come here for treatments and travel at the same time. Therefore, the topic discussed in this article is of realistic significance to today's new normal.

4. Research Methodology

In view of the research questions and objectives, this study is exploratory in nature. This article adopts literature study, interview, normative analysis and other methods to carry out qualitative study on developing age-friendly tourism at Phuket, Thailand. First of all, a thorough literature study was conducted on the idea of active ageing and the Thai medical tourism industry. Previous studies, news, and White Papers related were also collected at this stage. The literature review of these documents enabled the authors to frame appropriate interview questions as shown in Table

Table 1: Interview questions as derived from the research questions

Research question	Lists of interview questions
▫ Can domestic tourists (especially the elderly) be an alternative of international tourists?	▫ Does the elderly in Thailand generally have travel demands and sufficient economic conditions? ▫ How do you evaluate the current domestic tourism stimulus campaign?
▫ What are the roles of the government and other sectors (such as tourism sector, medical sector, elderly care sector and so on) during this mega project respectively?	▫ If this project is approved, what role do you think the governments at all levels should play in the future implementation? ▫ And do you think all the stakeholders (such as the tour agencies, hospitals, and hotels should cooperate and integrate tightly under a comprehensive platform?

□ What are the constraints of developing age-friendly tourism at Phuket?	□ In your opinion, what is the biggest difficulty for developing age-friendly tourism at Phuket? What is the most urgent problem needed to be solved? □ Do you think Phuket is an age-friendly place? Why?
□ How to develop age-friendly tourism at Phuket and will it help Phuket both survive the pandemic crisis and get prepared for economic and social restructuring caused by the ageing society?	□ Is it possible to build Phuket into an age-friendly tourism destination which involves conventional tour, medical care, elder care, etc.? □ Do you think the development of age-friendly tourism is helpful for Thailand to deal with the challenges brought by the ageing society? Why? □ Do you think Phuket tourism industry should develop some new products and services suitable for the elderly? If your answer is 'yes', could you please give examples of what products or services need to be developed?

Meanwhile, the public financial theory, the incentive theory and stakeholder theory are used to explain the academic causes of developing age-friendly tourism at Phuket. A qualitative approach is more appropriate for this study and the in-depth interviews are conducted to obtain primary data with some stakeholders (listed in Table 2) such as Thai senior citizens, travel agencies, hotel managers, and senior hospital administrators etc. As this article is one part of a research project about ageing society in Thailand, other stakeholders like nursing home operators, Tourism Authority of Thailand, Phuket Office (TAT) would be contacted and interviewed in the near future. In addition, secondary information in the form of media reports, regional tourism plans and related documents are adopted as well.

Table 2: Position and organization of interviewee

No.	Position	Organization	Type of Business
1	Chinese medicine practitioner	Bangkok Hospital at Phuket	Medical service provider
2	Director	SIRACHETTAAACHOE Tour	Travel agent
3	Owner	Narong Clinic	Medical service provider
4	Retired Thai citizen	none	the elderly (aged 81)
5	General Manager	Modern Thai Group	Hotel
6	Owner	LYFE Medical Wellness	Health care provider

5. Results

5.1 Academic theories of developing age-friendly tourism

As mentioned before, age-friendly tourism means that the tourism industry is organized around older people's needs and preferences, and that services are age-friendly and coordinate closely with the older person. It also means that creating truly age-friendly tourism requires action in many sectors such as tourism, elderly care, medical care, labor, education; there will be many actors including government, service providers, civil society, older people and their organizations, families and friends. Much of the work is built around tourism and health services: design of new tourism products, transportation, housing and urban development, information and communication, and health and community services etc. The purpose of this part is to analyze the academic causes of developing age-friendly tourism at Phuket, Thailand.

5.1.1 Idea of active ageing

The gerontological literature in the social sciences has typically characterized the aging process in terms of decline, degeneration, and decrepitude (Gergen & Gergen, 2002). Tong and Liu (2017) contend that before the 1990s, most researchers in ageing science regarded "ageing" as a negative process, comparatively little attention has been paid to the possibility of growth, generativity, and development in the last decades of life. The idea of active aging explores the participation and contribution of the elderly in the process of social, economic, cultural and public affairs, and has gradually formed a new policy framework or action plan for responding to the challenge of population aging in the 21st century. The idea emphasizes that the elderly is not only beneficiaries of social development, but also active participants and contributors. The elderly is social wealth, not social burden, so it is feasible to develop age-friendly tourism for helping Phuket both survive this pandemic crisis and get prepared for economic and social restructuring caused by the ageing society. As mentioned before, the idea of active ageing contains three dimensions of health, participation and security, taking health as the foundation, participation as the means, and security as the support. Mei, Chen, and Glajchen's study (as cited in Hou, 2017) found that the participation behavior of the elderly has the effect of reducing the incidence of physical and mental diseases, enhancing cognitive ability, and acquiring knowledge and skills. Therefore, tourism activities can not only improve the quality of life and happiness of the elderly by enhancing the interaction with other members of society and the surrounding environment, but also achieve active ageing by encouraging and expanding the social participation of the elderly.

5.1.2 Theory of public finance

According to the theory of public finance in western economics, the invisible hand is powerful but not omnipotent, markets sometimes fail to allocate resources efficiently and the governments can correct the market failure by inducing market participants or taxing goods that have negative externalities and subsidizing goods that have positive externalities (Mankiw, 2012). Developing age-friendly tourism at Phuket is beneficial to creating an age-friendly environment in Thailand; the latter can help older people in Thailand to age safely in a place that is right for them, to continue to develop personally, to be included and to contribute to their communities while retaining their autonomy and health. Therefore, developing age-

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friendly tourism at Phuket could yield positive externalities to Thailand's aging society, and the government can use public finance to subsidize its development. In addition, many services and facilities involved in the age-friendly tourism have the nature of quasi-public products, so theoretically the supply should be shared by the government and the market. However, He and Fu's study (as cited in Yang & Zheng, 2016) found that in the diversified supply of public products, the provision of public products by for-profit institutions would cause some negative externalities, which require the government to implement necessary macro-control. Public finance is a distribution activity with the government as the main body, the governments can use the collected public finance revenue to provide such quasi-public products or services as infrastructure renovation at tourist attractions for older people, local medical and elderly care and community service. By doing this, the government can better macro-control the allocation of common resources and better satisfy the people's (especially the elderly) tourism consumption demand.

5.1.3 The incentive theory

Incentive theory began to emerge during the 1940s and 1950s, building on the earlier drive theories established by psychologists such as Clark Hull; in contrast with other theories that suggest we are pushed into action by internal drives, incentive theory instead suggests that we are pulled into action by outside incentives (Cherry, 2020). And according to Abraham H. Maslow's hierarchy of needs, the basic needs of human beings can be divided into five levels from low to high: physiological needs, safety needs, belonging and love needs, esteem needs and self-actualization. Wu's study (as cited in Yang & Zheng, 2016) showed Maslow believed that people will only demand higher-level needs after they are satisfied with the lower-level needs. Travel and leisure as a consumer behavior not only perfects the physiological and safety needs of older people, but also encourages them to invest a certain amount of time, money and energy to realize and complete higher-level needs, such as belonging and love needs, esteem needs, even self-actualization. The joy of mood, physical and mental health, and mental stress relief that older people obtain in travel and leisure activities will prompt them to continue to consume tourism-related products and services and adopt positive and intensified spiritual motivational behaviors. Specifically, by introducing dedicated facilities, special tourism events, classes and gathering places, age-friendly tourism could create opportunities for social interaction, which in turn provide a sense of value, belonging and attachment for the older people.

5.1.4 The stakeholder theory

A document from the University Virginia (2018) suggests that the stakeholder theory was originally detailed by R. Edward Freeman in 1984 in his award-winning book Strategic Management: A Stakeholder Approach, and now it has become a key consideration in the study of business ethics. The theory stresses the interconnected relationships between a business and its customers, suppliers, employees, investors, communities and others who have a stake in the organization; it argues that a firm should create value for all stakeholders. As far as the age-friendly tourism is concerned, there will be many stakeholders, such as the elderly, tour operators, hotels, hospitals, nursing homes, governmental departments, local communities, food providers, universities and colleges, research teams, health professionals and technicians

etc. The prime objective of developing an age-friendly tourism at Phuket is to maximize the benefits of all stakeholders, and all the work must rely on explicit partnership among various stakeholders. The role of government will be to steward this partnership, train and support human resource, ensure that integration occurs across various services, ensure the quality of services and directly provide services to those most in need. It also requires action at multiple levels of government. Aiming towards the shared goal of developing age-friendly tourism at Phuket allows these different stakeholders to work within their core areas but in a focused way that complements what is being done by others.

5.2 Implementation obstacles of developing age-friendly tourism at Phuket

The elderly now has more wealth, more leisure time, stronger desire to travel; they have better education and are more inclined to travel during the off-season (Yao & Hou, 2019). Vania (as cited in Yao & Hou, 2019) found that senior tourists travel more frequently, travel longer, spend more on tourism activities, and they are more inclined to travel by package tour. Meanwhile, senior tourists need more attention and service both physically and psychologically, they pay more attention to the safety, health, transportation and sharing during the travel (Gu, 2017). Lee and King (2016) found that barrier-free tourist facilities have a significant positive effect on the satisfaction of elderly tourists, and the diversity of natural and cultural resources is an important predictor of travel frequency. Solving the problems that the elderly may face in tourist destinations and providing them with satisfying tourism products and services are inevitable demands for promoting the supply-side reform of the tourism and developing high-quality tourism. In view of the above-mentioned characteristics of elderly tourists, this section aims to demonstrate the constraints of developing age-friendly tourism in Phuket.

5.2.1. Lack of targeted tourism products and services

For developing age-friendly tourism in Phuket, the first problem encountered is the lack of tourism products and services for the elderly. Phuket consists of the island of Phuket, Thailand's largest island, and another 32 smaller islands off its coast (Tourism Authority of Thailand, 2013). It lies off the west coast of Thailand in the Andaman Sea and offshore tour activities is the main type of Phuket's tourism product and service. The island's economy is, either directly or indirectly, 90% reliant on a steady flow of international tourists, and now most tourism businesses in Phuket have closed due to the Covid-19 pandemic (Chuenniran, 2020). However, the elderly, especially the Thai elderly, have always been undervalued by the Phuket tourism market, there are currently no tourism products and services tailored for the elderly in the market. For instance, most of the offshore tour projects are risky for older people and have certain requirements for the physical strength of the tourists, so they are not suitable for elderly tourists. In addition to the lack of diversity in tourism products, the tourism services that are available are often a poor fit with the needs of older people. For example, in terms of catering services, delicious food with local characteristics may not be suitable for the taste and health of some elderly tourists; in terms of transportation and physical accessibility, some tourist attractions still lack barrier-free travel facilities for the elderly. Moreover, the service content should also include the provision of reasonable travel insurance and an instant medical rescue system to create worry-free travel for the elderly so that they can enjoy a reliable and high-quality travel experience. After all, safety and health are the primary considerations for the

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elderly when traveling. So the tourism industry in Phuket should be redesigned to deliver comprehensive and more appropriate and effective services for the elderly by focusing on the unique needs and preferences of the elderly.

5.2.2. Lack of a platform to integrate various resources

Compared with conventional tourism in the past, age-friendly tourism involves more stakeholders, such as hospitals, nursing homes, insurance companies, governmental departments, local communities, universities and colleges, health professionals. It can greatly promote the development of local catering, accommodation, transportation, medical care, education and other industries. For the elderly tourists, in addition to general tourism services such as hotels, tour guides, transportation, and catering, medical care, health care, communications, learning, sharing, etc. are also important components of the tourism. For example, continuing to learn enables older people to have the knowledge and skills to manage their health, to keep abreast of developments in information and technology, to participate, to adjust to ageing, to maintain their identity and to keep interested in life (Boulton-Lewis, 2010). So seminars, debates, cultural outings and a variety of training courses could be arranged as new products of age-friendly tourism, and these activities definitely need effective cooperation and interaction between the tourism sector and the education sector. In the age-friendly tourism, in addition to the target users-the elderly, all other stakeholders will be potential revenue providers and cost contributors. To achieve mutual benefit and win-win results, all stakeholders should coordinate and interact with each other, learn from each other's strengths and make overall plans, instead of working independently and fighting alone. However, according to the research on the Thai medical tourism supply chain, there's little interaction among the stakeholders; the medical service providers arranged tourism services for customers upon request, as a supplement to their medical services (Kaewkitipong, 2018). As to the age-friendly tourism which involves more stakeholders, there is an urgent need for a platform to integrate superior resources of all the stakeholders together in order to play a greater role. Because real-time sharing of data and information, common sharing of benefits and costs, and proper resolution of conflicts and disputes on this comprehensive platform are the keys to the successful development of Age-friendly tourism.

5.2.3. Lack of professional talent training and team building

As mentioned before, age-friendly tourism is organized around older people's needs and preferences, and that services are age-friendly and coordinate closely with the elderly. Age-friendly tourism also involves many stakeholders, therefore, it will require careful consideration of the human resources who will be needed to deliver elderly-centered and integrated services. In view of the fact that the elderly is more likely to encounter the risk of illness and injury during travel, it will be important to ensure that service providers have basic gerontological and geriatric skills, as well as the more general competencies needed to work in integrated systems, including communication, teamwork, ICT and other technologies. However, Thailand still has a long way to go in ensuring a sustainable and appropriately trained workforce. For example, most health care personnel at the primary health care level are not trained for old age care, only some have attended the short course programs provided by the MoPH (Ministry of Public Health, Thailand) and academic organizations (World Health

Organization, n.d.). Even the medical staff need to be trained, not to mention the tour guides, drivers, and hotel staff those serve at the frontline. In addition, the development of new products and the design of new routes are very important for the development of age-friendly tourism. In the near future, talents in product development and operation management will also be in short supply.

5.2.4. Lack of relevant regulations and industry standards

Making progress on age-friendly tourism will also require developing and reaching consensus on related regulations and industry standards. As a new industry, there are currently no typical and specific products or services for age-friendly tourism, so the targeted industry standards and regulations have not yet been issued. For instance, although the local government of Phuket has announced that it will make Phuket a medical hub to attract more medical and wellness tourists, there is still no mention of developing relevant policies and governmental interventions, monitoring and evaluation strategies. This lack of effective regulations and industry standards, on the one hand, will bring obstacles to the integration and coordination among various stakeholders in the age-friendly tourism; on the other hand, when encountering various disputes and new problems, the regulatory authorities also lack reasonable basis to carry out their work.

5.2.5. Lack of age-friendly environments and awareness of active ageing

Chen, Liu, and Ma's study (as cited in Hou, 2017) discussed that the idea of active aging was derived from the World Health Organization's summary of the experience of population aging in developed countries and it represents countries with a higher level of development and is not suitable for developing countries. Actually, the idea of active ageing is not only a practical method, but also a cultural model. It transcends outdated ways of thinking about ageing, fosters a major shift in how we understand ageing and health, and inspires the development of transformative approaches. Obviously, developing countries are getting old before a substantial increase in wealth occurs (Kalache & Keller, 2000). In 2050 nearly one third of Thailand's population will be age 60 and over. However, Onode claimed (as cited in Ochiai, 2009) that public facilities for elderly care are almost non-existent in Thailand, and care centres attached to hospitals are extremely expensive. State organizations paid little attention on developing home/community services to assistant the older persons and their caregivers (World Health Organization, n.d.). Outdated ideas and ways of working, which often focus on keeping older people alive rather than on supporting dignified living and maintaining their intrinsic capacity, undermine the quality of old age care (World Health Organization, 2016). At this time with a "new normal" policy, the Thai governments still hope and focus on attracting international tourists to save tourism and the Thai economy, not realizing the profound consequences of ageing population. It is the time for the Thai governments to improve the pension system, social welfare, give more financial support to the elderly and then guide them to carry out higher-level spiritual pursuit activities. For developing age-friendly tourism at Phuket, building an age-friendly environment and promoting the concept of active ageing are key factors.

6. Discussion and Conclusions

As this article is about to be completed, Thailand is still struggling to try to open its borders to international tourists and not all are in agreement about the new Chinese tourist arrival and the shortening of the quarantine period (Chuenniran, 2020). Therefore, this article's discussion on developing age-friendly tourism at Phuket provides another alternative for the survival and development of Thailand's tourism industry under the new normal of the epidemic. Age-friendly tourism can not only enrich and improve the life of the elderly, but also boost the economy by stimulating consumption and providing employment opportunity. In the short term, it can fully utilize the idle resources of the tourism industry; in the long term, building Phuket into a demonstration base integrating tourism, elderly care and medical care can also provide experience for coping with the challenges of aging society.

Based on the idea of active ageing, the theory of public finance, the incentive theory, and the stakeholder theory, this article has elaborated the academic causes for developing age-friendly tourism in Phuket. Moreover, this article points out the following constraints of this development initiative: lack of targeted tourism products and services, lack of a platform to integrate various resources, lack of professional talent training and team building, lack of relevant regulations and industry standards, and lack of age-friendly environments and awareness of active ageing. In response to these constraints, the authors put forward following specific countermeasures for developing age-friendly tourism in Phuket.

Firstly, the tourism industry should promote supply-side reforms by designing and developing corresponding tourism products and services according to the physical and mental characteristics of the elderly. As most of the offshore tour projects are not suitable for elderly tourists, alternative tours such as urban cultural heritage tour, medical or wellness tour, education tour can be developed to create a satisfying travel experience. In certain respects, this may reflect the needs of those professions--scientific, medical, social service--that depend on aging as a problem to remain viable as well. Compared with ordinary tourists, the travel itinerary for elderly tourists should not be designed too tight, the hotels should provide friendly barrier-free service facilities for elderly tourists. During the trip, the tour guides need to maintain real-time contact with local medical, rescue and insurance departments to ensure travel safety.

Secondly, all the stakeholders should work together to build a comprehensive resource integration platform guided by the governments and participated by multiple parties. Aiming towards the shared goal of developing age-friendly tourism at Phuket allows these different stakeholders to work within their core areas but in a focused way that complements what is being done by others. Facilitating macro-level conditions such as political stability, safety, and reliable transportation infrastructure are all things that have to be developed by the government (Kaewkitipong, 2018). Only governments can create and oversee this platform, the role of governments will be to steward this partnership, enhance the enthusiasm of social forces to participate, maintain a sustainable and appropriately trained workforce, ensure that integration occurs across various services, ensure the quality of services etc.

Thirdly, ensure a sustainable and appropriately trained workforce with careful consideration of the human resources that will be needed to deliver elderly-centered and integrated service. It

will be important to ensure that service providers have skills and knowledge commensurate with their roles. Other key actions that might be taken include: establishing a professional qualification system for elder care services, providing basic training about geriatric and gerontological issues for all service providers, including core geriatric and gerontological competencies in all health curricula, training professional tourism product developers and tourism project managers, etc. The Faculty of Hospitality and Tourism of the Prince of Songkla University is located in Phuket and commits to supporting the development of the community and the wider region. The faculty could include core geriatric and elder care competencies in its curricula or even open new majors to reserve talents and provide intellectual support for the development of age-friendly tourism in Phuket. Additionally, all professional education programs should be allied to robust and effectively implemented accreditation mechanisms.

Fourthly, the government should formulate policies to encourage and promote the development of the age-friendly tourism market, and create a good, fair business environment and service guarantee system for enterprises that provide tourism services, such as appropriately reducing the taxes and fees of enterprises engaged in age-friendly tourism services. In addition to educating and training employees, relevant industry groups also need to formulate reasonable industry service standards, and elderly care guidelines must be developed and made more widely available. Besides, laws and regulations about service quality supervision, dispute resolution, and licensing or accreditation of care providers and facilities should also be studied and promulgated as soon as possible.

Fifthly, the government should raise awareness about active ageing and an age-friendly environment in Phuket is necessary. Age-based stereotypes influence behaviors, policy development and even research (World Health Organization, 2016). But a strategy for active ageing can enhance quality of life, therefore, can further economic sustainability; it shifts the focus of policy away from older people, as a separate group who have aged, to all of us, who are ageing constantly (Walker, 2002). An age-friendly environment is built around key municipal-level services: transportation, housing and urban development, information and communication, and health and community services. All relevant sectors should work together towards the common goal to foster healthy and active ageing. Engendering change requires collaborating across various levels of government and among government and nongovernmental actors, including, for example, academics, private service providers and older people's organizations.

To a certain extent, the age-friendly tourism is an innovation and many questions remain untreated. During its initial development period, there are bound to be constraints such as high investment and operation risks, narrow consumer demand in the service markets, high service costs, low service income, and low operating profits. Support and continuous incentives from the government's fiscal macro-control policies are necessary. Considering that age-friendly tourism is closely related to the problem of population aging, the importance and practical significance of developing age-friendly tourism at Phuket cannot be ignored.

7. Limitations and future study

Despite a careful research design and data analysis, the findings, discussions and suggestions in this article should be applied with caution. As this research aims to lay the theoretical

foundation and propose policy suggestions for an innovative industry development, most of the considerations and analysis in this article are at the macro and theoretical levels. Therefore, they might be incomplete and superficial. If this article can arouse the attention of academia and trigger more academic discussions, the authors will feel reassured.

According to the interviews, most of the interviewees were worried that intervention of governmental departments would make the implementation of the project lack flexibility. They insisted that the comprehensive resource integration platform should be managed by all the stakeholders, especially the private providers. In addition, one interviewee suggested that the governments should focus on changing Phuket's image from 'a destination for international tourists' to 'a destination for elderly tourists'; he also stated that the responsibility of the academia is to investigate and study firstly, propose practical solutions secondly, convene all parties to negotiate and discuss finally. So our future research will attach more importance to the analytical methods of empirical research, combine the survey results with real conditions at Phuket, transform various suggestions that are conducive to promoting active ageing into public policies, and conduct research on the relevant mechanisms for achieving these policies.

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STUDY OF CULTURE AND DEVELOPMENT OF THAI PHUAN STANDARD CUISINE RECIPES FOR CULTURAL TOURISM IN UTTARADIT AND SUKHOTHAI PROVINCE

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Abstract: The study of culture and development of Thai Phuan standard cuisine recipes for cultural tourism promotion in Uttaradit and Sukhothai provinces was intended to 1) examine cuisine culture of Thai Phuan ethnic communities in Baan Haadsiao and Baan Pakfang villages, 2) develop standard recipes for the ethnic groups being studied, and 3) determine the consumer acceptance of the ethnic cuisine recipes. The study was carried out in 3 phases: 1) survey and identification of the ethnic cuisine culture and ethnic culinary tradition potential for tourism, 2) development of standard ethnic recipes and sensory evaluation of the developed recipes by 300 experts and consumers, and 3) construction of a cookbook containing the 25 highest-rated simple Thai Phuan recipes for cultural tourism purposes.

The results showed that Thai Phuan ethnic communities have simple culinary practice, using locally-available or home-grown ingredients. In this study, 25 ethnic recipes were developed. The developed recipes were grouped into 5 culinary categories: 1) curry and soup, 2) dipping sauce and paste, 3) salad and leaf-wrapped roast, 4) stir fry, and 5) snack and dessert.
With regard to the potential evaluation of the recipes performed by 16 experts using
7-point Likert scale (5 experts at a time), all of the 25 recipes were found potential at a high level (5.50-6.49) and at a very high level (6.50 – 7.00) in terms of traditional cuisine originality, variety of ingredients, identities, nutritional values, popularity and contemporariness.

The sensory evaluation through a 9-Point Hedonic Scale Test showed that all of the recipes gained the acceptance at a high level (7.51 – 8.50) and at a highest level (8.51 - 9.00) in terms of food appearance, texture, color, smell, taste and overall satisfaction.

Keywords: Thai Phuan ethnics; cuisine culture; Thai Phuan recipes

1. Introduction

Thai Phuan ethnics originally migrated from Xiang Khuang province in Laos and have settled in 23 provinces throughout Thailand. Through cultural transfer and exchanges during their migratory journey as well as adjustments to new settlements, Thai Phuen culture seems to vary by location. In this study, the researchers targeted Thai Phuen cultures in Haadsiao, Sukhothai and in Pak Fang, Uttaradit, both of which are located in the lower part of Northern Thailand where three significant cultures, including Lanna, Central Thai and Lan Xang, meets, making it distinct from Thai Phuan cultures in other areas.

Thai Phuan cuisine is unique in that the cooking methods are simple and unfussy with preferences for bland tastes and local ingredients like vegetables, fish, frog, pork and red ant eggs as well as herbs and spices including chilies, peppermint, ginger, galangal, lemongrass, garlic and bamboo shoots (Yangyen and Panyayong, 2017: 80). This coincides with the current trend and demand of healthy food, especially clean eating trend that encourages whole, unprocessed and organic foods. These foods are typically fresh foods that have not been processed and tend to contain very little seasoning like added sugar or salt. Boonprakop et al. (2018:17) state that cuisine plays a part in creative tourism that holds both artistic, cultural and social values obviously visible in the society. Local food has the potential to attract tourists from different cultures by acting as a medium to stimulate tourists' interest in the tourist destination. Oftentimes, the identity of the local cuisine is used to create the brand of a tourist attraction. Food is also used as a tool to develop strategies for attracting tourists at both local and national levels. An important source of tourism-based income is eating, the main activity in which tourists spend up to one-third of their expenses during a trip. Over 30 percent of tourists are searching for good food while traveling. Food gives tourists a profound impression of that attraction, so tourism for learning about food is a blend of culture, nature, unique local, hospitality, and services that offer an impressive experience to travelers (Designated Areas for Sustainable Tourism Administration, 2012: 1).

Over the past decade, cultural tourism has been in greater demand both nationally and internationally. The influence of globalization has resulted in international tourists changing their values and behavior, wanting to learn the indigenousness or authenticity of the local community even more. Both developed and developing countries use cultural tourism as one of the key mechanisms in the country's economic and social development process (Rattanasuwongchai, 2011: 33). In non-industrial countries, in particular, entrepreneurs and tourism-related organizations turn to the locality and identity potential selling points in the community. Driven by tourist demand, there has been an apparent rise in selling "oldness" or ethnic cultures to attract tourists. Cuisine culture, thus, plays a key role as an originality item to be included in various forms of tourism like cultural tourism and home stay accommodation that highlight traditional food service in promoting the sales. As Thai Phuan culture in Uttaradit and Sukhothai provinces has been maintained to the greatest extent, the study was intended to preserve and pass on Thai Phuan cuisine culture, and to be guidelines for developing Thai Phuan ethnic food in response to a growing trend in ecotourism or cultural tourism that goes in line with the 12th National Economic and Social Development Plan (2016) emphasizing on

the principle of economic growth that reduces inequality by increasing productivity through wisdom and innovation.

2. Research Objectives

1. To study cuisine culture of Thai Phuan ethnic communities in Ban Haadsiao and Ban Pakfang villages.
2. To develop standard recipes for the ethnic groups being studied.
3. To determine the consumer acceptance of the ethnic cuisine recipes.

3. Literature Review

3.1 Cuisine culture

According to the United Nations Educational, Scientific and Cultural Organization (UNESCO, as cited in Ministry of Culture. Office of the National Culture Commission 2008), culture is classified into 5 following domains.

1. Humanities include tradition, integrity, morality, religion, philosophy, history, archeology, social etiquette, government, law, etc.
2. Arts include language, literature, music, dance, fine arts, architecture, sculpture, painting, etc.
3. Crafts include embroidery, carving, weaving, lacquerware making, silversmithing, goldsmithing, floristry, crafting, pottery making, etc.
4. Home economics includes food science, cooking, dressing, parenting, housekeeping, medication, medicine use, family relations, etc.
5. Sports and recreation include Muay Thai, two-handed fencing, sword-fighting, dove keeping, plant dwarfing etc.

Cuisine culture encompasses several associated factors and elements as follows (Wongthong cited in Sakkayapan, 2011:17-20).

There is a socially-learned pattern of what can be used for food. In those ancient times, eating was intended to respond to hunger and satisfaction in food that was pleasing, regardless of the value or benefit of the food in nourishing the body. Therefore, choosing what to eat was based upon the traditional culture passed on. This can be considered that society plays a very important role in the cuisine culture of the community.

For food foraging and food processing, in the past, women were usually food foragers who searched for and collected food, while men were assigned a role to work outside, such as cultivating and animal raising, and bring it back home to the women or the housewife to prepare meals. Processing or preparing food create special traits for home dishes or even national dishes which vary from each other. For instance, Thai dishes are typically prepared by making curry, tossing ingredients and leaf-wrapped cooking methods, while Chinese dishes are usually cooked by boiling and frying techniques. Indian food primarily features curry and meat cooked

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in rice, whereas European cuisine is mainly prepared by baking and frying. These culinary cultures have greatly influenced the cooking utensils and equipment used in food preparation and cooking that has been passed down generation to generation. For example, mortars and pestles for making curry paste are commonly found in a Thai kitchen, as are steaming pots in a Chinese kitchen and a baking oven in a European kitchen. In addition, cooking techniques also have a great influence on the use of food containers and eating utensils. To illustrate, Western food, generally served in a large piece, needs knives and forks to cut the food into smaller bites; Chinese food, prepared in small pieces, is conveniently picked up by chopsticks; Thai food is particularly good for eating with fingers. Thanks to these cultural traditions, there are many different types of tableware for different serving functions, and also proper table manners to be observed accordingly.

Food consumption is determined by individuals' social classes. In some societies, occupational or caste status is an important determinant of food consumption, even without any written regulation or law concerning this matter.

In a society, treats for special occasions are generally governed by social norms or beliefs. Special dishes have been specified to be served at a special event such as a newborn baby ceremony, a Western Christmas celebration and the Chinese Ghost Festival. On these special occasions, food is regarded as essential and has symbolic meanings attached to it. In a Thai society, for instance, bananas, sugar canes and rice noodles are typically prepared for a wedding and a new house blessing ceremony; some dishes, like Kaeng Bon (Caladrum elephant ear plant curry), Tom Yam and Kaeng (spicy hot soup and curry), are considered as avoided food items in such auspicious events. Food arrangement for special occasions is also based on vegetation, fruits and raw materials that are locally and seasonally available.

Cuisine culture is, to some extent, based upon supernatural beliefs associated with food, like Muslim's prohibition on eating pork. Such beliefs or practices belong to a particular group, some of which are inconsistent with and cannot be undermined by scientific explanations.

3.2 Standard recipe development

A standardized recipe is defined as one that has been tried and has been found to consistently produce an established yield with the same or near the same quality when the exact ingredients, methods of preparation, and all aspects of making the dish are used. The exact quantity and quality of ingredients as well as detailed procedures, such as cooking time and temperature, are listed. In addition, a standardized recipe is used by a particular food service operation to ensure the same food quality, quantity and decoration every time it is produced. A standardized recipe includes recipe title, recipe category, ingredients, preparing instructions and serving, illustration, quantity and volume of prepared food, serving size, and number of servings (Panyayong, 2016: 14). Benefits of using a standardized recipe include:

1. consistency of the product quality,
2. Inventory Control that helps manage the kitchen stock and raw materials, and is useful for planning, ordering and keeping needed raw materials available,

3. food cost control,

4. production control which can help produce menu items most efficiently as raw materials and time needed can be estimated, thus planned accordingly,

5. staff training and labor control that aids in training employees to be able to work interchangeably,

6. food quality improvement,

7. efficient production with confidence.

However, a standard recipe must be one that is adapted to each food service operation. To determine a standard for time, temperature and tools, it should be based on the equipment practically available at the operation. A recipe should also be retried and adapted to the equipment and the production needs of the establishment before becoming standardized for an operation.

The sensory evaluation determines food properties including appearance, texture, color, smell, flavor and overall satisfaction, through a 9-point hedonic scale sensory test by scale in which 9 = Like extremely, 8 = Like very much, 7 = Like moderately, 6 = Like slightly, 5 = Neither like nor dislike, 4 = Dislike slightly, 3 = Dislike moderately, 2 = Dislike very much and 1 = Dislike extremely, which showed the degree of likeness. The data were analyzed, and feedbacks and suggestions from the experts were gathered for further development.

3.3 Ethnic tourism

Ethnic tourism refers to a form of tourism whose focus is on cultural identity/characteristics of a living culture or traditions of a particular ethnic group. Ethnic tourism provides the chance for tourists to experience and learn about aspects of unique cultures and ways of living of different ethnic groups, as well as various rituals such as weddings, funerals, traditional living of the community, etc. Ethnic tourism, intended to present distinctive attributes of an ethnic group which is unique to that particular culture, makes it become better known to the world. More importantly, creativity processes can seemingly add value to ethnic tourism, products and services, as aligned with the Creative Economy guidelines in the 12th National Economic and Social Development Plan (2017-2021).

Today, tourism that provides a chance to experience ethnic and local cultures is becoming more and more popular and has become an important selling point of tourism in many countries. Particularly in African and Asian countries including Thailand, jungle trips and hill tribe visits are an increasingly popular form of tourism. In addition, there are numerous local attractions in Thailand that have high potential for this kind of tourism. If properly implemented, this form of tourism can be a potential source of income that can be derived throughout the country. In this regard, food is considered to be a great advantage to boost cultural tourism and a significant contributor that allows tourists to develop sense of place through interaction with local people when sharing their food experiences. On a trip, tourists spend money and time most on food which accounts for one-third of their overall travel expenses (Designated Areas for Sustainable Tourism Administration, 2015: 1).

3.4 Creative tourism

Creative tourism is a form of tourism that offers tourists or visitors the opportunity to develop or utilize their own creative potential or creativity through voluntary active participation in learning experiences, which are characteristic of the holiday destination. Tourists are not merely viewers or observers who are just visiting there, but as participants and co-creators who actively engage in creative activities with local people (Designated Areas for Sustainable Tourism Administration, 2012).

In the past, tourists valued and sought experiences that would allow them to visit buildings, museums, beaches or mountains. Nowadays, tourists have turned their attention to image, identity, ways of life, atmosphere, stories and creativity. There has been a transition in tourism with a shift from high culture, such as castles and palaces, to everyday culture, like local restaurants, markets and houses. This shift makes the tourists more engaged in the tourism experience (Creative Tourism Model Project, Faculty of Sociology and Anthropology Thammasat University, 2012 cited in Teeranont and Sophoncharatkul, 2016: 207)

3.5 Thai Phuan Ethnicity

According to Central Knowledge Center, Ministry of Culture (2012: 4-5), the Phuan people originally lived in Phuan, Xieng Khuang province, Laos. The people are referred to as Thai Phuan in Northeastern dialect, while in Central Thailand, they are called Lao Phuan. The Phuan people have scattered in the Ngum River Basin of Laos. Another theory (the Northeastern Arts & Culture Club Chulalongkorn University, 2009) suggests that the Thai Phuan people settled in Ban Buhom and Ban Klang, Chiang Khan District, Loei Province migrated from Tao Hai City, Luang Prabang, Lao People's Democratic Republic. They are believed to travel down and across the Mekong River to settle in Ban Buhom first, and later on some part of them moved to settle in Ban Klang. The people lived a simple life in a rural setting. Their main sources of livelihood were farming, weaving, blacksmithing, silversmithing and goldsmithing. Like Thai Phuan people in Sukhothai and Uttaradit provinces, women, in the past, were responsible for weaving, and men were skilled at forging, making knives and farming tools. Their culture is similar to the Lan Xang culture (once a Lao kingdom located in the Mekong River Basin in Laos) but has its own unique identity. The people primarily use simple ingredients like vegetables, herbs and fish locally available. They basically cook with locally sourced vegetables and seasonal wild edible items, using simple and unfussy cooking methods with preferences for bland tastes. The main condiments include fermented fish, dried chilies, salt and fish sauce, used in combination with garlic, shallots, galangal and lemongrass. (Nadee, 2017: 66).

4. Research Methodology

1. Documentary research was conducted to explore the cultural background of each area to determine the significance of Thai Phuan ethnic cuisine culture. In completing this study, the following procedures were implemented.

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（1）Literature reviews on history and background related to Thai Phuan ethnic groups were carried out.

（2） Documentary research via texts, electronic media on food and consumption culture in terms of local food ingredients, condiments, spices, cooking utensils, food characteristics, and cooking identity was conducted.

2．Local area surveys in the context of Thai Phuan ethnic cuisine culture were undertaken to investigate ways of living of Thai Phuan people, with a focus in 2 areas: Pak Fang Subdistrict, Mueang District, Uttaradit Province and Haadsiao Subdistrict, Si Satchanalai District, Sukhothai Province. To collect information about food culture, in- depth, unstructured interviews were conducted. All the interviews were noted down by hand and audio-recorded during the discussion. The emergent data were checked against the literature reviews both in Thai and English.

3. Thai Phuan recipes were then developed. Derived from the identification of food identity in the study areas, a total of 25 recipes were selected by their popularity and their unique taste of Thai Phuan food identified by 16 local experts, all of whom were sage villagers and members of the Thai Phuan Association in Pak Fang and Haadsiao, having experience and credentials in traditional cuisine. Information about Thai Phuan cuisine was shared and discussed at a forum with a gathering of more than 50 people including sage villagers and Thai Phuan villagers in a friendly and stimulating environment. (The evaluation of individual recipes was performed by 5 experts at a time according to their expertise.) The selection was also based on the value of true cultural roots, especially in rare dishes that are at risk of disappearing due to the process of cultural transfer. The recipes were tested and evaluated by local food experts. The evaluation was repeated 3 times.

4. Data verification and evaluation of the developed recipes by experts in Thai Phuan ethnic cuisine were performed, using sensory evaluation and cultural acceptance assessments. The obtained scores based on the experts' evaluation was then analyzed for mean and standard deviation. Each recipe was revised based on the results and recommendations given by the experts.

5. The recipes were finalized and tested by general public who visited Pak Fang and Haadsiao, and tourists who took part in the annual festival called "Kam Fah" held in Haadsiao. Then, the data obtained were statistically processed.

6. All the obtained data were grouped and arranged into different cultural themes to construct a cookbook which was checked by Thai Phuan cuisine experts and was revised according to the remarks of the experts. The complete cookbook was returned to the study areas for their benefit and use in promoting cultural tourism.

5. Results

The results are presented in 3 sections according to the objetives of the study.

1. For the first objectives, the researchers carried out local area surveys and interviews with Thai Phuan villagers to discuss Thai Phuan cuisine culture from the past to the present. All

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obtained information was documented and is compiled into the book about Thai Phuan called "Su Kan Kin A-han Thin Thai Phuan" (literally translated as Sharing Meals of Local Thai Phuan Food), which has been disseminated in libraries and dispatched back to the study areas. The findings cover the following topics.

1.1 Thai Phuan cuisine culture in Haadsiao and Pak Fang villages
1.2 Ingredients and preparation of Thai Phuan food
1.3 Cooking tools and utensils
1.4 Traditional events in relation to food
1.5 Rice-eating culture of Thai Phuan people
1.6 Traditional Thai Phuan houses

As the study yielded loads of information, a brief summary of key results is provided here below.

Thai Phuan ethnic foods in both locations have similar characteristics in terms of food title, category and preparation. Despite being close to Lan Xang culture, Thai Phuan cuisine has its unique attributes: using simple ingredients like vegetables, herbs and fish locally available, preference for locally sourced vegetables and seasonal wild edible items, favoring meat consumption in regular diet, using simple and unfussy cooking methods with preferences for bland tastes, seasoning with fermented fish, dried chilies, salt and fish sauce in combination with garlic, shallots, galangal and lemongrass.

Thai Phuan people in Haadsiao and Pak Fang consume glutinous rice as well as white variety, but white rice is consumed in a larger proportion (approximately 5:1), which is considered to be different from Lao people who primarily eat glutinous rice. In the area inhabited by Thai Phuan people, there is alternating farming practices between cultivating glutinous rice and white rice. In addition to eating rice as a staple food along with different types of side dishes, rice is also milled into flour and has brought about a culture of eating rice-based foods such as noodles and desserts made from rice flour. Prominent Thai Phuan foods are Kanom Jeen (rice noodles) and Khao Tho The (fermented rice flour balls).

Kanom Jeen (rice noodles) is known as Khao Pun among Thai Phuan people. It is made from rice fermented for 2-3 days and then milled. If broken milled rice is used, it can be kneaded after fermented without milling first. The kneaded dough is set aside for 2 days before it is steamed, kneaded, sieved and made into noodles. It is usually eaten with fish curry sauce. In the past, it was customary to make rice noodles for auspicious religiuos events, harvest events or large gatherings. A large tray of rice noodles and a big pot of fish curry sauce were prepared to be served for guests. As prepared in a large quantity, there was often some leftover. The leftover noodles was sun-dried to preserve them for later use. The dried noodles can be used in various dishes such as spicy soups and fried noodles. Before cooked, dried noodles are immersed in water or boiling water to make them soft.

Figure 1 Rice noodles making process

Figure 2 Sun-dried rice noodles as local wisdom in food preservation

Khao Tho The is a fermented dough made into balls which has not been processed into noodles. It is considered a snack that can be eaten for any occasion. In the past, they were grilled and eaten alone. Thai Phuan villagers and Kaewprasert (2018) said, "there were many steps in making rice noodles which took a long time to prepare. Sometimes young children happened to cry because they were hungry. Kneaded dough balls are therefore flattened and grilled on fire to be eaten as a snack to relieve hunger." Nowadays, there is a dipping sauce eaten with the grilled dough unlike in the past. This is considered food dynamics, showing shifts and assimilations arising from social change.

Figure 3 the making process of Khao Tho The or grilled rice dough

Desserts and snacks are typically made from rice or rice flour of both white and glutinous varieties. Khemmook (2018) stated, "many types of desserts and snacks of the Thai Phuan people, such as Khao Lom Laem, Khao Tuu, Khao Khiap Khao, Khao Khiap Daeng, Khao Khong Khaeng, Khao Tong Tong Khaem, Khao Nom Khon, Khao Toh Tat, Khao Pad, Khao Luum, Khao Long, Khao Khong, Khao Nom Huae, Khao Mao, Khao Niao Daeng, Khao Long Song or Lod Chong have been eaten as desserts and snacks since the old days. However, many desserts and snacks has disappeared since no one makes them any longer. The new generation do not know how to make it, thus making the foods dissipate."

2. The standard recipe development of Thai Phuan standard cuisine recipes for Haadsiao and Pak Fang communities
The researchers developed 25 standardized recipes which fall into 5 following categories.

(1) Soup and curry category includes Kaeng Nor Mai Non Nang (bamboo shoot hot and sour soup), Kaeng Jan (pickled bamboo shoots in spicy pork soup), Kaeng Bur Kan Tong (spicy died fish soup with Colubrina vegetable), Kaeng Phak Tud (spicy died fish soup with Lebbeck vegetable), Kaeng Yuak (spicy banana stalk coconut curry with pork), and Kaeng Ud Lud Ma Khuae (eggplant thick soup)

(2) Dipping sauce and paste category includes Jaew Haeng (chili paste with dried fish), Jaew Pur Lur (red dried chili dip with grilled fish), Jaew Ma Khuae (spicy mashed eggplant), Jaew Ma Phet (red and green chili dip), Jaew Ma Den (tomato and chili dip), and Jaew Ngao (green chili dip with frog)

(3) Salads and leaf-wrapped roast category includes Mo Nor Mai (spicy bamboo shoot salad), Salerm Moo (spicy grilled pork salad with herbs), Tam Jan, Yam Yod Man Dang (spicy salad with sweet potato shoots and herbs), and Ka Naep Pla (fish curry grilled in banana leaves)

(4) Stir-fry category includes Khua Bak Mee (stir-fried young jackfruit), Khua Khao Pun Haeng (stir-fried rice noodles), and Khua Jan (stir-fried pickled bamboo shoot)

(5) Snacks and desserts category includes Khao Khong (fried sweet potato dough), Khao Lom Laem (rice balls in sweet coconut milk), Khao Luum (puffed rice balls coated with sugar), Khao Tuu (cooked rice kneaded with salt), and Khao Tom Tong Khaem (boiled sticky rice and coconut in a bamboo grass leaf)

3. The consumer acceptance of the ethnic cuisine recipes

The sensory evaluation performed by experts was employed to determine level of food acceptability through a 9-Point Hedonic Scale. The evaluation was repeated 3 times. The sensory evaluation determines food properties including appearance, texture, color, smell, flavor and overall satisfaction.
The test showed that all of the 25 recipes gained the acceptance at a high level (7.51 – 8.50) in all terms of properties, as shown in Table 1.

Table 1 The sensory evaluation by Thai Phuan cuisine experts (N= 5)

Item	Appearance	Texture	Color	Smell	Taste	Overall satisfaction
Mean and S.D.	8.22±0.28	8.22±0.24	8.18±0.26	8.22±0.32	8.29±0.25	8.22±0.31

The evaluation showed that overall potential of the developed recipes was at a high level (5.50 – 6.49). The scores gained by each recipe were at a high level (5.50 – 6.49) and at a very high level (6.50 – 7.00) in all aspects, as shown in Table 2.

Table 2 The evaluation of the cultural acceptance of recipes by Thai Phuan cuisine experts (N= 5)

Item	Originality	Variety of ingredients	Identity	Nutritional values	Popularity	Contemporariness
Mean and S.D.	6.28±0.27	6.22±0.28	6.45±0.24	6.34±0.32	6.20±0.40	6.24±0.32

The evaluation of the cultural acceptance of recipes by Thai Phuan cuisine experts was comprised of 6 dimensions: originality of traditional cuisine, a variety of ingredients, identities, nutritional values, popularity, and contemporariness. The experts' acceptance of the 25 recipes was overall at a high level (5.50 – 6.49) and at a very high level (6.50 – 7.00).

In overall, all of the 25 developed recipes gained the consumers' acceptance at a high level (7.51 – 8.50) in all aspects. For the curry category, Kaeng Nor Mai Non Nang (bamboo shoot soup) gained the highest acceptance in terms of its texture (8.52±0.50), color (8.54±0.50), smell (8.46±0.50), and overall satisfaction 8.53±0.50), whereas Jaew Ma Khuea (eggplant spicy paste) showed the highest acceptance from the consumer for the dipping sauces category. Details are provided in Table 3 below.

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Table 3 The sensory evaluation by general consumers (N= 300)

Cuisine items	Mean and S.D.					
	Appearance	Texture	Color	Smell	Taste	Overall satisfaction
1.Kaeng Nor Mai Non Nang	8.16±0.74	8.52±0.50	8.54±0.50	8.46±0.50	8.48±0.50	8.53±0.50
2.Kaeng Jan	8.16±0.78	8.26±0.71	8.18±0.74	8.22±0.72	8.15±0.80	8.19±0.77
3.Kaeng Bur Kan Tong	8.09±0.75	8.20±0.77	8.14±0.77	8.22±0.76	8.14±0.73	8.12±0.78
4.Kaeng Phak Tud	8.17±0.76	8.52±0.50	8.54±0.50	8.45±0.50	8.50±0.50	8.50±0.50
5.Kaeng Yuak	8.53±0.50	8.13±0.76	8.21±0.77	8.15±0.76	8.14±0.72	8.18±0.75
6.Kaeng Ud Lud Ma Khuae	8.12±0.76	8.24±0.75	8.18±0.73	8.16±0.74	8.14±0.73	8.27±0.74
7. Jaew Haeng	7.99±0.82	8.06±0.81	8.12±0.82	8.00±0.86	8.04±0.84	8.08±0.81
8.Jaew Pur Lur	8.23±0.75	8.49±0.50	8.54±0.50	8.49±0.50	8.52±0.50	8.50±0.50
9. Jaew Ma Khuae	8.47±0.50	8.48±0.50	8.55±0.50	8.46±0.52	8.51±0.50	8.54±0.34
10.Jaew Ma Phet	8.44±0.50	8.49±0.50	8.54±0.33	8.49±0.34	8.52±0.32	8.50±0.46
11.Jaew Ma Den	7.99±0.82	8.02±0.79	7.98±0.82	7.97±0.82	8.00±0.81	8.08±0.85
12.Jaew Ngao	7.98±0.82	7.95±0.78	8.07±0.80	7.88±0.74	7.93±0.88	7.95±0.79
13.Mo Nor Mai	8.20±0.74	8.22±0.76	8.20±0.74	8.18±0.76	8.18±0.74	8.16±0.76
14.Yam Yod Man Tang	8.20±0.73	8.04±0.75	8.18±0.73	8.16±0.74	8.14±0.73	8.17±0.74
15.Salurm Moo	8.02±0.81	7.96±0.80	7.96±0.82	7.61±1.13	8.00±0.69	8.02±0.83
16.Tam Jan	8.14±0.75	8.26±0.71	8.18±0.74	8.22±0.72	8.15±0.80	8.19±0.77
17.Ka Naep Pla	8.18±0.74	8.15±0.76	8.13±0.76	8.29±0.71	8.12±0.77	8.21±0.74
18.Khua Khao Pun Haeng	8.51±0.32	8.52±0.51	8.54±0.52	8.46±0.42	8.48±0.50	8.53±0.44
19.Khua Bak Mee	8.52±0.50	8.28±0.74	8.18±0.79	8.17±0.77	8.14±0.77	8.22±0.74
20.Khua Jan	8.28±0.75	8.20±0.77	8.14±0.77	8.22±0.76	8.14±0.73	8.12±0.78
21.Khao Khong	8.49±0.50	8.53±0.50	8.50±0.50	8.53±0.50	8.54±0.50	8.51±0.21
22.Khao Lom Laem	8.10±0.77	8.15±0.76	8.13±0.76	8.29±0.71	8.12±0.77	8.21±0.74
23.Khao Luum	8.25±0.75	8.28±0.74	8.18±0.79	8.17±0.77	8.14±0.77	8.22±0.74
24.Khao Tuu	8.12±0.77	8.28±0.72	8.20±0.77	8.18±0.74	8.25±0.75	8.21±0.72
25.Khao Tom Tong Khaem	8.24±0.75	8.24±0.74	8.14±0.73	8.17±0.78	8.20±0.78	8.19±0.74

6. Discussion and Conclusion

1. Thai Phuan ethnic food whose raw materials are mostly indigenous vegetables and seasonal wild edibles can be used as development base for cultural tourism in Uttaradit Province. It was found in the present study that there appear to be a considerable number of potential entrepreneurs for enhancing such different forms of creative tourism as ethnic tourism and gastronomy tourism, by making use of food as a selling point to encourage local culture to survive and then thrive, and to become an income source. This is aligned with Teeranon's study (2012: 219-220), finding that creative tourism underlines the reality of the community and value enhancement of local ways of life, which engage tourists with the local community through numerous creative activities, providing opportunities of sharing experiences and mutual learning between cultures. The community, on the other hand, appears to benefit from tourism in terms of sustaining cultural assets and local wisdom for future generations to celebrate through a mechanism driven by the government, community and private sector in forms of conservation, restoration, application and creation to create such new activities for tourists as cooking lessons and visiting agricultural farms, etc.

In order to prevent certain ethnic dishes from disappearing, improvement and assimilation process may be necessary to make them become more favored and good for tourism promotion. Clear examples of this case are Khao Tuu, traditionally as cooked rice kneaded with salt, and Khao Luum, originally as puffed rice balls coated with sugar. That these dishes were once popular may be due to the fact that in the past food was limited; there were few choices to make. A tremendous selection of food has been developed, making available a wide array of food in terms of production, quantity and flavors. Such traditional dishes have been made unpopular, or eventually disappear. In several communities, efforts in preservation of traditional dishes have been made, but have not been so successful because they strictly adhere to the principle of originality as practiced in the past. This is in congruence with a study by Chanthanawat (2003), investigating lifestyles of Shan villagers at Ban Tham Lod and finding that there have been substantial advances in all aspects: communication, transportation, economy, society, culture and environment. Cultural and social assimilation and shift are not likely to occur solely in a particular aspect of the socio-cultural system, but rather have the impact on the whole system. To balance the system, conventional forms considered good and useful are maintained to carry on, while good external cultural traits are assimilated. This assimilation and shift are thought to constantly occur to maintain livelihood in response to the current situation being different than it was in the past, providing a chance to survive.

A similar conclusion was reached by Kritawit Kritmanorot and Supakorn Disthaphan (2019), who studied on gastronomy tourism through food identities in the four regions, concluding important theories related to gastronomy tourism and presenting lists of local cuisines that are representative of cultural identity of each region of Thailand based on the concept of authenticity associated with tourism. It was found that authenticity can relate to traditions, food production processes, origin of the food and its ingredients, and that the authenticity of the food has the potential to attract tourists.

2. As Thai Phuan standard recipes of Ban Haadsiao and Ban Pak Fang exhibit high acceptance rates among the experts, especially for the originality and the identity of Thai Phuan food, they can potentially be used as a knowledge base for Thai Phuan people. The collection of developed recipes can serve as an important reliable source of information about their own culture, given that they have been developed through extensive development processes based on community engagement including collecting in-depth data, exploring preparation methods, and applying the principles of recipe preparation with exact measurements, proportion adjustment and several tests. This is consistent with what has been found in a previous study by Panyayong (2016), suggesting the principles of developing a standard recipe that it is necessary to carry out a survey from various secondary sources including books and textbooks, or primary data from sources such as restaurants, community sages, events or traditions where the recipes are used. In addition, multiple tests for each recipe are necessarily conducted to ensure that the food obtained is of the same or similar quality. Testing must be performed at every step as specified from selecting ingredients, determining quantity, weights and measures, cooking time and temperature, recipe yield, serving portion, and tasting tests or recipe evaluation (Wiriyachari, 2002), which is a sensory assessment in terms of appearance properties such as color, shape and size, odor, taste, and texture by cuisine experts. An acceptance test by general consumers are recommended to be performed to confirm the recipe quality prior to actual use. The development of a standard recipe is deemed to have been completed if the recipe successfully gains an acceptance from its prospective consumers.

3. Thai Phuan people in Sukhothai and Uttaradit provinces are thought to have migrated from Xieng Khuang along the Ou River, Luang Prabang and traveled across the Mekong River to the current settlements. According to the data obtained from the area survey, Thai Puan cuisine in Pak Fang and Haadsiao has a remarkable cultural identity and natural attributes, which features fresh, local ingredients with little seasoning, making it a very nutritious healthy food. In the constructed Thai Phuan cookbook, a table of basic nutritional information of each recipe is presented so that it can be used as a reference for ethnic tourism purposes. These attributes are also shared among other ethnic groups in the Mekong region. The finding is consistent with Saowapa Sakyaphan's (2013) study of Tai Lue food in terms of history and nutritional values, which found that migration routes and time had an impact on local diets. Thai Lue ethnic food is considered healthy, prepared with natural vegetables. With its nutritive merit, it can potentially be further developed for commercial purposes, with a selling point of healthy food, traditional food and ethnic food.

4. Further expansion of the study to promote cultural tourism

From the data obtained from field surveys in both areas, it was found that there was an effort to promote community-based cultural tourism by people in the community, but there has yet to be any prototype of recipes or set meal, thus varying by individuals. Therefore, information on Thai Phuan food was collected, which can be summarized as follows. One meal set consists of steamed white rice as main dish, chili dipping sauce, blanched vegetables, fresh vegetables, curry, meat-based dishes that provide protein, like mackerel, grilled catfish, grilled dried fish, grilled salted fish, and a few side dishes, characterized by its simplicity and natural flavors with less seasoning. In addition, Jongboriboon (2018) and traditional villagers explained, "in the

past, a Thai Phuan meal set consisted of only a few simple dishes prepared from home-grown, indigenous herbs and vegetables, and freshwater fish, including spicy soup dishes, mostly bamboo shoot soup, chili dipping sauce, boiled or blanched vegetables. When there was one spicy dish in the set, a dish with mild flavor was always included. Meat-based dishes as sauce of protein included grilled fish and boiled eggs, later replaced with mackerel. Roasted catfish, boiled eggs and glutinous rice were prepared for kids. Important dishes typically served along with rice included chili dipping sauce eaten with vegetables (fresh or blanched), grilled salted mackerel, dried fish, grilled fish, and eggs (for kids). Glutinous rice was often eaten as snack. Soup dishes included vegetables soup and Kaeng Ma Lerng Jerng Jang (mixed vegetables such as string beans, eggplants, hyacinth beans, etc boiled with fresh chilies)."

Therefore, the example set meal shown here is one that can be served for tourists to taste and experience the Thai Phuan food culture in Haadsiao and Pak Fang.

Figure 4 Thai Phuan set meal for tourism promotion

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PREDICTING FACTORS TO CONSUME THE VEGETARIAN FOOD AMONG CAMBODIAN GENERATION Y AND GENERATION Z: THE APPLICATION OF THE THEORY OF PLANNED BEHAVIOR

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Abstract: Vegetarian cuisine has become popular among the Cambodians and is now booming in parallel with the regional and national growth of the food industry. With respect to the population growth of Cambodians, Generation Y and Z show their potentials to be the predominant target markets for vegetarian food. This study aims to explore factors predicting vegetarian food consumption for both generations, by using Phnom Penh as a studying context. The study examined if both groups share similarities or pose differences when it comes to factors that influence their vegetarian food consumption. The theory of planned behavior was applied. There were 111 surveys collected by using snowball sampling technique. By using the Partial Least Squares Sequential Equation Modeling (PLS-SEM), all the reliability and validity tests of the measurement model were confirmed (Cronbach's alpha > 0.8; AVE > 0.5, HTMT < 0.9). The results of the path model showed that attitude (β = .44, t = 4.41), subjective norm (β = .14, t = 1.82) and perceived behavior control (β = .33, t = 3.72) had a significant relationship with the consumption intention for both generations. However, both generations were different regarding the degree of the predicting factors towards the consumption intention. For Generation Y, the consumption intention is positively influenced by perceived behavior control (β = .46; $p < 0.05$), followed by attitude (β = .32; $p < 0.05$). For Generation Z, it is significantly influenced by attitude (β = .56; $p < 0.05$), social norm (β = .23; $p < 0.1$) and perceived behavior control (β = .21; $p < 0.1$). Yet, the perceived behavior control was the only factor to show a significant difference between the two groups when it comes to the influence on the consumption intention. This study gives an insight on the intention for vegetarian food preference. It helps filling the gaps of previous studies by fulfilling additional knowledge from the context of Cambodia and add more insight into a regional context. This study also helps practitioners develop an appropriate way to attract both generations for the vegetarian food consumption.

Keywords: Vegetarian food; Food consumption; Generation Y; Generation Z; Theory of Planned Behavior

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1. Introduction

A report from Euromonitor International revealed that the vegetarian consumption has been increasing and the majority of countries in favor of vegetarianism (Richter, 2019). In spite of the limit in number of countries across the continents, the report could help preview the global picture of vegetarianism booming. For instance, between 2016 and 2017, more vegetarians lived respectively in Asia, Africa and Europe while those in Australia were not illustrated. Nigeria was the first nation in the world and in the Africa to be populous in vegetarian practice, which accounts for more than 1.4 million vegetarians. Only two African countries, Nigeria and Kenya respectively, were on the list. Numerous Asian nations stood on top: Pakistan (1.2 million vegetarians approximately), Indonesia (nearly 0.3 million vegetarians), the Philippines (more than 0.2 million vegetarians), Turkey (over 0.16 million vegetarians) and Thailand (above 0.09 million vegetarians). In Europe, vegetarian population was dominant in Germany (more than 0.20 million people) followed by Italy, the second and the last European country recorded in the list (nearly 0.09 million people).

Cambodia has become an emerging market in food and beverage sector and attracted a number of international brands in the fast food and coffee industry ("Business guide: Opportunities in Cambodia 2016 ", 2016). It may be the result of the rapidly growing economy in the last decades and the improvements particularly in the living standard of the population related to the purchasing power and the eating habits. According to Google Trends (2020), the search interest on "vegetarian food" has been gaining popularity in Cambodia in the last decade. From 2011 to 2013, the search interest over time was valued between 50 and 100 (the value of 100 regarded as the greatest popularity and 50 as half as popular). In other words, it was at a record high in the latest decade. The trend on this interest steadily increased after 2013, but in recent months, it sharply decreased probably due to the Covid19. Google Trends showed that Phnom Penh was the only spot on the term "vegetarian food". "Vegetarian cuisine", "vegetarianism" and "vegetable" was amongst the topics related to vegetarian food. The urge to provide the alternative on vegetarian food is amongst the solution for the food security issue, and understanding the consumption intention of vegetarian food will also help the industry promote the appropriated factors to induce the consumption and enhance the experience. The Google trend result turns out that there was a decreasing number of Cambodians interested in the vegetarian food. This justifies the need of this research as the study results will help a better understanding on what affect the consumption intention so that the better way to attract the Cambodian Gen Y and Gen Z vegetarian food can be suggested.

Food industry may be an important sector in Cambodia and the vegetarian food industry is growing. Moreover, to response to the current world crisis of the food security and the call to consider vegetarian food choice by Gleiser (2016), it is necessary to conduct the research studies that promote vegetarian consumptions and provide deeper insights on the consumption intention for the vegetarian food. Therefore, studies on food consumption behavior/intention are proposed and aimed to contribute partially to the future improvement of this industry. However, the research on food consumption behavior/intention is very limited, which bound our understandings on the topic. In addition, no previous literature has focused on the intention or the behavior of Cambodian people in favor of vegetarian food choice. Only one study on

'general' food consumption behavior for Cambodians was conducted so far by Kasikorn Bank in 2017. It showed that Cambodian people preferred staying and eating at home in the past, but in the present, they preferred hanging out and eating out, especially for those living in Phnom Penh ("Cambodia consumer behavior," 2017). The research also discussed about the lifestyles and mindset of Cambodian people, yet it did not shed light on the vegetarian eating behavior or the motivation on such practices.

Therefore, this current research is crucial in both academic and professional sphere. For the academic purpose, it will contribute to fill the knowledge gap of the previous researches, particularly on the Cambodian context. The researches on vegetarian motivation have been studied in the latest decade, but only in other geographical region, mainly in Western countries. Moreover, there is a call for more research on this topic by Ruby (2012) who reviewed the previous literature to explore variants of and motivations for vegetarianism, disparities in attitudes, values and points of view between vegetarians and omnivores and the gender dissimilitude in meat consumption and vegetarianism. In Asia in particular, the motivation on vegetarian food has been studied in some countries namely China (Liu, Cai, & Zhu, 2015), India (Kumar & Kapoor, 2015; Yadav & Pathak, 2016), Korea (Park, Bonn, & Cho, 2020; Taebum & In-Jin, 2015), Taiwan (Neo, 2016; Shen & Chen, 2020), Malaysia (Islam, 2018; Mohamed, Terano, Yeoh, & Iliyasu, 2017) and Thailand (Somthrong, 2019). However, this research area has not been spotted in Cambodian context yet. For the industry practitioner, understanding the intention of Cambodian people on vegetarian food is essential in developing the vegetarian food industry in Cambodia. Practitioners in vegetarian food-related fields can apply research findings to improve and enhance their products and services.

This research will focus the study on the two generations: Generation Y and Generation Z as they are perceived as important target groups. According to the global market research company, Kantar TNS, Cambodian Generation Y are apt to find new products, brands and shops that personalized their preference (Kotoski, 2017). They are considered as in the "full exploration or experimentation mode" when deciding on purchasing products or services. They hunt and explore products and services that bring value to them. They socialize online, evaluate themselves, do startups and make change. They are "me" consumers. For them, food is a fashion. Generally, they are more confident, but less careful consumers than their seniors. On the other hand, Generation Z are perceived to be green, environmental and tech savvy lover. There is a relation between sustainable behavior of members of Generation Z and the preferences, attitudes and motives for which these members have a strong willing to prefer retailers who commit to provide sustainable and green offers and to accordingly adapt their products (Dabija, Bejan, & Dinu, 2019). In contrast to their family members, particularly their parents or older siblings, this young generation behaves distinctively. They belong to green concept, sustainability and tech savvy. They become more connected with companies or brands that relate those concepts to their personal experience and feelings. This young generation becomes more empowered and loyal to products or services when they are emotionally connected (Haddouche & Salomone, 2018).

Moreover, this research applies the theory of planned behavior (TPB) as a theoretical framework of the study. This theory can help deepen the understanding on the factors that lead

to behavioral intention of people in the chosen practices. A deeper explanation of this theory will be elaborated in the following part.

2. Research Objectives

This research aims to explore the factors behind the consumption intention of the Cambodian, specifically Gen Y and Gen Z, on their choice for vegetarian food in the capital city of Phnom Penh, Cambodia. The main objectives of this study are as follows:

1. To find out the factors that predict the intention to choose a vegetarian food for Gen Y and Gen Z in the capital city of Phnom Penh, Cambodia.
2. To identify if the two generations have similarities or differences in the factors affecting the decision to choose a vegetarian food.

3. Literature Review

3. 1. Motivation of Choosing a Food

A number of researchers identified the behavior of food consumption in their study. Pollard, Kirk, and Cade (2002) studied on food choice decisions made by individuals with the association of fruit and vegetable consumption, and they suggested factors that affect food choice. Their study shows that the influence on food choice consists of two respective layers which are affected by different factors. The factors addressed in the framework comprises the two main categories: the influencing factors based on what a person is *able to buy* and consume and the influencing factors based on what a person *chooses to buy* and consume. Another study on eating motivation revealed that people opted for certain food items in their daily life because of some of these motives: liking, habits, need and hunger, health, convenience, pleasure, traditional eating, natural concerns, sociability, price, visual appeal, weight control, affect regulation, social norms and social image (Renner et al., 2012). Choosing food is a complicated decision making for customer because they need to consider about taste, convenience, cost and nutritional value; amongst these, taste has played a crucial role in this choice (Drewnowski & Monsivais, 2012). The study also explained that food taste consists of texture and aroma, taste sensation and pleasure response to food. In addition, it showed that human body perceives taste as basic food quality.

The consumers' intention and behavior on food choice became a focus for a number of researchers in recent years. The studies of numerous issues under the umbrella of food choice have been addressed. Table 1 informs the previous literature on consumers' intention for food choice from 2015 to 2019. The food choice research was applied in a diversity of contexts, using different approaches and variables. Therefore, it has been contributed to a better understanding of consumers' intention for food choice.

3.2. Motivation of Choosing a Vegetarian Food

The distinction of vegetarians from others is often identified by their dietary way of eating plant food and avoiding some or all kinds of animal products (Perry et al., 2001). They are different from others because of the food items they want to add or avoid in their diet. There are different reasons why people are motivated to choose vegetarian food. According to Fox and Ward (2008), Ginsberg (2017), and Shani (2010), there are different types of vegetarians and the type of diets they consume. For instance, a flexitarian, also known an occasional vegetarian, refers to an individual who consumes animal-based products and includes vegetarian diet or vegetarian food practice for a particular time span. Whereas the semi-vegetarian, they consumes animal-based food excluding beef and lamb or a vegan, and they abstain all kinds of animal-based food and ingredients including honey and insects.

Table 1. Publication on consumers' intention for food choice

Context	Literature	Approach	Variables used in the model
Vegetarian and non-vegetarian food products	Kumar and Kapoor (2015)	Simple statistical analysis, factor analysis and analysis of variance, and logit regression	**DV:** consumer's buying behavior of vegetarian and non-vegetarian food products **IV:** demographic characteristics of consumers (gender, age, education and income), product attributes, market attributes
Organic food	Yadav and Pathak (2016)	Structural equation modeling	**DV:** purchase intention **IV:** attitude, subjective Norm, moral attitude, perceived behavioral control, health consciousness and environmental concern
Local food	Shin and Hancer (2016)	Structural equation modeling	**DV:** local food purchase intention **IV:** attitude, subjective norm, perceived behavioral control and moral norm
Dayak food choice	Ting, Tan, and John (2017)	Partial least squares, a variance-based structural equation modeling	**DV:** consumption intention towards Dayak food **IV:** health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity
Organic menu	Shin, Im, Jung, and Severt (2018)	Structural equation modeling	**DV:** intention to choose organic menu items **IV:** attitude, subjective norm, perceived behavioral control, and personal norm
Junk food	Faghih et al. (2019)	Hierarchical multiple regression analysis	**DV:** junk food consumption **Predictors:** attitude, subjective norm, perceived behavioral control and habit strength, intention
Green food	Qi and Ploeger (2019)	Structural equation modeling	**DV:** purchase intention **Predicting variables:** attitude, perceived behavioral control, face consciousness, group conformity, confidence, personal characteristics

DV = dependent variable, IV = independent variable

Moreover, due to the limitation of previous academic and professional researches on the vegetarians' needs, Shani and DiPietro (2007) proposed the typology of vegetarians focusing on their motivations to choose the chosen diet, which will be useful for the professionals to have a better understanding of these consumers and create items and services that match to their needs. They suggested motivations based on two aspects: self-interest and altruistic orientation (see Table 2).

Table 2. Motivations based on self-interest and altruistic orientation (Shani & DiPietro, 2007)

Self-oriented vegetarian	Altruistic-oriented vegetarian
Health awareness. Think that vegetarian diet is beneficial to health or medical restrictions on consuming food originated from animals	*Ethical awareness.* Think of the moral issues for treating animals in the modern large-scale farms
Weight control. Choose vegetarian diet to maintain or reduce weight	*Environmental concerns.* Oppose to the environmental degradation caused by animal-based food industry
Sensory refusal. Disgust the smell, taste or texture of food originated from animals	*Humanitarian reasons.* Think that vegetarian diet can help reduce the famine of the world
Economic concerns. Opt for vegetarian food to spend less	
Social awareness. Try to resemble vegetarian celebrities	
Religious belief. Adopt vegetarianism to conform to religions that forbid consuming (some) food originated from animals	

For a decade, many researchers conducted their studies by selecting a wide range of sample size and sample traits to identify the motivations for adopting vegetarianism (see Table 3). Their studies added value to that of Shani and DiPietro (2007). The results of their studies showed that animal welfare, environmental concerns and health awareness were respectively the most common reasons why people are in favor of vegetarian food. Whereas religion, sensory refusal, weight control, economic concern and social support, they were respectively amongst the lowest motivation for vegetarian food choice. However, social awareness and humanitarian reasons were not taken for consideration.

Table 3. List of reviewed studies investigating the motivations for following a vegetarian diet

Author(s)	Health awareness	Weight control	Sensory Refusal	Economic concerns	Religion belief	Animal welfare	Environmental concerns	Social support
White and Potts (2008)						x		
Fox and Ward (2008)	x					x	x	
Merriman and Wilson-Merriman (2009)							x	
Guillemette and Cranfield (2012)					x			
Haverstock and Forgays (2012)						x	x	
Bobić et al. (2012)						x	x	
Brinkman et al. (2014)			x					
Cherry (2015)								x
Janssen et al. (2016)						x	x	
Arora et al. (2017)	x					x	x	
Testoni et al. (2017)	x		x		x	x	x	
Dewan (2017)					x			

3.3. Theory of Planned Behavior (TPB)

Over the past several years, the social psychologists proposed a number of models to have a better prediction and understanding of human behavior. Those models include the theory of planned behavior conceptualized by Ajzen (1991). It extended the theory of reasoned action developed by Ajzen and Fishbein (1973). Many researchers have extensively applied this theory in human behavioral studies for many years (Zhang et al., 2018) as it is considered as one of the most commonly used models (Sirakaya & Woodside, 2005), and one of the most significant socio-psychological theories to predict human behavior (Dean, Raats, & Shepherd, 2012).
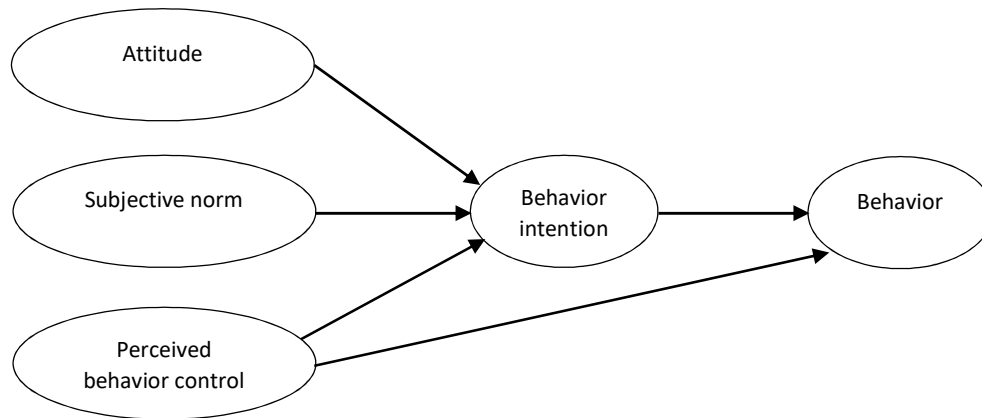
Figure 1. Theory of planned behavior for food choice by Barjolle et al. (2013, p. 23)

In the theory of planned behavior, the performance of any particular behavior is preceded by the intention to implement that behavior. This intention is established by three types of considerations: attitude, subjective norm and perceived behavior control (see Figure 1). The previous studies applied the theory of planned behavior on food choice and motivation. For instance, Yadav and Pathak (2016) focused on organic food, Eid (2018) on halal food, Faghih et al. (2019) on junk food and Shen and Chen (2020) on agri-food.

3.3.1. Attitude

Attitude of the people towards vegetarian diet is an important factor that drives people to choose the vegetarian consumption. Attitude reflects individual preferences to perform or not perform a behavior. It expresses the global positive/negative evaluation of individuals about a certain behavior: the more positive the attitude, the stronger will be the intention to express such a behavior (Armitage, 2001). Attitude can be used to explore psychological evolution on a product and predict how consumers really behave because they can interact in their mind between a product and the assessment of the products (Bonne, Vermeir, Bergeaud-Blackler, & Verbeke, 2007; Eagly & Chaiken, 1995; Schiffman & Kanuk, 2007). For instance, consumers' attitude towards sustainable consumption has a positive relationship with their booking intention towards green hotels (Han & Yoon, 2015). Another example from Van Birgelen, Semeijn, and Keicher (2009) is that there is an association between the consumers' attitude towards the environment and the choice for environmentally friendly beverage packaging. Therefore, this study proposes the following hypothesis:

H1: Attitude has a positive relationship with the consumption intention of both generations towards vegetarian diet.

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3.3.2. Subjective norm

Another construct of the theory is the social norm, perceived by people in association with their engagement (or disengagement) in a particular behavior (Ajzen, 1991). It is essential to adhere to norms as it helps group members escape from triggering rejection answers when they stimulate a sense of social consent (Cialdini, Bator, & Guadagno, 1999). Subjective norm can be expressed by normative influence, which associates with what the most important referent people regard as an acceptable or unacceptable behavior (Scalco et al., 2017).

Studies related to the subjective norm on vegetarian food preference found that subjective norm has a relationship with the intention to opt for vegetarian food. While Janda and Trocchia (2001) found that social conformity and vegetarian orientation are not interrelated, Ruby (2012) discovered that a relation with vegetarian close friends, an involvement with advocacy group for vegetarianism, animal rights or environment, or a support from family members are factors that leads to the preference for vegetarian consumption. Cherry (2015) revealed the same finding. More specifically, the social influence in association with vegetarian food choice is from friends and family who have vegetarian identity and practices. For this reason, the aforementioned discussion leads to the following hypothesis.

H2: Subjective norm has a positive relationship with the consumption intention of both generations towards vegetarian diet.

3.3.3. Perceived behavior control

Perceived behavior control consists of two elements, according to Ajzen (1991), and Taylor and Todd (1995). For the first element, an individual requires resources available (money and time for instance) to show a behavior. This element is the availability of resources. For the second element, when an individual requires confidence to express a specific behavior, that behavior may happen. This second element is an individual's confidence in expressing a specific behavior. Previous literature indicates the positive relationship between perceived behavior control and consumption intention in various contexts, for instance in organic food purchase intention (Ha & Janda, 2012), environmental friendly consumption intention to book green hotel (Chang, Tsai, & Yeh, 2014; Teng, Wu, & Liu, 2015) and environmentally aware consumption (Moser, 2015; Taylor & Todd, 1995). For this reason, the aforementioned discussion leads to the following hypothesis.

H3: Perceived behavior control has a positive relationship with the consumption intention of both generations towards vegetarian diet.

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3.4. Cambodian Generation Y and Generation Z

There are some particular features of the Generation Y and Generation Z population which reflect recent history. Table 4 shows that the total of Cambodian population had climbed since 2000 and in the last 20 years, the number of Generation Y was greater that of Generation Z. For Generation Y, the number of this group fell down from 2000 to 2020, excepted in 2005 where it was the highest. Generation Z, however, drove in different direction from Generation Y. In the latest years, Generation Z was in a small increase, excepted in 2005 where it dropped slightly.

Table 4. Total number of Cambodian Generation Y and Generation Z compared to the total population in Cambodia between 2000 and 2020

Reference Date (as of 1 July)	Total Population (thousands)	Generation Y		Generation Z	
		Number (thousands)	%	Number (thousands)	%
2000	12,155	4,137	34%	2,459	20%
2005	13,273	4,987	38%	2,411	18%
2010	14,312	4,585	32%	3,257	23%
2015	15,521	4,683	30%	3,609	23%
2020	16,719	4,628	28%	4,479	27%

Source: The United Nations (2020)

Known as millennials or Gen Y, Generation Y were born between 1981 and 1996. They grow up in the hard times such as the 9/11 and financial crisis. They are pragmatic idealists as they are hopeful of making a better world. They are digital savvy and less religious. They expect business to be local, green and socially conscientious (Rauch, 2019). In contrast to Generation Y, Generation Z, also known as Gen Z, centennials or iGen, were born between 1996 and 2010, and the oldest of this cohort will graduate their college by 2020 and be ready to integrate in the job market (Robinson, 2017). Generation Y are strongly passionate about food (Saulo, 2016). Whereas Generation Z, they are also interested in food; and vegetarian items are already in their list for order (Maynard, 2019). For the second group, "plant-based menus as well as "sustainable seafood" are part of their food trends (Robinson, 2017). Motivations behind the reasons why Generation Y and Z opt for vegetarian diet are health concerns, animal welfare issues and environmental impacts (Bodker, n.d; Hancox, 2018; Rowland, 2018).

Based on the set literature and the set hypotheses, the adapted conceptual framework as can be seen in Figure 2 is designed to accommodate the research objectives and the time length of the research. The moderating factor of the framework is the generation factor, which includes both Generation Y and Generation Z, both of which are interested in the vegetarian food.

4. Research Methodology

4.1. Survey development

The framework is conceptualized with three exogenous variables (attitude, social norm, perceived behavior control) and one endogenous variable (consumption intention), each of which is reflectively measured by a few indicators adapted from the previous literature. Attitude was evaluated based on indicators developed by Wang et al. (2013), subjective norm and perceived behavior control by Han, Hsu, and Sheu (2010), and consumption intention by Lee, Hsu, Han, and Kim (2010). An expert panel reviewed the primary measurement items to validate the content (DeVellis, 2016). Two experts on the studies of human behavior initially evaluated the applicability of the indicators. They suggested deleting a number of irrelevant indicators and improving on the language use of 11 remaining indicators in the questionnaire.

4.2. Data collection

This research targeted the group of population who are part of Cambodian Generation Y (born between 1981 to 1996) and Generation Z (born between 1997-2012), both of which stay in Phnom Penh and are interested in vegetarian food choice. The study applied the survey by using online questionnaires snowball sampling through the referral networks of the researcher's respondents. In other words, the researcher contacted a small number of the respondents and later asked to introduce a group of generation Y and Z who would be prepared to answer the questions. These respondents would also further nominate their friends to respond to the questionnaire. The study collected a total sample of 59 respondents and 52 respondents from Generation Y and Generation Z respectively. Therefore, the total sample size collected is 111 respondents from both generations.

The survey questionnaire was originally written in English but later translated in Khmer with careful translation to ensure the content validity. The questionnaire consists of two parts (see Table 6 for reliability and validity of the questionnaire). The first part provides a set of information related to demographic characteristics namely residence, generation, gender, family status, education, monthly income, occupation and vegetarian status. In the second part, there are 4 constructs under each of which measuring items were formulated in affirmative statement. The constructs are arranged in respective orders: attitude (3 indicators), subjective norm (2 indicators), perceived behavior control (3 indicators), and consumption intention (3 indicators). The measure of each indicator is based on a 5-point Likert's scale, where 5 represents an affirmative standpoint (strongly agree) and 1 shows a negative standpoint (strongly disagree). Table 5 shows the profiles of the respondents.

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Table 5. Descriptive profile of the target respondents (N = 111)

Variables	Categories	Frequency	%
Residence	7 Makara	9	8.1
	Toul Kork	27	24.3
	Dong Kao	11	9.9
	Mean Chey	14	12.6
	Russey Keo	8	7.2
	Por Sen Chey	7	6.3
	Sen Sok	18	16.2
	Chamkarmon	8	7.2
	Chbar Ampov	5	4.5
	Chroy Changvar	1	0.9
	Boeung Keng Kang	3	2.7
Generation	Generation Y	59	53.2
	Generation Z	52	46.8
Gender	Male	73	65.8
	Female	38	34.2
Family status	Single	103	92.8
	Married	7	6.3
	Prefered not to say	1	0.9
Education	Graduate	70	63.1
	Postgraduate	38	34.2
	Higher degree (PhD)	3	2.7
Monthly income (USD)	Below 60	21	18.9
	61-120	10	9
	121-180	5	4.5
	181-200	5	4.5
	201-260	9	8.1
	261 and over	61	55
Occupation	Students	59	53.2
	Employed	48	43.2
	Unemployed	2	1.8
	Others	2	1.8
Vegetarian status	Vegetarian	34	30.6
	Non-vegetarian	77	69.4

5. Results

Structural equation modeling (SEM) is among the dominant research methods used to investigate a set of interrelated dependence relationships between a series of constructs represented by many variables while account for measurement error contributes to the SEM's widespread application.

This research used PLS-SEM given its tolerance in the limit of its sample size and the non-nominal data (Ali et al., 2018). Moreover, it was because PLS-SEM helped explore the factors behind the consumption intention of the Cambodian Gen Y and Gen Z, on their choice for vegetarian food.
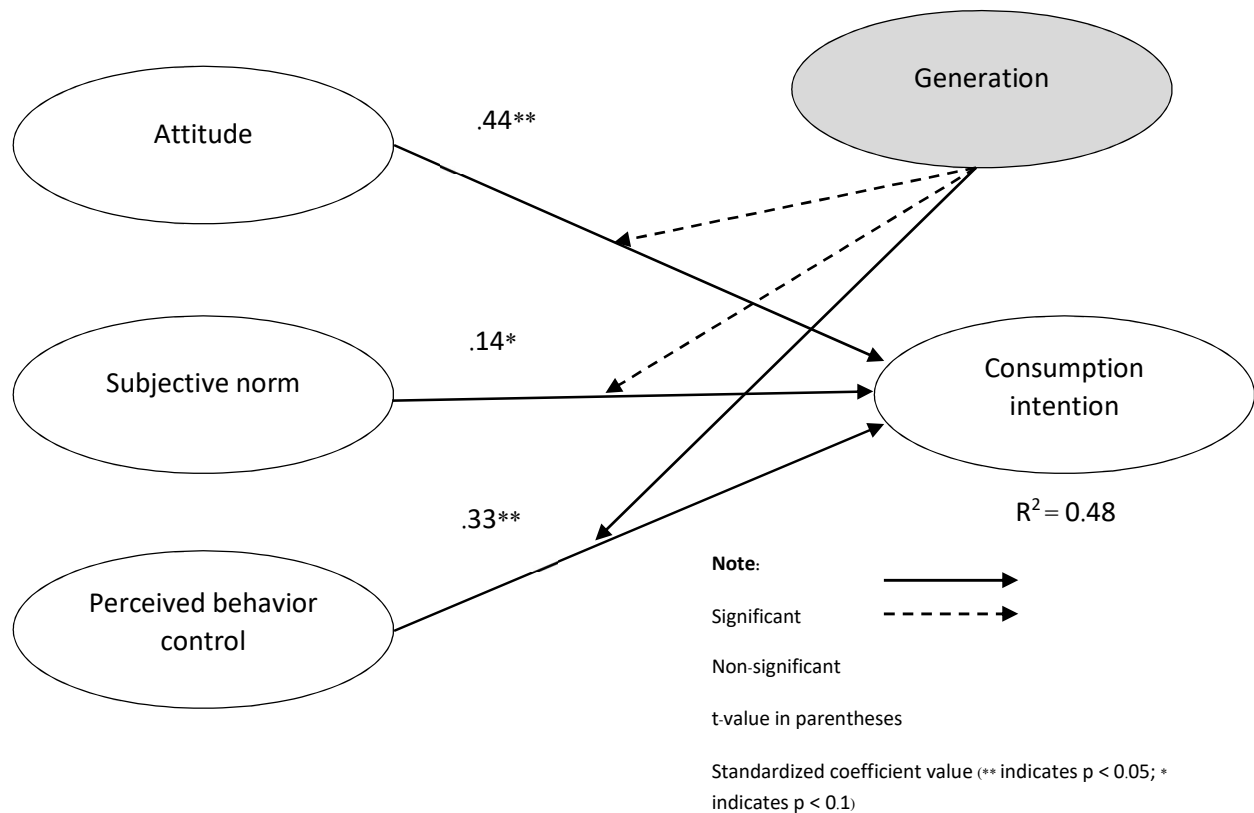

Figure 2. The conceptual model

5.1. Results of the Conceptual Model

Regarding the internal consistency reliability, Table 6 showed that Cronbach's alpha of each construct was above the marginal acceptable value **(0.6) (**Hair et al., 2016; Tenenhaus et al., 2005**).**

The average variance extracted of the individual constructs **(**AVE**)** indicated the convergent validity by going beyond the AVE cut-off value **(**0**.**5**) (**Chin, 2010; Hair et al., 2016**).** Given that all the constructs had the AVE values exceeding the squared correlation of the inter-construct, the discriminant validity was satisfactory **(**Fornell & Larcker, 1981**).** The discriminant validity of the model could be also confirmed by mean of the Heterotrait-Monotrait Ratio of Correlation **(**HTMT**).** As Table 7 showed that the HTMT values were smaller than HTMT criterion **(**0**.**90**),** the model exhibited a confirmed discriminant validity **(**Benitez et al., 2020**).** The above results reflected the reliability and validity of the measurement model associated with the intention consumption on the vegetarian food**.**

Table 6. Mean, SD, loading, Cronbach**'**s alpha and AVE

Factor	Mean	SD	Loading
Attitude (ATT) (Cronbach's alpha = 0.88 ; AVE = 0.81)			
1. I like the idea of choosing vegetarian food.	3.76	0.81	0.86
2. I choose vegetarian food because it is a wise choice.	3.32	0.83	0.92
3. I choose vegetarian food because it would be pleasant.	3.48	0.88	0.91
Subjective Norm (SN) (Cronbach's alpha = 0.83 ; AVE = 0.86)			
1. I would choose vegetarian food because many people who are important to me think that I should do so.	2.53	0.97	0.95
2. I would choose vegetarian food because many people who are important to me want me to do so.	2.47	1.01	0.90
Perceived Behavior Control (PBC) (Cronbach's alpha = 0.80 ; AVE = 0.71)			
1. It is easy for me to choose vegetarian food.	3.29	0.93	0.87
2. I am confident that if I want to, I can choose vegetarian food.	3.55	1.02	0.81
3. I do have enough resources and time to choose vegetarian food.	3.44	0.96	0.85
Consumption Intention (CI) (Cronbach's alpha = 0.83 ; AVE = 0.75)			
1. I am willing to consume a vegetarian food.	3.33	0.98	0.87
2. I will make an effort to consume a vegetarian food.	3.39	0.88	0.90
3. It is acceptable to consume a vegetarian food.	3.84	0.78	0.83

SD = standard deviation, AVE = average variance extracted

Table7. Squared correlations; AVE in the diagonal, HTMT in the top triangle

Construct	ATT	CI	PBC	SN
ATT	0.81	0.69	0.47	0.19
CI	0.36	0.75	0.06	0.33
PBC	0.18	0.29	0.71	0.22
SN	0.03	0.08	0.04	0.86

5.2. Hypothesis Testing

This research used ADANCO software (version 2.2.1) to generate the results. The bootstrapping procedure within the program showed a number of results essential for the analysis of the hypothesis testing in this research. As can be seen in Figure 2, all the constructs, namely attitude, subjective norm and perceived behavior control, had a significant relationship with the consumption intention on the vegetarian food. The attitude had the highest value of path coefficient at β = .44 (t = 4.41), and it was followed respectively by the perceived behavior control (β = .33, t = 3.72) and the subjective norm (β = .14, t = 1.82). Based on the above results, all the hypotheses (H1, H2 and H3) were supported. The model revealed that the coefficient of determination (R^2 = 0.48) value was greater than the cut-off value of 0.25 (Hair et al., 2016).

5.3. Moderating effect of the generation factor

The procedure of multigroup moderation suggested by Lowry and Gaskin (2014) was used to conduct PLS analysis. Two data sets were identified: group 1 for Generation Y and group 2 for Generation Z. The path coefficient values (β), and standard errors were resulted from the bootstrapping procedure of each group's data set. The t-statistics differentiated the effects of both groups (see Table 8). The closer the path coefficients are to zero, the lower are the influences (Hair et al., 2016). Therefore, the results showed that for both generations, there were influences of attitude, social norm and perceived behavior control on the consumption intention. More specifically, for Generation Y, the highest influence on the consumption intention was given to perceived behavior control followed respectively by attitude, and social norm did not have significant influence on the consumption intention. For Generation Z, attitude had the most significant relationship with consumption intention, and social norm and perceived behavior control went behind attitude in terms of relationships with consumption intention. However, for both generations, only one path indicated a significant effect. In other words, perceived behavior control had a positive effect on the consumption intention and were different between the two groups as the t-statistic of this path is more than the minimum threshold of 1.65 (Hair et al., 2016).

Table 8. Results of multigroup analysis

Path	Group 1: Generation Y (n = 59)		Group 2: Generation Z (n = 52)		Difference between groups		
	β1	Std error	β2	Std error	t-statistic	p-value	Sig. level
ATT -> CI	**0.32****	0.12	**0.56****	0.15	1.33	0.19	NS
SN -> CI	0.12	0.16	**0.23***	0.13	0.46	0.65	NS
PBC -> CI	**0.46****	0.12	**0.21***	0.11	1.73	0.09	S

NS = not significant, significant value in **bold (**** indicates p < 0**.**05; ***** indicates p < 0**.**1**)**

6. Discussion and Conclusion

The main objectives of this research are to explore the factors that predict the intention to choose vegetarian food for Cambodian Generation Y and Generation Z as well as to identify if both generations have similarities or differences in the factors affecting their decision for the vegetarian food choice.

With regard to the first objective, the overall results revealed that the consumption intention had a positive relationship with all the predicting factors namely attitude, social norm and perceived behavior control. Among those, attitude (β = .44, t = 4.41) was ranked as the highest influencing factor toward the consumption, followed by perceived behavior control (β = .33, t = 3.72) and subjective norm (β = .14, t = 1.82) (see Figure 2). However, their relationship with the consumption intention were found relatively low. Google Trends (2020) also showed that there was lately a decreasing number of Cambodians interested in the vegetarian food.That may be due to the emerging market of fast food by international brands, which are considered as a luxurious products for both generations ("Business guide: Opportunities in Cambodia 2016 ", 2016).

With respect to the second objective of the research, the results found that there was a difference between Generation Y and Generation Z in terms of degree of predicting factors towards the consumption intention. For Generation Y, the consumption intention is positively influenced by perceived behavior control (β = .46; p < 0.05), attitude (β = .32; p < 0.05) which social norm (β = .12; p > 0.05) did not have a significant influence on the consumption intention. This finding is partly consistent with the study of Parment (2013) pertaining to factors that influence the purchase involvement amongst Generation Y and baby boomers. Parment (2013) revealed that Generation Y intended to purchase based on their emotion for selecting a product, and their financial condition; however, this group was influenced by its surroundings for their purchasing. In the current study, Generation Y intended to consume the vegetarian food because not only did they believe it was a

wise choice and they liked the idea of choosing such food, but also because they had enough resources and time for this type of food.

On the other hand, the current research also indicates that, for Generation Z, the intention of vegetarian food consumption was significantly influenced by respective factors: attitude (β = .56; p < 0.05), social norm (β = .23; p < 0.1) and perceived behavior control (β = .21; p < 0.1). This finding is consistent with previous research conducted by Mohammed (2018) who focused on the motivation for purchasing intention of smartphone among Generation Z. Their purchase intention was significantly affected by perceived enjoyment, peer and social influence, product brand and product design as well as payment options provided. In the current case of study, Generation Z felt pleasant for their vegetarian food option; their social circle had a critical impact on their choice; and for them, their financial situation did not pose any barrier for their intention to enjoy the vegetarian diet.

In order to identify whether there are any differences between the two generation groups when it comes to the influence of attitude, social norm and perceived behaviour control on consumption intention, only one factor shows a significant difference in terms of the generation moderation. In other words, there is a difference between the two group when it comes to the influence of perceived behavior control on the consumption intention whilst when it comes to attitude and social norm, no difference is found between these two generations. That positive relationship supports the findings originated from a study conducted by Zhang et al. (2020).

For the managerial perspective, this research gives a better understanding on predicting factors on the vegetarian consumption intention amongst Cambodian Generation Y and Generation Z. The results of this research can be taken for a possible consideration. They would be possible good practice guides essential for designing and developing the market strategies for attracting the target segments, which refer to Generation Y and Generation Z in this case. Although all predicting factors have significant effects on their consumption intention, the influencing degree of each factor vary within each generation and between both generations. For instance, the results obtained from the study revealed that the perceived behavior control had the highest influence on the consumption intention for Generation Y while this factor showed the weakest effect on such intention for Generation Z. For the practitioners in the vegetarian food industry, it can be suggested that understanding the particular predicting factors on the consumption among each generation would give them more knowledge for drawing vegetarian marketing tactics aiming at expanding the market shares.

Some limitations of this research should be taken for consideration. First of all, despite the method used for the analysis, the sample size was small and therefore, the findings of this study must be interpreted with caution. Second, since this research was conducted using snowball sampling technique, it is crucial to bear in mind the possible bias in the responses. Third, given that this study focused on Phnom Penh's residents in the target groups, the results of such study may be

different in other locations of Cambodia. Further researches in different approaches, the qualitative approach for instance, are required to elaborate and validate the current findings and to accumulate the understanding on the consumption intention of Cambodian Generation Y and Generation on the vegetarian food.

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THE RELATIONSHIP BETWEEN CULTURAL TOURISM SITES INFORMATION AND THE YOUNG TOURISTS' INTENTION TO VISIT IN SOUTHERN UNITED STATES.

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Abstract: The research aims to 1) Study the importance of cultural tourism sites information and the young tourists' intention to visit in Southern United States and 2. Study of the relationship between of cultural tourism sites information and the young tourists' intention to visit in Southern United States. The samples selection was purposively selected from the young people age between 10-24 years old who live in Southern United States. The sample sizes was 400 samples. The questionnaires were conducted among the tourism lecturers, young travelers and the tourism agencies. The questionnaires were surveyed by using online media. The research found that cultural tourism sites information were averagely important ($\bar{x}$= 4.11, S.D. = 0.727). The important ranking of each variables were firstly price and promotion ($\bar{x}$= 4.21, S.D. = 0.698), communication channels ($\bar{x}$ = 4.19, S.D. = 0.718), safety and security ($\bar{x}$= 4.18, S.D. = 0.684), cultural attraction and sites activities ($\bar{x}$= 4.08, S.D. = 0.724), and products and services quality ($\bar{x}$ = 3.87, S.D. = 0.813) respectively. The cultural tourism sites information was also positively very important for the young tourists intent to visit the cultural tourism sites in Southern United States ($\bar{x}$= 4.61, S.D. = 0.513). The relationship between cultural tourism sites information and the young tourists' intention to visit in Southern United States were significant at 0.000 (p < 0.01).

Keywords: Cultural Tourism, Sites Information, Young Tourists, Intention

1. Introduction

In the fast growing economy, there are many young tourists who enjoy travelling around the world. They want to visit the attraction sites as many as they can. They like to experience different culture and varieties of activities. The young tourists and cultural tourism become increasingly important segments of tourism activity. They have been widely researched, an opportunity exists to further examine the intersection of youth travel demand and cultural tourism supply. Understanding youth travelers (aged 15 – 25 years old) was important because they were eager to explore and learn about different cultures (Guo, 2008), yearn for a sense of freedom (Schönhammer, 1992), and were different from previous generations of travelers (Richards & Wilson, 2004; Boukas, 2008). Cultural tourism was popular with youth travelers as they seek to explore different environments (Moisa, 2007). The youth tourism demand segment receives more attention because they are majority of the world travelers' today. Travel Statistics by Age Group 2020 from www.condorferries.co.uk shown that The Younger Gen Z's (born in 1997 – 2009) and Millennials are the highest spenders when they travel. They call themselves as 'flashpackers'. They spend around about $3,500 per trip and $60 a day. Gen Z travelers, who travel 29 days each year. Gen X travels the least, as a result of work and family commitments. By 2020 there will be almost 300 million international youth trips per year, according to The World Tourism Organization (UNWTO) forecasts. Besides understanding the requirements of youth, knowing the ability of the cultural tourism attractions in serving the needs of youth is crucial since it reflects the performance of cultural tourism attraction sites. This is an opportunity for cultural tourism attractions to identify their performance in order to create and improve strategies to attract youth travelers and other groups of travelers in the future.

According to the previous studies, there were many factors youth travelers consider as importance that affect their travel decision making. Safety and security is one of the important factors that young travelers are concerned when traveling (Egyptian Student Travel Service, 2008; Guo, 2008; Moisa, 2010). Moisa (2010) states that young people are sometimes worried about the safety and security mostly the transportation and other tourism facilities both in-route and at the destination such as public bus, tourist coach, or shuttle service. They probably reschedule the trip if they are informed about the accident happening at the site or nearby. Besides safety and security in terms of transportation, political unrest and natural disaster are also considered among young travelers. It influences their decision making whether to travel or not to travel (Hostelworld, 2007).

As far as young travelers are in the age of modern technology, receiving and updating tourist information by using information technology tools such as internet, website and social media is the youth characteristic in recent tourism trend. Young travelers emphasize on social network not only to search and update tourist information, but also to connect to their friends in order to exchange their travel experiences (Mundojoven, 2007). Moreover, they also prefer to collect large availability of tourist information from many sources, for example, website, blog, online newspaper, and online magazine (Moisa, 2010; Hostelworld, 2007). The young travelers

sometimes look for excellent quality of service with reasonable prices from the destination provider. Moisa (2010) and Munjudovan (2007) mention in their studies that quality of service such as staff member's performance (i.e. friendly and handful of information) are what they look for during their trips. The quality service is also regarded to the atmosphere that represents the desire of their age. Quick service, response with multiple options, or utilize information technology to manage the trip are some examples.

Another unique characteristic of youth is, aiming to gain knowledge and wonderful experience from their travel. Some of them are avidly learn about site's history and quality of museum (Boukas, 2008), while some are eager to explore destinations and learn different cultures (Guo, 2008). Guo (2008) and Murphy & Pearce (1995) emphasize on their studies that one of the objective for young travelers is to make friends and communicate with local people as well as participate the activities they have never experienced in order to share among their friends. Interarts (2008), Guo (2008), and Park (2006) found another youth characteristic which is important to the current study. They reveal that some youth desire to participate in activities arranged at the site or destination specifically outdoor and recreation activities not just for leisure, but to learn different culture through activities and events from the original source. Form their studies, some youth travelers prior look through the activities, then follow by beauty and facility of the chosen destination.

As far as the sense of preserving of the site and attraction while travelling is concerned (Richard & Wilson, 2003), it is considered as one of the obvious youth characteristics in recent decade (Park, 2006; Boukas, 2008). Boukas (2008) studied the perception of youth towards archeological sites and found that youth travelers visit the site mainly for seeing old buildings, monuments, beauty of scenery, and landscape, however, when they are at the site, they also give some opinions and comments about the authenticity, cleanliness, and maintenance process of the sites. In accordance with the study by Park (2006), he says that youth travelers nowadays are the cornerstone of natural and cultural conservation because they are concerned with the provision of natural, cultural, and heritage resources when traveling to each site or destination.

Beyond the connection with young tourism, cultural tourism is significant as it provides positive effects to economic and social dimensions of a community, revitalizes destinations that may otherwise be forgotten or underdeveloped, and provides resources for the expansion of conservation activities. The young tourists and cultural tourism are beneficial to tourism industry in recent decade, to investigate cultural tourism ability to satisfy travelers especially young traveler's demand is important. The researcher are keen to study the importance of cultural tourism sites information and the young tourists' intention to visit in Southern United States and to study of the relationship between of cultural tourism sites information and the young tourists' intention to visit in Southern United States. The results of the research can be guidance to any particular parties who are responsible for young travel market to merge the youth requirements with cultural tourism plans, information and strategies to attract them. In addition, the cultural tourism planners

and mangers can use the results of the study to improve the communication channel with full information with each cultural tourism attribute performance as to meet the needs of youth who are the majority of travelers and will be adult visitors in the future. Importantly, the results can be used as guidelines for other cultural tourism site to access the capability of cultural attractions information to meet the need of travelers.

2. Research Objective

The objectives of the research are

1. To study the importance of cultural tourism sites information and the young tourists' intention to visit in Southern United States
2. To study of the relationship between of cultural tourism sites information and the young tourists' intention to visit in Southern United States

3. Literature Review
Information of Southern United States
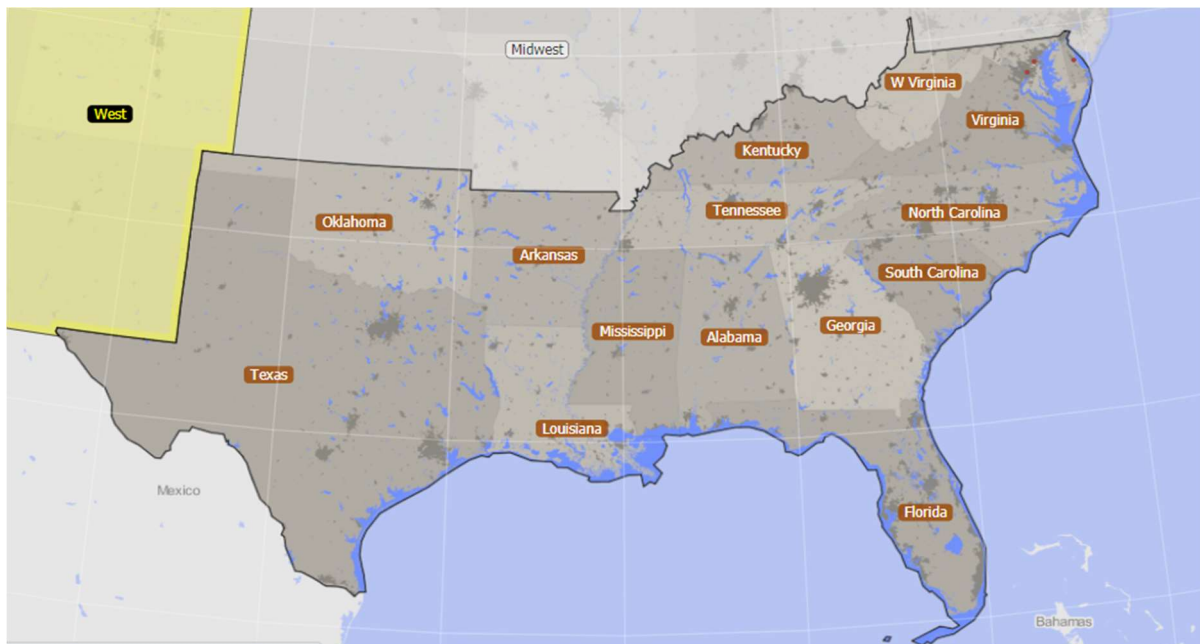
Picture No.1 The map of Southern United States
(Source: https://statisticalatlas.com/region/South/Overview)

United States of America is the developed and very prosperous country. The researcher has studied in Southern United Stated. That is why the researcher selected to conduct the survey in Southern United Stated. The city in the Southern United Stated consists of Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia. The area is shown in the picture no. 1. The population is 119,755,723 people and 44,105,282 households (statisticalatlas.com, 2020). The household income percentiles have shown in the picture no.2 that the people are on the median income earning around $21.0 K to $197.2 K.
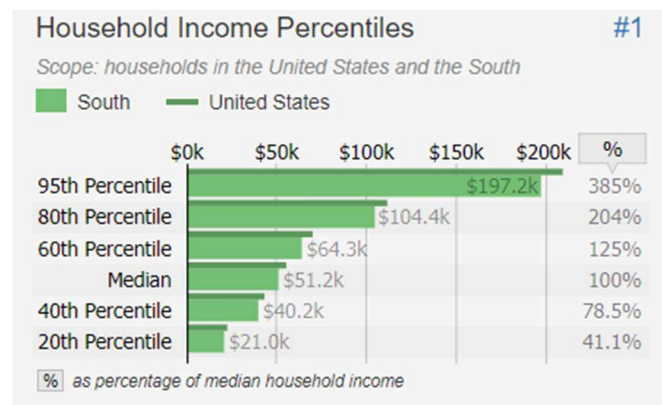
Picture No.2 The households in the United States and the South.
(Sources: https://statisticalatlas.com/region/South/Household-Income)

There are many cultural tourism sites in Southern United States such as Abraham Lincoln Birthplace and Boyhood House, Mammoth Cave, Constitution Square, Old Fort Harrod, Kentucky Capitol, Ashland: The Henry Clay House, Buffalo Trace, and Heaven Hill Distillery. The researcher was really interesting to find out the variables of sites information and the young tourists intentions. The South is defined by its cuisine, landscape, accent, literature, music and, under-girding all of the above, history – one that is long and beautiful in places, brutal and bloody in others. Yet while Southerners consider themselves tied to this land and water, they are also the inhabitants of cities deeply in tune with the American experience, from the sweat-drenched noir of Charleston and New Orleans to the accept-all-comers diversity of Atlanta and Nashville.

UNWTO Tourism Highlights of World Tourism Organization (2018) shown also that South America growth momentum continued in 2017. Robust outbound travel from Argentina and the rebound of Brazil fueled growth in neighboring destinations. Double-digit growth in arrivals was recorded in Chile, Colombia, Ecuador, Paraguay and Uruguay. In the picture no.3 shown that international tourist arrivals in South America keep increasing since 1995 as 11.7 million and in 2017, there were 36.7 million with highest average annual growth of 6.0%.

International Tourist Arrivals by (Sub)region

	International Tourist Arrivals (million)							Market share (%)	Change (%)		Average annual growth (%)
	1995	2000	2005	2010	2015	2016	2017*	2017*	16/15	17*/16	2005-'17*
Americas	108.9	128.2	133.3	150.4	194.1	201.3	210.9	16	3.7	4.8	3.9
North America	80.5	91.5	89.9	99.5	127.8	131.5	137.0	10	2.8	4.2	3.6
Caribbean	14.0	17.1	18.8	19.5	24.1	25.2	26.0	2	4.7	2.9	2.7
Central America	2.6	4.3	6.3	7.8	10.2	10.7	11.2	1	4.1	4.7	4.9
South America	11.7	15.3	18.3	23.6	31.9	33.9	36.7	3	6.3	8.3	6.0

Picture No.3 International Tourist Arrivals (World Tourism Organization (2018))

Recently, the tourism in America has positively developed and focus to path of Sustainable Development Goals (SDGs). According to the World Tourism Organization and Organization of American States (2018) stated that tourism and the sustainable development goals – good practices in the Americas across the Americas and particularly in the Caribbean that tourism is one of the primary sources of employment, foreign direct investment and GDP. There are the summary and key recommendations as following

    • Tourism in the Americas also improves livelihoods, promotes poverty alleviation, enhances the protection of biodiversity and cultural heritage development, and helps to build peace.

    • It is crucial to precisely define the role tourism should play in the sustainable development agenda of the region up to and beyond 2030.

    • Critical attention must be paid to the way tourism is managed, with its income generation and employment benefits at risk of being compromised by tourism 'overcrowding' and climate change.

    • The emergence of a more responsible traveler means that destinations in the region should integrate resource efficiency and multi-stakeholder involvement in adopting policies, actions and initiatives.

    • Managing tourism development sustainably also requires strengthening partnerships between national and international public and private stakeholders, as well as local communities.

    • Destinations can fill their data gap in measuring the social, economic and environmental impacts of tourism, and improve effectiveness of policies and programs related to the SDGs, through a statistical framework such as is being suggested by the launch of the Measuring Sustainable Tourism (MST) project.

Cultural Tourism

The Cultural tourism can be said that it is one of the oldest forms of special interest tourism. Many people from different age range love to travel the cultural tourism. It was since the days of the

ancient Romans Empire visiting Greece and Egypt or Chinese scholars making journeys to beautiful landscapes. The knowledge and information about the sites becomes very important in the digital era. The paradoxes of cultural tourism are that, while the decision to enter this sector must be driven by tourism considerations, the assets it utilizes are managed by the principles of cultural management (CM) within which arts management (AM) and cultural heritage management (CHM) are subcategories.

According to Cros and McKercher (2015) there are the five cultural tourist market segments are referred as **1. purposeful cultural tourist**: cultural tourism is the primary motive for visiting a destination and the individual has a deep cultural experience; **2. sightseeing cultural tourist**: cultural tourism is a primary or major reason for visiting a destination, but the experience is more shallow; **3. serendipitous cultural tourist:** a tourist who does not travel for cultural tourism reasons, but who, after participating, ends up having a deep cultural tourism experience; **4. casual cultural tourist:** cultural tourism is a weak motive for visiting a destination and the resultant experience is shallow and **5. incidental cultural tourist:** who does not travel for cultural tourism reasons, but who nonetheless participates in some activities and has a shallow experience.

Cultural tourism has been identified as a powerful economic development tool that can create jobs, induce investment and help revitalize communities in the decline. It is especially important to many small rural, indigenous or ethnic minority communities that have limited economic development options. Tourism is driven by attractions or, in marketing terms, demand generators. However, not all tourism attractions have equal demand generation potential. That is, not all attractions have an equal amount of market appeal. A clear hierarchy of tourist attractions exists that can be defined according to the degree of compulsion felt by tourists to visit them: the more dominant the attraction, the greater the sense of obligation to visit it. The proximity of an attraction to a large population base, a major tourism destination, or a gateway (e.g. airport or other transport hub) will influence visitation and consequently how the asset is used. Demand, in turn, influences the revenue generation potential for the asset, which should, therefore, influence the size, level of development, and level of investment. The basic rule of thumb is that attractions that are located close to large population or tourist centers will attract significantly larger numbers of visitors than more distant attractions. The same maxim holds true on a micro or destination specific scale. Readily accessible attractions will enjoy greater visitation levels than out of the way assets, unless the compulsion to visit them is so great that remoteness becomes a non-issue.

In the work of Chirapanda, Yoopetch and Yoopetch (2018) on the title of understanding the young tourists and the future visit intention to cultural tourism destination shown the findings that these tourists had interests in visiting cultural destination sites. However, there were some important issues, such as lack of awareness about cultural tourism destination and limited available time to travel. It means that the site information is very important for the cultural tourism. In the digital world with the emergence and rapid growth of the new technologies, young tourists tend to participate in travel and tourism activity more than older tourist generations through using internet,

social media and Information Communication Technologies (ICTs) to find the information about their interesting tourist destination.

The intention of tourists

The tourist is also the important factors for the success of cultural tourism sites. The tourist is as the final element to be considered. Tourists are non-local residents travelling primarily for fun, recreation, escape or to spend time with family and friends. They have limited and, usually, fixed time budgets. Most are looking to be entertained, while only a small number are looking for deeper learning experiences. Most also have a limited knowledge of a destination's cultural heritage and living culture. As such, they are a fundamentally different user group than local residents, with completely different needs and wants. Products that suit their needs may be inimical with the needs of local residents with different generation. In this research focus on the young tourists' intention. There are different age range between the range of Youth and Young as Department of child and adolescent health and development (WHO) (2006) defines 'Adolescents' as individuals in the 10-19 years' age group and 'Youth' as the 15-24-year age group. While 'Young People' covers the age range 10-24 years. The young travelers may travel to tourist destination with their friends, parents, cousin and even travelling alone sometimes.

The young tourists have their interests in searching the information before travelling from online, social media, EWOM. It really affected the intention of the tourist to visit the cultural tourism sites. Yacob, Johannes and Qomariyah (2019) had found in their studies in the research of Visiting Intention: A Perspective of Destination Attractiveness and Image in Indonesia Rural Tourism that impact of destination attractiveness through destination image towards development of visiting intention. A main reason destination attractiveness is one of key factors to attract tourist what they want and need. Secondly, an important to create nature tourism achievement perspective between local people and government. Third, also to increase a public awareness of their effort an environment protecting and preserving it as economic value thru rural tourism. In the work of Yang, Yuan and Hu (2010) Tourism about Destination Image and Visit Intention: Examining the Role of Familiarity results indicated that familiarity was positively associated with destination image and visit intention and confirmed that destination image was positively related to visitation intentions. This study has advanced the researchers' understandings of the interrelationships between familiarity, destination image, and visit intention under the background of Chinese culture. Boukas (2013) had a research towards understanding youth travel experiences in cultural heritage destinations: an integrated framework of youth cultural tourists' behavior youth cultural travel is of great significance and youth tourists constitute an important segment for cultural destinations. In this context, more emphasis on studying their motivation and perceptions for cultural destinations is needed in order to explore and understand their behavior. This study based on semi-structured interviews with youth cultural tourists of the archaeological site of Delphi, Greece, identifies the factors such as the individual background, ethnic origin, family/social context, education, and marketing that influence youth cultural tourists.

Conceptual framework

The researchers have developed the conceptual framework from the literature review from secondary data such as text book, journal, thesis, dissertation, websites and interviews. It is shown in the picture no. 3. The dependent variables consist of cultural tourism sites information consists of 1. Safety and Security (SS), 2. Products and Services Quality (PS), 3. Cultural Attraction and Sites Activities (CS), 4. Communication Channels (CC) and 5. Price and Promotion (PP). The independent variables are the Young Tourists' Intention to Visit in Southern United States.

Cultural Tourism Sites Information

- Safety and Security
- Product and Service Quality
- Cultural Attraction & Sites' Activities
- Communication Channels
- Prices and Promotion

The Young Tourists' Intention to Visit in Southern United States
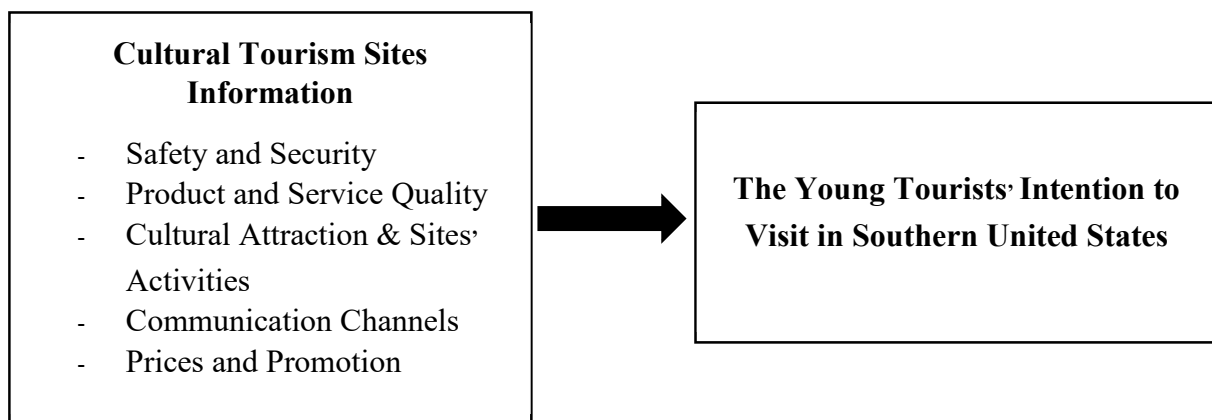
Picture 4: Conceptual Framework

4. Research Methodology

The sample selection and data collection

The research had purposively selected the samples. The samples were selected from the young people age between 10-24 years old who live in Southern United States. As according to the definition of department of child and adolescent health and development (CAH) World Health Organization (2006) that young people are covering age range 10-24 years. The researcher did not know the exact number of population of young people who lived in Southern United States. Therefore, this research applies Taro Yamane (1967) formula for sample size with confidence 95%. The sample sizes table indicated 400 number of sample size.

The researcher conducted the questionnaires after the thorough study of literature reviews and interviews among the tourism lecturers, young travelers and the tourism agencies. The first part in the questionnaire was to ensure the age range of young people (10-24 years) and the resident who live in Southern United States. The Second part was about the importance of cultural tourism sites information consists of 1. Safety and Security (SS) about traveling, food, drink, accommodation

and natural disaster, 2. Products and Services Quality (PS) such as hotel, restaurant, infrastructure and transport , 3. Cultural Attraction and Sites Activities (CS) such as traditional food and drink , heritage and ancient building and infrastructure, cultural Dress and costume, cultural dance and folk, cultural festival and activities, 4. Communication Channels (CC) such as prints media (brochure, newspaper, magazines), website, social media, TV, radio, billboard and advertising board, word of mouth and EWOM and 5. Price and Promotion (PP) such as reasonable price, package price, sales and seasonal promotion price, government support price and voucher, accepting all kind of payment (Cash, Credit Card). The third part was directly asking the importance of relationship between of cultural tourism sites information and the young tourists' intention to visit in Southern United States. The questionnaires were surveyed by using online media such as e-mail and social media. The questionnaires were sent to 490 young people and got the return only 413 samples during the month of November – December, 2018. The researchers used only 400 correct and clear questionnaires to analyses. The data analysis was conducted after that in the month of February, 2019. The reliability of the questionnaires by conducting IOC from three experts was valued as 0.85 from average of every question and The Cronbach ˑs Alpha value was 0.895 from 25 samples. This means the questionnaires were suitable for conducting the online survey.

Data analysis

This study is the quantitative research and descriptive research. The researchers used the questionnaires for the online survey and the data collection. The researchers conducted the literature review from secondary data such as text book, journal, thesis, dissertation, websites and interviews. The data were synthesized and analyzed to develop the research tool and questionnaires. The statistics were applied as the following:

1. The 5 levels rating scale according to Srisatidnarakul (2010) was applied in the questionnaires in the part of the importance of cultural tourism sites information and the young tourists' intention to visit in Southern United States. The average mean range are 5 levels as
    1. Average Means between 1.00 – 1.80 means Not at all important;
    2. Average Means between 1.81 – 2.60 means Less important;
    3. Average Means between 2.61 – 3.40 means Neutral;
    4. Average Means between 3.41 – 4.20 means Important and
    5. Average Means between 4.21 – 5.00 means Very important.

    The researchers used the descriptive statistics, mean and standard deviation to describe and analyze the data.

2. Pearson's Correlation analyze was applied to analyze the relationship between of cultural tourism sites information and the young tourists' intention to visit in Southern United States.

5. Results

The research found that cultural tourism sites information were averagely important ($\bar{x}$= 4.11, S.D. = 0.727). The table no.1 shown that the very important variable was price and promotion ($\bar{x}$= 4.21, S.D. = 0.698) which the young tourists concern about their intention to visit. Sales and seasonal promotion price ($\bar{x}$= 4.69, S.D. = 0.554) and reasonable price ($\bar{x}$= 4.37, S.D. = 0.499) are the very important issues among the price and promotion variable. The important variables were communication channels ($\bar{x}$= 4.19, S.D. = 0.718), safety and security ($\bar{x}$= 4.18, S.D. = 0.684), cultural attraction and sites activities ($\bar{x}$= 4.08, S.D. = 0.724), and products and services quality ($\bar{x}$= 3.87, S.D. = 0.813) respectively. This data statistical analysis has ensured that each variables are the very important and important cultural tourism sites information factors for the young tourists' intention to visit in Southern United States.

Table No. 1: The mean and standard deviation statistical analysis of the important variables in cultural tourism sites information and the young tourists' intention to visit in Southern United States.

Cultural Tourism Sites Information	$\bar{x}$	S.D.	Level
Safety and Security (SS)			
Safety and Easy to travel	4.74	.457	Very important
Safety Food and Drink	3.88	.609	Important
Safety Accommodation and Environment	4.51	.864	Very important
Free from Natural Disaster	3.63	.704	Important
Less Criminal Cases in the City	4.12	.787	Important
Average	**4.18**	**0.684**	Important
Products and Services Quality (PS)			
Good Quality of Accommodation	4.24	.833	Very important
Variety and Quality of Restaurants and Souvenirs	3.99	.867	Important
Good Infrastructure in the city	3.51	.712	Important
Good Quality in All Kind of Transportation	4.12	.787	Important
Supportive Government Officers	3.50	.867	Important
Average	**3.87**	**0.813**	Important
Cultural Attraction and Sites Activities (CS)			
Cultural and Traditional Food and Drink	4.11	.784	Important
Cultural, Heritage and Ancient Building and Infrastructure	4.49	.873	Very important
Cultural Dress and Costume	4.26	.829	Very important
Cultural Dance and Folk	3.85	.563	Important
Cultural Festival and Activities	3.71	.571	Important
Average	**4.08**	**0.724**	Important

Communication Channels (CC)			
Prints Media (brochure, newspaper, magazines)	3.88	.782	Important
Website and Social Media	4.45	.741	Very important
TV and Radio	4.26	.648	Very important
Billboard and Advertising Board	4.22	.631	Very important
Word of Mouth and EWOM	4.12	.788	Important
Average	**4.19**	**0.718**	Important
Price and Promotion (PP)			
Reasonable price	4.37	.499	Very important
Package Price	3.88	.782	Important
Sales and Seasonal Promotion Price	4.69	.554	Very important
Government Support price and Voucher	4.00	.869	Important
Accepting All Kind of Payment (Cash, Credit Card)	4.11	.784	Important
Average	**4.21**	**0.698**	Very important*
TOTAL AVERAGE	**4.11**	**0.727**	Important

Remarks: * Indicate the average mean of variable that is very important

The research also found that the direction questions about the importance of cultural tourism sites information towards young tourists' intention to visit the cultural tourism sites in Southern United States was positively very important ($\bar{x}$= 4.61, S.D. = 0.513). The table no.2 shown that the young tourists need the good cultural tourism sites information for their trip planning. The clear and interesting information will attract more young tourists to visit in Southern United States.

Table 2: The mean and standard deviation statistical analysis of importance of cultural tourism sites information towards young tourists' intention to visit the cultural tourism sites in Southern United States

Young Tourists' Intention to Visit the Cultural Tourism Sites in Southern United States	**Mean**	**S.D.**	**Level**
The cultural tourism sites information is positively important for the young tourists' intention to visit the cultural tourism sites in Southern United States.	4.61	0.513	Very important
Average	**4.61**	**0.513**	Very important

The research applied Pearson correlation to analyze the relationship between two factors. The table no.3 had shown that the relationship between cultural tourism sites information and the young tourists' intention to visit in Southern United States was significant at 0.000 (p < 0.01). This means

that the importance of cultural tourism sites information consisting of 1. Safety and Security (SS), 2. Products and Services Quality (PS), 3. Cultural Attraction and Sites Activities (CS), 4. Communication Channels (CC) and 5. Price and Promotion (PP) had positively relationship with the young tourists' intention to visit in Southern United States. The more information will positively attract more intention of the young tourists to visit the cultural tourism sites in Southern United States.

Table 3: The Pearson correlation analysis of the relationship between of cultural tourism sites information and the young tourists' intention to visit in Southern United States

		Information Of Cultural Tourism Sites	Young Tourists' Intension to Visit
Cultural Tourism Sites Information	Pearson Correlation	1	.629**
	Sig. (2-tailed)		.000
	N	400	400
Young Tourists' Intension to Visit in Southern United States	Pearson Correlation	.629**	1
	Sig. (2-tailed)	.000	
	N	400	400

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

6. Discussion and Conclusions

This research had shown the importance of cultural tourism sites information. As in the big data economy, the people concerning more about the information before decision or intention to travel and visit various tourist destination. Especially, if we want to meet young people expectation, social media (i.e. facebook, instagram) and high technology equipment (i.e. touch screen or Kiosk) should be applied to create an interactive visitor experience. This research result that shown the importance of price and permotion with tourist intention to visit. It is similar to the work of Permana (2018) that shown the price and value perception has a positive, significant impact on satisfaction and satisfaction also has a positive significant impact on re-visit intention of the tourists. The communication channel and advertising also plays very important role as in the work of Kim and Jun (2016) that city recognition significantly contributed to the variations in peoples' attitudes (F ¼ 4.48, p ¼ .04) and intention to visit the hosting city (F ¼ 23.33, p ¼ .00). It indicated that the respondents shown a more positive attitude toward the well-known city. The information is very important for the tourists

In the digital world, the internet and social media play the important communication channels. The young tourist also used the smart phone to search the information about the tourism sites and activities. They normally search on search engine website and social media such Facebook, Youtube and Instagram. The electronic word of mouth in tourism is also very important. It is similar to Gosal, Andajani, and Rahayu (2020) who had emphasized the social media about e-WOM. It had a significant effect on attitude, city image, travel intention, and travel decision. The attitude variable had a significant effect on city image and travel intention. Travel intention had a significant effect on travel decisions. The cultural tourism sites information is very important for the young tourists to decide where to travel and earn the valuable experiences. The content of tourist sites and online media play significant role as Majeed et al. (2020) found that tourists' perceptions of tourist destination online content (TDOC) directly influence their behavioral intentions, while tourists' satisfaction exerts a mediating influence between tourists' perceptions of TDOC and their behavioral intentions. Taking advantage of an economical and widespread online environment, destination marketing organizations could attract more tourists by fostering confidence in TDOC and positive eWOM to remain competitive in the long run. Onpium (2020) also ensure the result that rotated component matrix of the components of motivation factors also found new 4 indicators which were given name that the intrinsic leisure motivation, source of information influences, efficiency aspects, personal perception. The weight indicator is between 0.411 and 0.768.

Another aspect of product and service quality, according to Mundojoven (2007), Moisa (2010), and Hostelworld (2007), young tourists sometimes look for quality of service that response to their age characteristics such as quick service and utilizing information technology to manage the trips. Therefore, to provide some resources that allow those to manage the trip or research some information at the site by themselves could be another strategy to serve this particular group of tourist. Moreover, it is an opportunity for the site to develop and train staff to have some knowledge in terms of technology and tourism.

Nevertheless, the government and private sectors should pay attention to the data of information and content of the cultural tourism sites and activities to promote and attract the young people to travel more in the state or provinces. There should also have a good reasonable price and promotion to increase the intention to visit. The safety and security are also important factors. It means every organization in the state should provide clear information and useful detail to promote the cultural tourism sites in Southern United States. It is to attract more young tourists to visit and experience the cultural tourism sites in Southern United States.

Recommendation

The research results provide the useful information in order to know the capability of cultural heritage site for serving youth travelers. Since youth and young tourists are highlighted in today's tourism and is a major traveler in a recent decade. The concerned parties could use the research

results to develop or design appropriate plans or strategies to promote cultural tourism sites among youth tourists with the interesting information and contents. Based on the research results, it is suggested that the government, site managers and related tourism parties should concentrate on maintaining the authenticity of the place and update the information every day and week. Since most of young tourists are very much changed due to the internal factors and external factors i. e. technology, innovation, natural disaster, tourism policy, and the extension of construction. The communication channel should keep in trend with the young generation.

Furthermore, the future research can conduct on the different area and countries. The different variables can also have added to the questionnaires to find out more factors that has relationship with young tourists' intention. The research can also focus to the aging tourists and retired tourists who has money from pension and have a free time to travel. They love to visit the cultural tourism sites.

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INTERNATIONAL STUDIES

MEDICAL TOURISM BEHAVIORS OF CHINESE TOURISTS: A CASE STUDY OF PRIVATE HOSPITALS IN PHUKET

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Abstract: The Thai government has focused on medical tourism since 2004 by establishing a policy to promote Thailand to become an international medical hub. The movement of medical tourism in Thailand is found in the government sector and is driven by medical services from private hospitals in Thailand. The Department of Health Service Support was also assigned to provide a development strategy for Thailand to be an international health center (Medical Hub). Therefore, the objectives were to study the medical service from hospitals in Phuket province to know the needs and tourism behavior and satisfaction in medical tourism among Chinese tourists receiving hospital services.

The theories and concepts about tourist behaviors guide analyzing patterns, purposes, and influencing factors to receive medical tourism services in this research, data collection located in Bangkok Hospital Phuket, and Siriroj Hospital. The sample group used in this study was 10 Chinese tourists who received medical tourism services. The in-depth interview method was applied by collecting data.

The results presented the factors influencing Chinese tourists, who travel to Thailand for medical tourism, were marketing promotion of medical tourism products, motivation, buying decision–making by receiving medical tourism information, experience, attitude, evaluation of alternatives primarily based on price.

Keywords: Medical Tourism; Chinese Tourist; Private Hospital in Phuket

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1. Introduction

From the potential and growing trends of the health industry globally, including Thailand, and health business adaptation in Thailand to suit the current global situation and increase competition, tourism has played an important role, especially health tourism or medical tourism. Medical service of the health tourism industry, for instant, health advice, spa services and spa products, massage, herbal compresses, meditation, natural treatment, health promotion, etc. Due to the rapidly growing health-conscious trend, there is a continuous increase in overseas traveling. As a result, many countries' governments have been focusing on medical tourism, which generates a lot of yearly income from massive spending on medical services by medical tourists and spending on tourism-related businesses by medical tourists and followers. The Ministry of Public Health assigned the Department of Health Service Support as the central department to manage and support policies for promoting medical and wellness tourism. This policy was one of the essential target industries of the government. It had been a vital system for driving the country's economy since 2015 to promote and develop health tourism. The policy was consistent with the national plans and policies by adhering to all sectors' participation according to the people-centered conceptual framework of the 12th National Economic and Social Development Plan (2017-2021). Health tourism participates in health activities, such as check-up programs and medical treatment at hospitals and clinics, including alternative medical programs, such as Thai massage and spa treatments. Therefore, the health tourism market has higher average spending than the general tourism market and is likely to increase in line with current healthcare trends. Thailand is one of 4 Asian countries that is recognized and accepted in healthcare services from foreign tourists.

Most of Thailand's health tourism is still centered in Bangkok and major tourist cities, such as Phuket, Pattaya and Chiang Mai, which are readily available in medical services and various travel services. Medical services with attention from foreign tourists to Thailand include health checks, LASIK, cosmetic surgery, dentistry, surgery, rehabilitation, etc. Also, Thai alternative medicine services, such as Thai massage and spa, are well known worldwide, resulting in a continuous increase in the number of foreign tourists receiving health services in Thailand. According to the ranking by The International Healthcare Research Center (IHRC), the tourism industry regard health tourism in Thailand is ranked at 6th place in the world because of the following strengths:

1. International standards accept hospital place, facilities, personnel, and services.
2. Service rates are not high when compared to the quality.
3. There are varieties of natural and cultural attractions, relatively low tourism expenses, comprehensive airlines for the journey, and quick coordination.

Data from the Center for Economic Research, Siam Commercial Bank (EIC), revealed that private hospitals in Thailand earn approximately 70 billion baht per year from foreign healthcare income or 0.01% of the GDP (Bangkok Living Taste. (2018). ท่องเที่ยวเชิงสุขภาพไทย บูมสุด ขีด.[Thailand extremely popular for health Tourism]).

Therefore, various medical facilities have increased health promotion, disease prevention and rehabilitation services to target medical tourists. According to the Tourism Authority of Thailand (TAT) data, it revealed that in 2017, Thailand generated more than 23,000 million baht income from medical tourists receiving anti-aging medicine and beauty services, and is expected to increase 13.9% or about 26,000 million baht in 2018. Most of the medical tourists traveling to Thailand to treat specific diseases, health checks, anti-aging services and cosmetic surgery, because these services in Thailand have a good reputation with standards similar to European hospitals in terms of technology, waiting time and more economical costs than any other countries. According to Visa and Oxford Economics, the overall global health tourism market in 2016 was at USD 100 billion, with 11-14 million tourists, a 25% increase over the previous year. (Fayossy.(2018). เปิดฐานข้อมูลนักท่องเที่ยวจากทั่วโลกที่เข้ามาเที่ยวเชิงการแพทย์ในไทย. [Open a database of tourists from all over the world who come to Thailand for medical tourism.]). The highest number of tourists coming to Thailand for medical services in China. Due to the new policy allowing each family to have two children, IVF infertility treatment services have been prevalent among Chinese patients. Also, the service has the highest cost, from 200,000 up to 400,000 baht per time. Moreover, Chinese tourists receive Anti-Aging & Wellness service the most, generating more than 23 billion baht in revenue for Thailand.

The study findings would be essential information for those who are involved in both the public and private sectors, which can be used as a guideline for the development of health tourism, as well as establishing a strategy to promote medical tourism in Thailand, applying as a guide for the promotion of essential long-term medical services and marketing planning of hospitals, clinics and businesses related to the medical service tourism. The results of this study can also be used as necessary information for preparing the development of Thailand as an international health center with the ability to compete with other countries by using the strength of the country's health service system to attract more Chinese tourists to decide to receive medical services in Thailand, as well as able to generate national income and promote national and local stability with the balanced economic and social development as a foundation for developing the country towards sustainability.

1. Research Objective

By concerning the medical tourism of Chinese tourists thus the objective of this research is to study the factors influencing Chinese tourists who travel to Thailand for medical tourism, and to study the opinions of Chinese tourists on medical tourism services.

2. Literature Review

Health tourism may be divided according to the objectives and objectives of tourism programs and activities according to tourists needs into two categories (Tourism Authority of Thailand, 2009).

1) Health Promotion Tourism - This is a trip to visit beautiful attractions in natural and cultural attractions, including historical and environmental places for learning about lifestyle and leisure, by spending time from traveling part of doing health promotion in accommodation or outside accommodation that is accurate, technically and of proper quality standards.

2) Health Healing Tourism It is a trip to a place of tourism, nature, and culture for learning of lifestyle and recreation, or as an organized place for therapy for health care activities, medical treatment and rehabilitation in hospitals or nursing homes or businesses there are qualified personnel, standardized processes, and services such as traveling to tourist attractions and having physical examination and treatment of various diseases together with the model of health tourism.

Department of International Trade Promotion (2014). It mentions health and sports tourism as therapeutic, physical, or mental health tourism, exercise, or sport to maintain health, and adventure tourism, as part of sub-activities of the sport. In health tourism activities, it was found that spa activities and wellness massage were the most exciting activity models for tourists. Patitta (2003) organized different health promotion activities in the Health Promotion Tourism program that travel agencies offer to tourists, including (1) Thai massage (2) Foot massage (3) Herbal compress (4) Aromatherapy (5) Mineral bath service (6) Hydrotherapy (7) Thai hermit exercise (8) Buddhist meditation practice (9) Food and beverage services, herbs and herbal drinks for health. (10) Service of herbal products for health and beauty.

KASIKORN RESEARCH CENTER (2018) estimates the market share from patients in foreign customers in each country, calculated from the income of private hospitals listed on the stock exchange with a market share of 70% of total revenues on the stock exchange. The eastern group, such as the United Arab Emirates, Oman, Kuwait, Qatar, occupies the highest share at 12.5 percent, followed by Myanmar, 8.7 percent, United States, 6.2 percent, United Kingdom, 5 percent, Japan, 4.9 percent, Cambodia 2.2 percent and others, total 60.4 percent. It is expected that in 2018, there will be approximately 3.42 million foreign patients come to use medical services, divided into 2.5 million times of Medical Tourism and about 9.2 hundred thousand times foreign customers are working and residing in Thailand (Expat), especially Japanese, Burmese and China. According on statistics of the number of Chinese tourists who have come to Thailand, coupled with an increase in Chinese people who travel abroad for medical treatment, private hospitals are more focused on Medical Tourism from China. In 2018, it was expected that there would be 10.4-10.6 million Chinese tourists visiting Thailand, expanding 6.1-8.2 percent, reflecting that the Chinese market is likely to be a potential customer of Thailand who is familiar with or like to Travel in Thailand Including food, and shopping Moreover, the Thai medical services are quite famous and recognized for their quality and treatment that meet international standards, worth the price. And the Kasikorn Research Center estimates that in 2018, at least 40,000 Chinese Medical Tourist tourists will come to Thailand. The exciting customer groups are 1. A group with infertility and 2. A focuses the group on beauty care.

Surapong and Piyanuch (2003), cited in Pimtha et al (2009), spoke of health tourism about medical tourism that tourists using health tourism services are a problematic group in terms of health or having congenital disease, regular checks must be performed, requiring health checks and rehabilitation. They can travel to relax and receive health services simultaneously, including groups that want beauty services, having some relaxation travel back to their own country with beauty.

Thanyaporn (2017) said that medical tourism's growth has contributed to increasing income for the country, especially private hospitals, with an annual income of 70 billion baht from foreign medical care, or 0.01. % Of GDP. Also, it generates income in related businesses such as tourism and hotel services from medical visitors and dependents. Currently, both the public and private sectors are increasingly preparing to accommodate medical tourists in development and promotion policies. It enhances the country as an international health center (medical hub) of the government, providing health and dental services packages in conjunction with tourism programs. It also has the policy to expand new markets by extending the length of stay in Thailand for medical treatment for health tourists and followers in CLMV and China, increasing from 60 days to 90 days from the original expansion policy that only applied in the Middle East market, which will facilitate more travel to the hospital.

Watcharee and Chanakan (2005) studied the potential of hospitals for health tourism in Phuket, it was found that from six hospitals' health tourism products survey, there were two private hospitals with health tourism products, and there was only one private hospital that has passed the standard HA (Hospital Accreditation). In addition to the health tourism needs of general tourists, it was found that most of the tourists who came to Phuket were interested in Thai massage and medical spa respectively, both Thais and foreigners. As for the tourists who had the opportunity to use the hospital services, most were satisfied with the hospital service. When comparing the expectations before using the service with satisfaction after using the service, it appears that there is a similar level. In conclusion, Thailand is ready to provide medical services to foreigners due to various factors such as cost of treatment, doctor's expertise, quality of travel services, etc. These factors can attract tourists to use medical services in Thailand very well.

Pimpa et al (2009) studied medical tourism behavior among foreign tourists. The sample group was 400 foreign tourists who used medical tourism services at hospitals, medical tourism service providers in Thailand. The results of the study showed that the majority of the tourists were male, aged 31 years and above, had a career as an expert and executive, with an average income from 2,000-4,000 USD per month. Most of them were married and were US nationals. Most tourists never travel to Thailand. They stayed in Bangkok for rehabilitation after using medical services, followed by Chiang Mai and Phuket. Most tourists came to the dental service, followed by annual health checkups, LASIK plastic surgery and hip or knee replacement. The treatment cost approximately US $ 1,300 and the length of stay in Thailand was about 18 days. Foreign tourists came to the medical service because they wanted to relax in Thailand the most, followed by treatment cost, which was cheaper than using services in their country. Doctors and hospitals in Thailand were well known, advanced medical equipment and devices. Also, tourists came to use the service because hospitals in Thailand had a world-class medical service, which tourists had seen from those who had come to treat or had used the service. Some tourists came to use medical services in Thailand because they did not have specialists in their country and had to wait for a long time to receive service. Foreign tourists who used the service had opinions that the quality of treatment of hospitals in Thailand was of good level, followed by the knowledge of the doctors doing the treatment, the security system, availability of nurse services, good care of doctors, nurses and hospital staff, easy research before using service, inexpensive medical expenses, hospitals had doctors who were ready to treat immediately, post-operation, quick treatment., reporting accurate treatment costs, and convenient access to

medical services in Thailand. Most of the tourists who came to use the services were impressed with the medical services provided by the hospitals that they used and was expected to go back to use the service in the future even though the medical fees are higher, including introducing people to know to use the service as well.

Katewarin (2010) studied business, travel, medical care, and rehabilitation. The sample group was entrepreneurs with services nearby or related to the company being reviewed, hospital marketing agencies, governmental and private agencies that support tourism operators, and tourism operators for medical treatment. The study results showed that the current trend and market condition of the education business tended to continue to grow from the improved quality of treatment of hospitals in Thailand, including the cost of treatment in Thailand compared to the cost of treatment abroad much lower. From this advantage, it was unique in that it can compete with any opponent. However, getting into this type of business requires many factors in the industry, especially management ability, which is key to the business's survival and readiness to change, which may arise from outside factors that cannot be controlled. Therefore, if able to plan a suitable strategy, be flexible and face any situation, the business will continue to survive and grow.

Jutathip (2010). Study on Research to develop a suitable health tourism management model for foreign tourists traveling in Phuket Province: A case study of Japanese tourists. The sample consisted of 15 Japanese tourists. The study found that 1) The model was female, aged 25-35, single, traveling with friends and family, experienced in using health services elsewhere and had used services in Thailand. They were impressed, receiving news from friends, family, technology media and travel agencies. The goal of using the service was to relax. 2) Factors in the formulation of health tourism were found to be two factors: 1. Tourism resources for providing customer services, dividing into two parts: 1. Natural and environmental resources, 2. human-made resources; and 2. Tourism objectives consist of health promotion tourism and therapeutic tourism, which can be used in 4 formats: (1). Natural resource-based models that use natural resources and focus primarily on disease care and prevention. (2) The man-made model relies on man-made resources or builds infrastructure and focuses primarily on disease care and prevention. (3) The model that emphasized local wisdom and used the community' knowledge for the treatment of disease. (4) The medical service model is a model that requires high input, high infrastructure preparedness, and a therapeutic focus. 3) Japanese tourists will focus on the 1st, 2nd and 3rd forms of tourism due to gain, support from time factors, price factors, general relations factors, public and private promotion factors. The output format will be a semi-mass tourism format. (Package tour) and health tourism care and disease prevention. For the fourth form, which is medical tourism, Japanese tourists were not clear. 4) Thailand's strengths are professional service, quality, price, convenience, but the development of all aspects of health tourism needs to accelerate the construction of the infrastructure, especially in the medical sector. It must target specific tourist groups such as the elderly, disease-specific risk groups. The public and private sectors remember that it is necessary to expedite public relations and create more product diversity.

Salika (2010) studied the medical service usage behavior in Thailand among health tourists from the Middle East: Perspectives from medical service providers. The sample group was a

hospital business operator and 17 entrepreneurs in the health tourism business. The study results showed that customers from the Middle East who used hospital services were divided into six groups: self-paying customers, customers from the Royal Household, customers with government health insurance, private health insurance customers, customers who used private health insurance and customers from the embassy. Diseases that they came to be treated were difficult and chronic diseases requiring specialized expertise such as bone conditions, diabetes complications, heart disease cancer, etc. Hospital selection was based on reputation, hospital specialty, physician expertise reasonable medical expenses, medical report responses, advice from relevant medical authorities, and advice from an Arabic interpreter. The problems of medical services found in the country were the problems of lack of understanding of religion and Middle Eastern culture among medical practitioners, the issue of inflated medical expenses, problem of lack of skill in the use of the Arabic language of the interpreter, the question of government assistance policies that cannot meet the needs and concerns that the hotel operators were facing.

Chantana (2011) studied the marketing factors affecting the decision to use large private hospitals in Bangkok. It was studied in a sample of the population who chose to use services in a large private hospital in Bangkok, totaling 400 people aged 20 years and over, both male and female. The study results showed that consumer behavior influencing the decision to use the services of large private hospitals in Bangkok, such as the frequency of using the service 2-4 times. The purpose was to receive general treatment. The cost of medical treatment used was 1,001- 3,000 baht. The person responsible for the expenses was the patient himself or the family. The decision-maker was family. And the reason for using private hospitals is the reputation of the hospital. The marketing mix factors influence the decision to receive services for large private hospitals in Bangkok, which are essential at a high level, including product, service location, distribution channels, the service process, and the physical aspect. However, the marketing mix factor in terms of price and marketing promotion was of moderate importance.

Thananoppa (2011) studied the factors of the marketing mix and the marketing environment that affect the behavior of choosing to use services for private hospitals. In the province of Chonburi to analyze the data on the factors of the marketing mix and the marketing environment of 400 private hospital users in Chonburi Province. Including Bangkok Hospital Pattaya, Phyathai Sriracha Hospital, Samitivej Sriracha Hospital and Akchon 1 Hospital. The study results showed that the overall marketing mix factors and the overall marketing environment had a high overall average. In the marketing mix factor by the side, it was found that the opinions of marketing mix factors affecting the behavior of choosing to use private hospital services in Chonburi Province. Overall, it was found that the five areas at the highest level were service, price, location/distribution channel, personnel and service process. In the marketing mix factors affecting the behavior of choosing to use private hospitals in the province of Chonburi overall, it was found that two aspects were found to be at the highest level, including marketing promotion and the physical part of the service.

Rachata (2019) studied the marketing mix factors influencing Chinese travelers' decision-making to travel medical in Thailand. The sample group was 336 Chinese tourists who came

to Thailand for medical trips. The study found that the vast majority of Chinese tourists were female, aged 36-45 years old, married and worked as company employees, earning a monthly income of 5,000-9,001 yuan. And the type of medical service chosen was mainly for skincare. Therefore, based on this survey results, the Thai medical tourism industry can use this information as a reference in formulating a medical tourism strategy to target specific groups. At the same time, we can consider some of the above demographic characteristics. For example, were focusing on women aged 36-45 years, marrying as a target group, or focusing on company employees with a monthly income of 5,000-9,001 yuan or more as the target group. Determining the specific population target from this data will help the Thai medical tourism industry develop more precise and effective strategies. For example, were organizing a fun and attractive travel package for married Chinese tourists aged 36-45. A specific process for tourism development in Thailand will be more successful than a non-distributed distribution strategy because the targeted distribution strategy cannot meet the needs of Chinese tourists coming to Thailand for medical tourism.

3. Research Methodology

This study is based on qualitative research methodology, for data collection of primary data, the researcher selected the primary data source by using a semi-structured interview with samples ready and willing to provide information. Data collection was conducted by collecting information from Chinese tourists who used the medical tourism service regard anti-aging medical programs at private hospitals in Phuket Province. The collected data included personal information, medical tourism behavior, medical tourism motivation, tourist opinion on provided medical service tourism and medical tourism business or brand loyalty of Chinese tourists who used medical tourism services regarding anti-aging medical programs at the two private hospitals in Muang District, Phuket Province. The researcher collected data by applying an in-depth interview with questionnaires indicating each subject according to the research objectives. The researcher also determined questions and issues in advance to achieve all items as specified and gave the tourist samples opportunities to express their feelings and opinions freely.

The observation was also used as the instrument of data collection. The researcher conducted a non-participant observation method by observing behavior of Chinese tourists who used medical tourism services regards the anti-aging medical program at the two private hospitals in Muang District, Phuket Province. The obtained observation data to explain and interpret the findings together with data obtained from the in-depth interviews. Also, this non-participant observation technique was considered a tool for qualitative research. As an observer, to maintain the Instrumental Validity in this study, the researcher was reminded to observe with precision without prejudice for the observation and data recording's reliability and accuracy. The area for data collection for this study was located in Bangkok Hospital Phuket and Siriroj Hospital.

The population used in this study was female and male Chinese tourists aged 18 years and over who used medical tourism services at private hospitals in Muang District, Phuket Province. Therefore, the study sample was 10 Chinese tourists who used medical tourism services at

private hospitals in Phuket. An in-depth interview method was conducted with the models to collect data regarding personal information, medical tourism behavior, motivations for choosing a medical tourism service in Phuket, opinions towards providing medical tourism services, medical tourism brand, or business loyalty of Chinese tourists. The random sampling processes were done in 2 steps as follows. Step 1: Quota Sampling was conducted by determining quota from private hospitals in Phuket providing data collection. Step 2: Purposive Sampling from quantitative samples that were ready and willing to provide information by collecting information only from Chinese tourists who used medical tourism service regards anti-aging medical programs at both private hospitals.

For the data presentation, analytical descriptive was used with sample information obtained from interviews and news obtained from theories, documents, textbooks, and related researches, to demonstrate the medical tourism behavior of Chinese tourists who used anti-aging medical programs by presenting the data along with analyzing the data into separated issues for better and easier understanding.

4. Results

The market for tourists to Thailand came mainly from Europe, America, and Japan from the secondary data. But after these countries were experiencing economic problems, the tourists coming to Thailand had slowed and grew at a slower rate. In contrast, tourists from East Asian regions such as the People's Republic of China, a new economic country, were increasingly traveling abroad. In 2014, more than 116 million Chinese tourists traveled worldwide, an increase of 17.8 percent. The first year that more than 100 million Chinese tourists traveled overseas, more than the US $ 140 billion had been spent. By the end of 2015, 135 million Chinese tourists were expected to leave the country (Huran Report for IL TM Asia: The Chinese Luxury Traveler, 2015) until 2030. On average, Chinese travel six times a year, and the number of foreign tourists travels up to 200 million per year (China National Tourism Agency, 2015). And according to demographic data, more than 35 percent of Chinese tourists are new millionaires aged 25-34, while more than 27 percent of tourists are teenagers aged 15-24. It is predicted that Chinese tourists will have an enormous opportunity to expand in the long run as the People's Republic of China has a population of more than 1.3 billion (Meryle Linch, 2014).

The Chinese tourists' overseas travel phenomenon is partly due to the Chinese government's policies that focus on improving Chinese citizens' livelihood from low to middle-income to high-income earners-adjusting the population base to the expanding middle class, which will further affect Chinese spending. Also, China's economy has grown steadily for a long time and has expanded more than 7 percent per year, resulting in improved Chinese incomes. Travelers from China have therefore become the dominant purchasing power in the world tourism market, including Thailand with a wide range of travel factors, including reducing the visa check process, allowing Chinese tourists to do Visa on Arrival, opening new routes, having regular and charter flights that can reach more of the main tourist destinations of Thailand, more convenient transportation channels both by land such as the R3A route connecting China-Laos-Thailand and by air, continued appreciation of the yuan, the price of general goods of Thailand

lower than the People's Republic of China, more behavior of using the internet to search for information and book travel, the popularity of Thai dramas, Thai movies, and Thai stars; Chinese online publicity as well as the aggressive marketing of the Tourism Authority of Thailand with a clear marketing strategy and direction and is the only country that can open up to 5 foreign tourism offices in the People's Republic of China.

From these additional factors, in 2014, 4.62 million Chinese tourists came to Thailand 2014, generating approximately 190 billion baht in income to Thailand, an increase of 1 percent. The average number of stay days was eight days, the price per person per day was 5,173 baht, and the cost per person per trip was approximately 41,390 baht. It was the only market in East Asia that had recovered from the Thai political crisis in 2014 since the end of the third quarter, and it was able to increase the overall growth rate. In 2015 were more than 7.9 million Chinese tourists traveling to Thailand, bringing in more than 388 billion baht in revenue. In 2016, there were more than 8.7 million Chinese tourists, bringing in more than 457,000 million baht in income. In 2017, there were 9.8 million Chinese tourists, generating more than 524,000 million baht in revenue. However, the Chinese market is a promising young star in both numbers and revenue growth. The average growth rate of tourist arrivals was the number 1 in the region, and the expansion was at the highest leap, nearly double 24 percent per year, and the average revenue growth rate rose 31 percent. Per year, far away from other markets in the East Asia region. The above data shows that the number of Chinese tourists is trending higher every year and is an essential contributor to the Thai economy.

From the data collection, the researcher found that medical tourism related to a tour to visit tourist attractions in natural and cultural attractions to learn the way of life, rest, relax by dividing travel for treatment, rehabilitation, physical examination, and medical treatment.

The ways of Chinese to achieve the information of medical service in Phuket were as follow;

      1. Chinese tourists were in direct contact with hospitals in Phuket. In this way, they were often familiar with the hospital seeking treatment and coordinating themselves, having friends or relatives residing in that country to help contact the hospital.
      2. Chinese tourists contact the hospital through intermediaries. In this model, the patient is communicated through a mediator to all coordinators, including hospital matters, treatment details, flight travel, and recovery accommodation after treatment.
      3. Searching for information on the internet, from tourism magazines, travel companies, tourism offices, including social information like families, relatives, friends, etc.
      The factors which were an influence to decision making Chinese tourists to take medical service in Phuket such as;

    1.   The attractions of beautiful beach and sea
    2.   The accommodation
    3.   Quality of health or medical service
    4.   The medical service that is not available in China
    5.   The cost of medical service is reasonable

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6.   There are various packages and promotions of medical services offered by Hospitals. The famous medical services are anti-aging medical service and hormone treatments

5. Discussion and Conclusion

Chinese tourists are a market with great potential. When assessed by the number and income, Chinese tourists are likely to travel to Phuket more in the future because Phuket is considered to have tourism potential, a variety of tourist attractions, and natural resources such as beaches, seashore, mountains, waterfalls, etc. Moreover, the unique cultural traditions in each region of the country, especially in major tourist destinations such as Bangkok, Chiang Mai, Phuket, Krabi, Pattaya and Samui island, etc. Moreover, the cost of therapeutics is cheaper than in other countries in Asia.

From the results of this study as Lalida (2007) studied the guidelines for planning the development of medical service tourism in Phuket by suggesting that private hospitals in Phuket must develop medical services to be of high quality and international standard. In order to elevate Phuket Province to become the Asian center for health and medical services. Phuket should develop and link medical and other tourism products together in the model of medical service tourism packages for foreign customers. For Phuket, medical and tourism personnel should maintain standards in tourism promotion services and develop facilities while increasing their expertise in treating specific diseases to expand the customer base, and increase the share of the medical tourism market, making Phuket health tourism market able to compete sustainably.

The next study to create knowledge for supporting medical tourism development in Phuket should be the model design of medical or health tourism package and promotion to attract an aging tourist from aging society outside Thailand. Due to this, at present, there are a lot of tourists who are retired people who travel to Thailand. Furthermore, the medical package program of Anti-Aging is popular among this tourist group. Thus, if the advertisement and marketing strategy have to attract tourists and create correct understanding, many tourists lack clear information.

The research found out a lot of Chinese tourists prefer to have the medical package program of Anti-Aging in Thailand, although in China this program is popular, however to make a reservation to access this program it will take a long time and also the cost is more expensive than in Thailand Finally, for researcher's view, Medical Tourism could be possible to create a package for an extended period of therapeutics for the healthiness of all physical and mind, to attract tourists to decide to stay longer time in Thaila

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SMART CITY: THE ROLE TO CREATE JUSTICE AND THE PROMOTION OF GENDER EQUALITY

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Abstract: The article has the objective to explain the relation of the concept of smart city development which has the important role in creating justice and the promotion of gender equality. The conceptual of smart city does not only prioritize technology or science, but it is also involved with social science and inter- disciplinary approach, especially Sustainable Development Goals (SDGs), the improvement of quality of life, and the reduction of social inequality. In addition, smart cities play a role in creating justice and the promotion of gender equality by improving Smart Mobility. In other words, public transportation patterns are different in gender which focuses on reasonable expenses, safety, convenience and easily- accessible transportation. Therefore, the conceptual of smart mobility plays as a role in creating justice and the promotion of gender equality.

Keywords: Smart City; The Creation of Justice; Gender Equality

1. Introduction

Currently, the national development approach, focusing on the use of technology as a development driver, is an important strategy which national government and international governments have chosen to develop in the globalization context. It is the important characteristics which are deterritorialisation, compressing time or linked issues of driving at the local and global level (Chettha Puanghat, 2018). Besides, the nature of this globalization has resulted in positive impacts such as the efficient system of transportation and communication, comfortable people's lives as well as rapid population movement, especially the movement of population from rural areas into urban areas. Estimated from the United Nations (United Nations, 2011), more than a half of the world's population lives in urban areas and there will be a tendency to have more movement of the population into urban areas. It is predicted that, by 2050, 66 precentage of the world's population will move to urban areas (United Nations, 2015) and, by 2099, 80 precentage of the world's population will move to urban areas. Moreover, approximate 90 percentage of developing countries are driving urbanization policy (Hardoy et al, 2013), especially in South Asian countries, China and South Sub- Saharan Africa (James H. Spencer, 2015). Thus, urbanization has been increased from past to present. It can be said that urbanization will be a key issue of development in the 21st century. It will become a challenge issue in planning for the preparation of infrastructure and

public services in the cities. Due to globalization, the movement of population and information increaes rapidly.

In 2015, the United Nations launch the Sustainable Development Goals (SDGs) (United Nations, 2015) in replace of the Millennium Development Goals (MDGs). The Sustainable Development Goals focus on environmental management, abolition of poverty, reduction of inequality as well as promoting participation and equality in society in particular, Goal 10 on reducing inequality within and among Countries, and Goal 11 on making cities inclusive, safe, resilient and sustainable. Because development has resulted in rapid urban growth and the increase of population movement from rural areas to cities, these lead to the expansion of urban areas. As a result, public services and infrastructure develop inconsistent with the growing population, causing inequality and social injustice.

For Thailand, to achieve consistency between the national development and the international context, therefore, the SDGs goals have been adapted to the 20-Year National Strategy Plan (2017-2036) (The National Strategy Act, 2017), aiming for the reduction of social inequality, the increase of fair distribution of access to resources as well as an environmentally friendly development. In addition, the 12th National Economic and Social Development Plan (2017 - 2021), which was the first plan to determine the strategy for urban and economic development, whose main goal is to spread prosperity and economic opportunities throughout the region, to develop the city into a livable city for all groups of people and to promote the development of environmentally friendly cities. As a result, people in the city have a better quality of life and this enhances competitiveness and sustainable development in the city. From the condition of the aforementioned, it can be said that cities can be seen that the greater the movement of the population moves into urban areas, more problems multiply as well as causing social inequality and poverty problems among urban population as well.

One of the ideas for dealing with such problems is to develop a smart city by using technology and information systems to facilitate and help to organize public services by creating the Smart City Development Promotion Plan of Thailand. These plan set goal of developing Thailand to be a smart city within 5 years, divided into 3 phases as follows: the first phase in the year 2018 - 2019 aiming to develop 7 provinces, the second phase in the year 2019 - 2020 aiming to develop 24 provinces in 30 areas and lastly, the third phase in 2020 - 2022 aiming to develop 60 smart cities in 30 province. Moreover, in 2022 onwards, there will expectedly be 100 smart cities in 76 provinces and 3 globally recognized smart cities. Thus, it can be said that Thailand has an expanding approach to smart city development throughout the country. Moreover, technology will be adapted to suit the area. As a result, the public service becomes more inclusive. This will lead to a reduction of inequality for the people. For Thailand, the Smart City Development Steering Committee has established a framework for the development of smart cities in 7 dimensions[1], which can be said to be elements of smart cities that are standardized with the Ranking of European medium-sized cities, including;

1) Smart Environment means a city that considers impact on the environment and climate change by using technology to help manage systematically, such as water

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[1] The National Smart City Committee of Thailand

management, weather care, waste management, and disaster surveillance as well as increasing public participation in natural resource conservation.

2) Smart Economy means a city that uses digital technology to create additional value in the economy and effectively manage resources such as intelligent agriculture city or intelligent tourist city.

3) Smart Energy means a city that can manage energy efficiently. Create balance Between production and energy use in the area to create energy sustainability and reduce dependence on energy from the main power network system.

4) Smart Governance means a city that develops a government service system, to facilitate to stakeholders who have access to government information by focusing on transparency and participation, and is continuously updated through the application of innovative services.

5) Smart Living means the city that has developed facilities, taking into account the Universal Design, providing people with good health and quality of life, safe and have a happy life.

6) Smart Mobility means a city that focuses on developing traffic systems and intelligent transportation to drive the country, by increasing the efficiency and connectivity of various transportation systems, also increasing convenience and safety in travel and transportation, including being environmental friendly.

7) Smart People means a city that aims to develop knowledge, skills and the environment. It is also conducive to lifelong learning, reduce social and economic disparity, and openness for creativity, innovation and public participation.

Therefore, it can be seen that from the aforementioned smart city development framework, technology and environmental development issues, they also pay attention to human resource development issues, such as participation establishment, promoting learning, or promoting the provision of public services to be more inclusive.

2. Smart City: Meaning and Social Science Linkages

It is estimated that more than 100 smart city definitions (International Telecommunication Union, 2014), or it might be say that there are not the standard definition of a smart city (Economic and Social Council, United Nation, 2016). The definition of a smart city may be linked to many issues, such as technology, economy, society, environment, governance, etc. (Yigitcanlar, T., et al., 2017). However, Smart Cities Council (Ekachai Sumalee, 2015) defined that smart city is a city that uses information technology to help improve quality of life, to operate and coordinate urban services, to save costs and reduce resource consumption, and to help connect relations between citizens and the public sector. For Thailand, the National Smart City Committee of Thailand has defined that "Smart City" is a city that takes advantage of modern technology and innovation to increase the efficiency of the city service and management, reduces the cost and resource usage of the target city and citizen. It focuses on good design and participation of business and public sectors in urban development, under the

concept of a modern and livable city development, for people in the city to have a good quality of life and sustainable happiness.

It can be noted that both the Smart Cities Council and the National Smart City Committee of Thailand do not only aim at technology development, but also pay more attention to social issues, such as public participation, quality of life improvement, the relationship between citizens and the government, etc. Therefore, the academic smart city can be said to be the integration between technology and urban governance (Meijer, A., Rodriguez Bolivar, M. P., 2015). Most people view smart city management as a science operation, such as information technology, engineering, or urban design. In fact, developing a smart city is also related to the social sciences as well (Chourabi et al., 2012). That is, the development of a smart city requires cooperation from a variety of social sectors other than the government sector (Odendaal, 2003; Yigitcanlar, T. et al., 2008; Nam & Pardo, 2011; Kourtit et.al., 2012), as well as to improve the quality of life of urban citizens (Thuzar, 2011; Zhao, 2011). According to scholars, in the promotion of a smart city, technology must be applied to benefit the livelihood of the people of the city.

In addition, the development of a smart city does not only focus on the development of technology, but also focuses on the sustainable city development issue. In fact, both the concept of smart city and sustainable city are relatively consistent. That is to say, developing to be a good smart city requires information technology to help improve the quality of life of the people in the city, to reduce social inequality, and to improve the environmental system. Many scholars have pointed that "cities cannot be truly smart without being sustainable" (Ahvenniemi et al., 2017; Yigitcanlar, T. el at., 2019), and also commented that the concept of smart city development will be a way to solve the problems that arise within the city (Bansal, Mukherjee, & Gairola, 2017). Thus, it can be said that smart city development will be the gateway to improve the quality of life and well-being of the urban population in accordance with the principles of sustainable development as well.

3. Smart City: The Inequality Reduction and Social Justice

The process of transitioning from rural areas to urbanization can lead to poverty and inequality. Both of these problems cannot be completely separated from each other. In other words, poverty is one of the causes of inequality in society. At the same time, the greater inequality leads to a different distribution of rewards or opportunities and finally leads to poverty. Therefore, inequality is always linked to poverty including economic growth as well (Cornai, Court, 2001). With some research finding, inequality correlations in cities of India were found after the policy to create economic growth, and it was found that the prosperity that has occurred has made a significant contribution to the high inequality in rural areas (Ghosh, Pal, 2004 cited in Nattawut Asawakovitwong et al, 2017). It means that the prosperity can cause the opportunity to create a greater social inequality.

Inequality is an extremely severe problem. The data from the CS Global Weath Report 2018 show that Thailand is the third inequality in society in the world after Russia and India. Office of the National Economic and Social Development Council (2018) clarified that the information was inaccurate. The 2017 analysis of the situation of poverty and inequality in

Thailand (Office of the National Economic and Social Development Council, 2018) describes the situation of inequality in Thailand which can be summarized as follows:

1) When comparing the inequality between urban and rural areas, it was found that urban areas encountered with inequality more than rural areas did, partly due to the diversity in careers and incomes.

2) People living in Bangkok perceived educational inequality more than those who live in other provinces since there are clear differences in quality in teaching in Bangkok. (Ratchawadee Saeng Mahamad, 2017)

3) Distribution of medical personnel has always been different in each region, resulting in inequality in an access to health services. Although the trend of the production of medical personnel will be sufficient for future needs (Thai Health Project Working Group, Institute for Population and Social Research, Mahidol University, 2017), it was found that the distribution of medical personnel concentrated in large provinces. This makes medical personnel in some provinces take a burden of abundant patients, causing the delay in the service including the quality of the service. However, currently there is the use of medical technology in the service, which is considered as one factor that helps reduce the inequality in quality of medical services.

4) The poor household expenses in travelling are accounted for 44.24 percentage of the total income while the rich household expenses in travelling are accounted only 13.31 percentage.

5) The proportion of access to household infrastructure in urban areas is higher than in rural areas which reflects the inequality in expanding services at the area level.

Moreover, Aphiwat Rattanawaraha (2009) suggests that efforts to spread the prosperity into the region between 1981 - 2005 still fail to create equality or reduce social inequality. In addition, the policy of promoting urban development is the heart of the civilization policy. It could be one of the reasons for more inequality. In addition, data from the Thailand Development Research Institute or TDRI (2013) studied the poor by categorizing the poor in three areas: 1) urban poor in large provinces, 2) urban poor in other provinces, and 3) rural poor or poor people outside the municipality. The results of the study clearly show that urban poor have less access to most types of welfare than rural or non-municipal poor. The data, supported by Nattawut Usavagovitwong, et al. (2018), found that urban poverty inequality can be classified in three areas:

1) Resource and land inequality (rights to stay in the city)
2) Inequality in access to economic opportunities
3) Inequality in power and access to city administration

According to the data, inequality is becoming more and more severe, especially with urban residents. They differ in careers, income, social class, and access to public services. Also, moving into large cities makes infrastructure and public services incompatible with people. Partly, the inequality arises from the inability to access efficient public services and infrastructures. Moreover, urban development policies that set the target at large provinces or metropolitan cities are causing more and more inequality in Thai society. Therefore, in order

to reduce the inequality arising in society, there are various proposals for creating justice to reduce this inequality, such as promoting employment, promoting land to diversify land ownership and access to resources, providing welfare to disadvantaged groups and responding to problems of the poor, or improving the regulation to create equality (Office of the National Economic and Social Development Council, 2018). These measures are all solutions to the problems that the government has dealt with in order to alleviate social inequality for a long time. Another approach is to promote inclusive access to infrastructure for people by adopting technology to help facilitate and organize public services. It can be seen that this approach is in line with smart city development, so smart cities play a vital role in social development and reducing inequality, which Akarawin Sasanapitak (2020) has synthesized the role of smart cities to help reduce inequality and create social justice, consisting of

1) The role in creating fairness in resource allocation for everyone, in other words, a smart city plays a role in creating a social inclusion. It is not only a city that uses technology to support aging society or underprivileged, but it will also be a city that prioritizes everyone in the city or being called "Inclusive digital citizenship" (Miklian, J., Hoelscher, K., 2017).

2) The role in urban development and transparent bureaucratic system is to promote the government to use technology to help manage the city and to help organize public administration more efficiently including creating new political organizing by applying technology to help and resulting in new democratic decision-making, such as E-election, etc.(Lynch CR, 2019).This causes public administration system to be transparent and verifiable and lead to the resolution of corruption (Miklian, J., Hoelscher, K., 2017).

3) The role in promoting careers and creating income; in the future, the world will face many changing environments as well as entering the aging society that will increase the number of the elderly. Thus, work is one of the factors that can drive society forward (Gudowsky N., et al., 2017). It is expected that in the future there will be many elderly people still working by relying on technology or digital systems to help with work and the role of a smart city will promote labor market for people of all genders and ages.

4) The role in promoting communication and engagement; the world is entering aging society which may lead to inter-generation in work, so the smart city will play a role in promoting communication and good understanding (Gudowsky N., et al., 2017), as well as being an important part in creating great public participation (Lynch, CR, 2019), which results in smart resident (Hatuka, T., & Zur, H., 2019).

5) The role in the promotion of gender equality; the research by Yamini J, Singh (2019) found that the technology that originated in a smart city helps to make it easier for public transportation allowing females to access transportation services easier.

4. Smart city and Gender Equality Promotion

One of the goals of smart cities is to enhance social inclusion, which has a significant effect on the establishment of justice and the reduction of social inequality (Angelidou, M., 2014; Caragliu, A., et al., 2009; Lee J.H., et al., 2013; Nam and Pardo, 2011). Another scholar added

that smart cities must have the ability to reduce social discrimination (Kitchin, 2015; Jarvis et al., 2009). The development of smart city and gender equality can. be considered as overlapping concepts. However, for Thailand, the framework of smart city development in the dimension of Smart People has identified indicators of social coexistence by inclusive society and culture. For the international level, there is the standard of smart city development from Ranking of European Medium-Sized Cities which determines Smart People dimension which has identified indicators of support of the life - long learning environment and knowledgeable and digital citizen. So, it can be said that one of the indicators of smart cities aside from technology issues also deals with a wide range of social and coexistence issues in society.

Smart city development is involved with the promotion of gender equality. Especially, in the dimension of Smart Mobility, which is an important development dimension that is linked to economic development, social opportunities (Roland Berger Consultants, 2014), the promotion of environmental issues, inclusive society (Shaheen et al., 2016), or the promotion the other of smart city dimension such as, smart people and smart living etc. Therefore, the development of smart mobility systems is associated with social development, the access to public services, and the access to social opportunities including the promotion of gender equality. Men and women there are differences in the way of life in the form of travel and transportation. In other words, both men and women have different objectives of the journey. Most men's travel are involved with career trips while most women's travel are involved, for instance, with shopping for household items, picking up children, or a visit to care for the elderly, etc. (Crane, 2007; Priya Uteng, 2011). Thus, women are often traveling with young children or with luggage. Several research papers have examined the nature of women's travel. For example, the survey show that 20 percentage of men traveled by private cars while only 7 percentage of women did (GTZ, 2007 cited in Yamini J. Singh, 2019), or, in Germany, it was found that men had twice the distance traveled than women between 2002 and 2008 (Peters, 2013) or, in Portugal, it was found that women traveled more frequently than men did with shorter distance and they tend to use public transport more than men

In addition, women' travel will be relevant to travel safety issues. It is also correlated with the choice of travel modes. However, if choosing a more secure mode, it may lead to higher costs (GTZ, 2007 cited in Yamini J. Singh, 2019). For example, if a woman chooses to travel in two ways: by public buses and by public private cars (Taxi). When considering safety, it can be said that traveling by public private cars are likely to be safer than by public buses because traveling by public buses may have to travel with several buses to reach her destination. They are also faced with a lot of people, which can pose a high risk of traveling. However, if a woman chooses to travel by a public private car, the cost will be more expensive. With such condition, girls in some countries choose to make themselves safe by getting themselves involved with a group of friends who look like a gangster or being stronger in order to help create safety for themselves while traveling. (Bhattacharya, Kopf, 2007 cited in Yanini J. Singh, 2019).

Therefore, it can be said that the women's travel modes with such social conditions cause difficulties for women. As a result, women use less public transport than men even though, nowadays, there are increasingly women working outside, but the shift in roles to work outside the home for women still have to maintain the same social roles which are to take care of family, children and the elderly. One of the solutions to this problem is to improve the travel

system by promoting smart mobility. According to Trafik Analys (2016), smart city development with digitalization has a profound effect on the promotion of gender equality. That is, Smart Mobility has been designed to bring technology to urban development to achieve gender equality, so Smart Mobility is a way to help people in the area access public services and cheap cost, regardless of gender and the Smart Mobility system helps to make travels safer or help reduce travel risks.

5. Conclusion

From all above, it will be noted that the smart city development is not just framed by the development of technology and digital systems but it is also related to social science issues as well. Some indicators of the smart city development aimed at improving the quality of life of the people, and developing inclusive public services. This will lead to the reduction of inequality and the creation of equality in society. However, developing a particular area as a smart city may leave areas that are not selected for development to be even more unequal. In other words, urban areas that are being developed into smart cities, compared to less developed areas or rural areas are significantly different. This means that inequality in these two areas are far greater.

A part of the data shows that the inequality in cities affects larger population and more severe than in rural areas. Also, in urban areas, there are people living in more than half of the total population. Therefore, if the city is developed as a smart city, it may reduce the inequality in society by more than a half. For areas beyond urban areas or developed areas which is expected to be quite inequality, the government should promote the social welfare policy or the rural development policy to promote people living in rural areas and to reduce the inequality that occurs between the areas.

Smart cities and the promotion of gender equality are related in term of smart mobility systems in which the modes of travel differ between genders. People, whether they are men or women, want transportation that is cheap, safe, comfortable and easily-accessible. Therefore, having a transport system that uses technology to facilitate or help organize public services may be a solution that promotes gender equality and improves the quality of life of the people.

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DISRUPTIVE TECHNOLOGY & LANGUAGE TEACHING: THE CHANGE IS INEVITABLE

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Abstract: This article suggests directions for language teaching instructors, mainly teaching English in higher education, in order to help them adapt to changes caused by disruptive technologies. The rapid changes have direct effects on society as a whole and specifically on the behaviors and methods of student learning. Three factors that a new generation of language instructor has to consider are: sufficiency of technological knowledge and up-to-date skills, understanding of the cultural context needed for pedagogy design and relevant educational theories of improvement in learning.

It is a crucial period for higher education to choose, improve and empower the staff to create and develop the better learning process. This article is proposing the integration of 2 models, "Disruptive Innovation Model" and "Teaching and Learning Activity System". These two models explain and provide conceptual frameworks for Higher Education (HE) to clearly see the interactions and consequences of the new educational paradigm. Therefore, with instructor's creativity, new pedagogies must be developed to integrate new technologies. This article intends to provide a map for language teaching instructors to see the directions in which the near-future roles and responsibilities will progress.

Keywords: disruptive technology; a new pedagogy; educational theory

1. Introduction

Before the COVID-19 pandemic, disruptive technology showed the significant change for higher education. Online class, computer simulation, augmented reality and artificial intelligence (AI) all provide limitless creativity for instructors. Then, it depended solely on how institution can adopt and adapt the technology which correlated to instructors' ability to develop and create new modules using technology effectively. At the same time, technology users' (students) behaviors are also altered, and they rely on technology more and more for their everyday lives. Some are enjoying the freedom to learn, and some are distracted by cyberworld life. As Higher Education Institutes (HEI) will shift towards different directions of teaching, these new behaviors will dictate the better ways to teach, learn and set new paradigm for higher education. The easy access to information, artificial intelligence, improvement of educational software and ubiquitous environment redefine learning and HEI's roles. It is crucial

for instructors to take advantage of the technology, promote life-long learning and reposition themselves as instructors of the future.

The nature of disruptive technology has to be seriously considered along with the learning process in higher education institution. Christensen's theory of disruption explains the effects and how disruption induces the change in business world. Those changes are similar in all industries and higher education has to reconsider its functions of educating a new workforce, effectively and appropriately considering the changes in the infrastructure and students' new behaviors. This article will elaborate on 2 important issues; disruptive technology and teaching and learning system model which would lead to suggestions for higher education's action with an example on language teaching matter.

2. Disruptive Technology

Disruptive technologies are technologies that have significant effects on society. The effects that alter or disrupt the way industries, consumers and how businesses operate. The word "Disruptive technology" (later was changed to "Disruptive Innovation" in 2003) was mentioned in Christensen's work since 1995 explaining the disruption in industries that results of new practices, innovation and also technology.

The Disruptive Innovation model illustrates the disruption and its effects on business competitions. It shows that innovation (or technology) will allow the business to improve its operations (or products) in a greater rate than established practices that leads to competitive advantages in short period of time. If business can utilize technology to enhance its performance, the same technology must also be used to improve educational effectiveness.

Interestingly, the term of "disruptive technology" was changed to "disruptive innovation", explaining that the disruption is not an intrinsic feature of the technology (Christensen, Raynor and Anthony, 2003), but is determined by practices within the organization confronted by the innovation. Disruption, therefore, it emerges from usage (Flavin, 2012).

Source: Clayton M. Christensen, Michael Raynor, and Rory McDonald
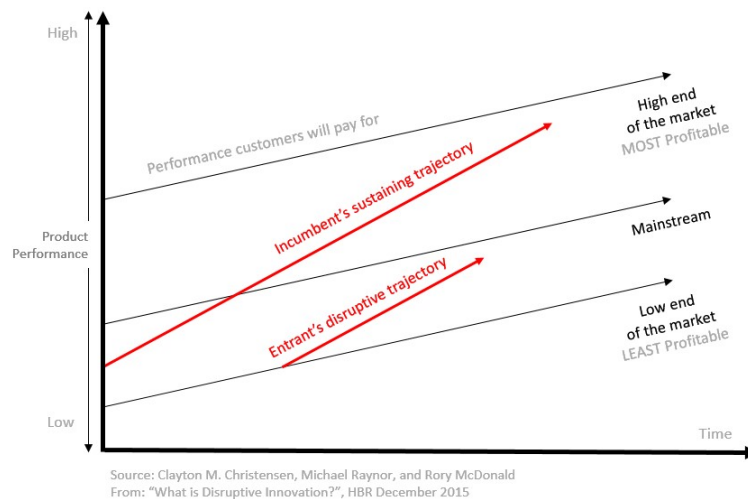From: "What is Disruptive Innovation?", HBR December 2015

Figure 1: Disruptive Innovation Theory

In the year 2020, the theory is proven to be valid even though it has not been proven quantitatively but the figure exemplifies the existence of the gap as a result of disruptive technology (innovation). From a business perspective, Christensen concluded that disruptive innovation exists when technology, business model and innovative approach work together in creating disruption.

In the past several years, the technology has rapidly improved and applied into various forms of businesses due to the advancement of computer technology, mainly, computing power, communication technology and computer security (encryption algorithm). The consequences of new technology are expansive. Online communication becomes the norm, mobile device outgrows desktop computer,cryptocurrency exists and information can be easily accessed with the power of the internet.

Many startups and new businesses disrupt markets and industries using new technology infrastructure and innovative business models as Christensen and Raynor foresaw in 2003. At the same time, the technologies have altered the framework of society with new behaviors and standards. As a result of communication and computer technology, internet became a communication infrastructure, social network became new community and digital transformation is the key for all businesses to survive including Higher education institutions.

Brian Solis has summarized these technologies and their applications in his "Wheel of Disruption" to explain what have disrupted industries and people's behaviors. Figure 2

illustrated the core of "Wheel of Disruption" and some technologies which are results of the disruptive technology. The Fourth Industrial Revolution is driven by a combination of disruptive and emerging technologies that began with widespread access to the Internet, mobile communications, and exponential increases in the processing power of computers. The data generated by billions of individuals, devices, businesses, and government agencies connected to the Internet, along with the capacity of computers to process these data, are accelerating the development and adoption of technological breakthroughs in fields such as artificial intelligence, robotics, the Internet of Things, autonomous vehicles, 3D printing, nanotechnology, biotechnology, materials science, energy storage, and quantum computing (Solis, 2019).
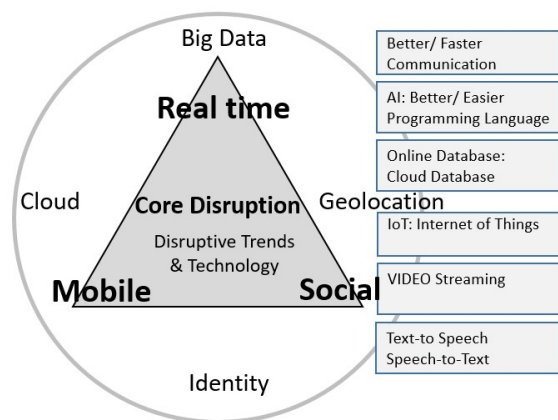

Figure 2: The Wheel of Disruption and Language Teaching Applications

The essential part of this "Wheel of Disruption", is the core that shows 3 main implications of technology (Real time, Mobile and Social) with 4 supporting applications (Big data, cloud, Identity and Geolocation) which are now new business standard operations. Business sector has responsively taken advantages of new technologies and infrastructures, for examples;

- The banking industry has gone digital and online
- The logistic services have improved and developed new standards
- Marketing has shifted from tradition research to big data and data mining for more accurate forecast

The consequences on people's behaviors and societal values are astounding. With the internet, mobile devices and business competitions, the services and products are all improved to serve which change the way we think, work and do things including the ways instructors teach and students learn in higher education. Presently, in 2019, these are the norms in most universities;

- Internet access is an essential infrastructure
- Students use notebooks or tablets in classroom
- Learning management systems are implemented in most institutions i.e. Online registrations, websites or databases for teaching/learning materials
- Free and open source learning materials are on the internet (i.e. MOOC and HEI's free online courses)
- Media for teaching and learning (audio, video, slides, interactive lessons such as simulations) are normal and easy to be developed
- Technology and software that supports and assists learning such as grammar checking, text-to-speech, speech-to-text are available freely or at low cost

The disruptive technology model demonstrates that the technology has direct effects on both business and society at the same time. When the business adapts, the workforce has to change which means that the higher education has to synchronize with the new ways of life. This happened before in the year 2000, "The Invention of the WWW" has changed the way people use the internet but then, the magnitude of the change was not significant and people had gradually learnt the new ways to surf the internet.

After 2015 when the mobile devices are widely used, the landscape of learning changes dramatically while higher education institutions are struggling in finding their ways to keep their own established practices. As a result, it seems that instructors are lost with their old ways of teaching and need to know more about technological enhanced methods of education. The COVID-19 pandemic in the beginning of the year 2020 has had a great effect on ongoing disruptive technology. The use of teleconferencing software and remote work software has been skyrocketing as a result of social distancing policy and online learning has been emphasized more than ever while HEIs are struggling with their business model and instructors who are familiar with conventional instructions are forced to adapt quickly. Evidently, most of instructors use S and A levels in SAMR model to improve their classes.

Substitution, Augmentation, Modification & Redefinition model (SAMR) explains how instructors apply technology in their class activities. Most instructors are more comfortable with "Substitution" which happened widely in COVID-19's "Learn from Home" model (Romrell, Kidder, Wood, 2014). The library has been substituted with online repositories, video

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tutorials have been stored in school's media servers, in-class learning process is substituted by video conferencing due to the social distancing restriction assuming that it will be, at least, as effective as the conventional classroom. However, in science and applied science classes, the "Augmentation" and "Modification" have been integrated in some "high-tech classes" as there are some publications focusing on teaching tools and methods. For examples, the use of Augmented Reality (AR) and Virtual Reality (VR) have been developed to explain things to students or even allowing students to do a virtual lab on their computers.

With the classifications from SAMR model, instructional designers now have the framework to evaluate activities to determine how well they meet the goal of transforming learning. Still, the development of integrated pedagogies and technologies will be limited if the instructor cannot foresee or understand what the technology can do and this is the result of disruptive technology, the advancement of technology is progressing faster than before.

The core disruption consists of 3 socially relevant factors caused by new technology; Real time, Mobile and Social. These 3 factors are results of the exponential growth of 4 technical factors; Big Data, Cloud Computing, Geolocation Technology and Identity Technology. As a result, now we have:

- Better and faster communication infrastructure
- AI: smart algorithm used for solving problems
- Online database or cloud that can be access ubiquitously

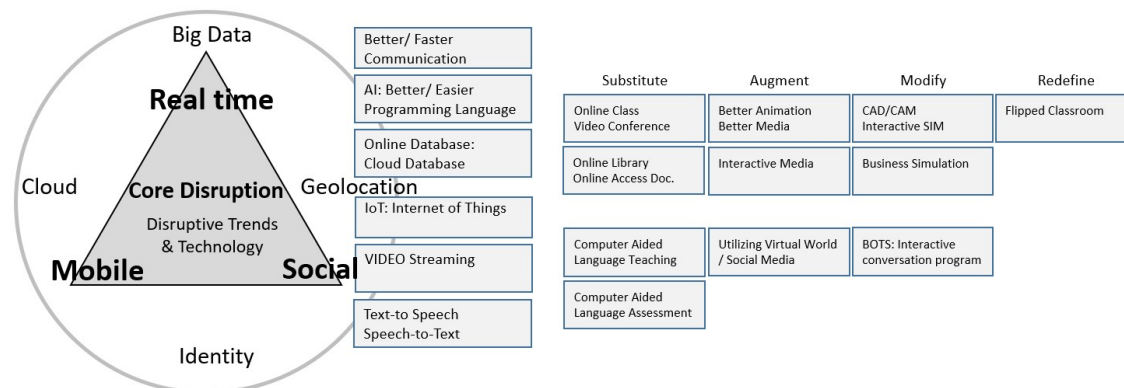The following examples of the use of new technology in education within SAMR model

Figure 3: The Wheel of Disruption and Language Teaching Applications

3. Changes in the Workforce and Higher Education

The rapid diffusion of disruptive technologies is changing traditional business models through a substantial change in cost, or access to goods and services (IFC, 2019). Industries are going through "digital transformation" with the best technologies they can acquire in order to compete and lead in their markets. Such a transformation requires new organizational structure,

new skills, new work patterns and new infrastructure which means that existing employees must adapt to new job descriptions and technology related tasks. At the same time, new technology companies with new ideas and innovative business models are entering the economy to compete. Both new and old businesses have redefined new job positions, skills, and tasks to suit their new updated version of infrastructure. Businesses also likely to replace low-skill jobs that emphasize manual and routine tasks with automation or use outsources to keep the operation running (IFC, 2019).

"The new casualization of work" will occur in the form of "Collaborative Economy" or "Gig Economy" which is "a way of working that is based on people having temporary jobs or doing separate pieces of work, each paid separately, rather than working for an employer". When digital platform allows them to work independently such as online trade or business, new generation tends to move towards the benefits of flexibility, autonomy and potential higher incomes. Consequently, the structure of work has been shifting away from the conventional lifetime or long-term employment framework that had dominated labor markets for generations. Skilled staff is increasingly needed on a project basis, and then moves on. Location is not a limitation any longer. Then, the hiring process and work patterns will be reformed which HEI has to prepare its graduates to deal with the situation (Mellul, 2018).

> *"Therefore, for both old and new workforces, tomorrow's skills required for the new economies seem to be embodied by two characteristics. First, competences across the board, even with high levels of specialization, will have to include a mixed range of both professional and personal skills. These includes professional knowledge, non-routine-higher-order cognitive skills (analytical, problem solving, critical thinking skills), and socioemotional skills (soft or non-cognitive skills i.e. creativity, working in teams, commitment). These skills will accommodate new ways of work patterns and still cannot be replaced by any technology, yet. Second, acquiring skills will no longer be confined to the formative years of life but will continue throughout professional life via life-long learning, i.e. life-long training and retraining."*

All skills in both characteristics are abstract measures in educational domain. Therefore, in order to prepare the graduates with these characteristics, HEI has to reconsider the directions of curriculums and pedagogies. However, disruptive technology that seems to be the cause that disrupts the well-established practices in HEI, might also be an answer for better teaching and learning processes, if and only if, the instructors and the organization adapt and make use of it properly. The objectives are clear. HEI has to maintain its academic integrity and, more importantly, maintain the financial balance in business model.

4. Action Theory, Higher Education and Disruptive Technology

In order to understand factors affecting an adoption of technology in HEI, this article will use Activity theory along with the concept of expansive learning (Engeström, 1987) based on Flavin's study (Flavin, 2016, pp. 3-15) to clarify all related topics, terms and connections among those factors that will illustrate both the distribution of tasks and the hierarchy of power. Engeström (1987) developed the expanded model of human activity (the activity system) to include and highlight the collaborative nature of human activity by adding social elements to Vygotsky's original model (1978), as shown in Figure 3. For the purpose of this article,

focusing on understanding roles of emerging technology in HEI, the labels are added to explain the connections and interactions.
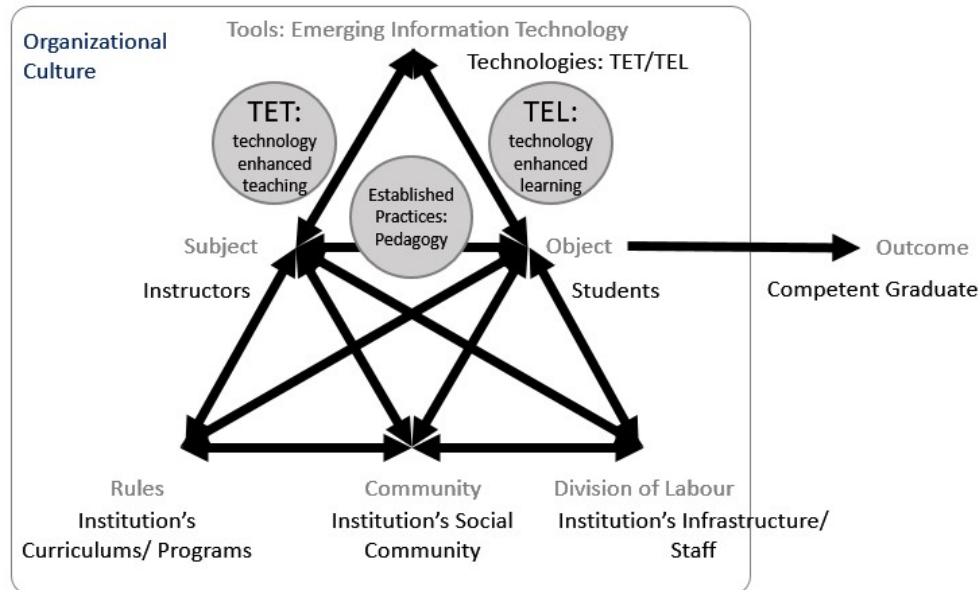

Figure 4: HEI's Teaching and Learning Activity System (Engeström, 1987 and Vygotsky, 1978, 1987).

The concept of action theory focuses on all players, relationships among them and tools in all related activities. The triangular shape links their relationships together while the arrows are activities along with any related tools, in this case is the new technology. The diagram (Flavin, 2016, pp. 3-15) states that the institution as a whole must be supportive to the adoption of technology as it will become an infrastructure. Three important factors along those activity arrow components are; TET (technology enhanced teaching), TEL (technology enhanced learning) and redesigned pedagogy or instructional design that works well with both TET and TEL. The disruptive innovation theory confirms that TET, TEL and new instructional designs (pedagogies) must be accelerate to the level that is up-to-date which means that instructors must 1) understand existing and potential technology that can be adopted for classroom or that can be used in the workforce, 2) develop new pedagogies using technology as a tool to facilitate learning and 3) have institutional support in terms of infrastructure and technological training.

In the fields of science and applied science fields, this approach is straight forward and intuitive as they must update the lab, robots, simulations and staff frequently to cope with the changes in order to prepare the graduates to use the new tools. The questions remain, "How well the instructors could adapt new technology for better learning?" Oleson (Oleson & Hora 2014, pp. 29-45) in the article topic "Teaching the way they were taught", has concluded that the ability of instructor to creatively new pedagogies depends on; the disciplinary context, experience as a teacher, experience as a learner and the complexities of instructional decision making. While in the age of disruptive technology, when communication technology is changed, technological infrastructure

is changed, sources of knowledge is ubiquitous and access to learning is limitless, this overwhelming learning environment overshadows instructors' capacity and roles. It is quite clear that instructors have to cope with new technology and learn how to adapt relevant technology into their instructional design. Furthermore, they have to be content creator or even learning software developer in order to integrate new pedagogies into classrooms using both TET and TEL.

5. Language Teaching Technology

Presently, language teachers are expected to understand how to integrate technology into their teaching as well as knowing how to help learners make use of resources such as media and the internet to improve their learning of all four skills; reading, listening, writing and speaking. Language technology has been advanced into speech recognition, speech synthesizer and artificial intelligence, AI, that can process and understand speech. The application of speech recognition has been widely used in with the internet of Things (iOT) for people to controls devices with their voices. Furthermore, the AI, artificial intelligence or computer program, can process and interact with the users to answer or perform tasks, ie, bots. (Chat)bots has been utilized on the web for more than decades; with conversional agents such as Google, Siri, and Alexa, chatbot has been integrated into different software to do all tasks with speech control. With a few tweaks in coding, these chatbots have a potential to be language teacher/tutor but what missing is the effective instructional design (Fryer, Coniam, Carpenter & Lăpușneanu, 2020) which will be a big leap in language learning.

With overwhelming resources and possibilities, language teachers now have to adopt the technology to a certain level in their teaching as technology is considered an infrastructure of the education. Then pedagogy and technology are now intertwined which requires teacher's to think clearly how to teach, which technology to be used and how to assess the learning. (Karamifar et al., 2019, pp. 55-81) has looked into the term "techno-pedagogical competencies" as part of a language teacher's professional identity. The list explains the technology abilities that language teachers should have:

> (a) assess the potential and limits of technologies for language and culture learning; (b) carry out a needs analysis to introduce adequate technologies at appropriate moments in a pedagogical sequence; (c) handle basic tools and applications, and solve simple technical problems; (d) design appropriate tasks; (e) design for interactions within and outside the classroom in view of the technologies' affordances; (f) rethink the contract with learners and colleagues; and (g) manage time and optimize the integration of technologies.

Therefore, language teachers must gain more knowledge and skills of educational theories, pedagogies, technologies and creativity to develop more effective instructional design using relevant technology. Furthermore, besides choosing available technology to use for specific pedagogy, if the language teacher is capable of redesigning a technology that could accommodate the pedagogy, this will take a step further in terms of developing an educational tool from a pedagogical perspective (Fryer et al.,2020).
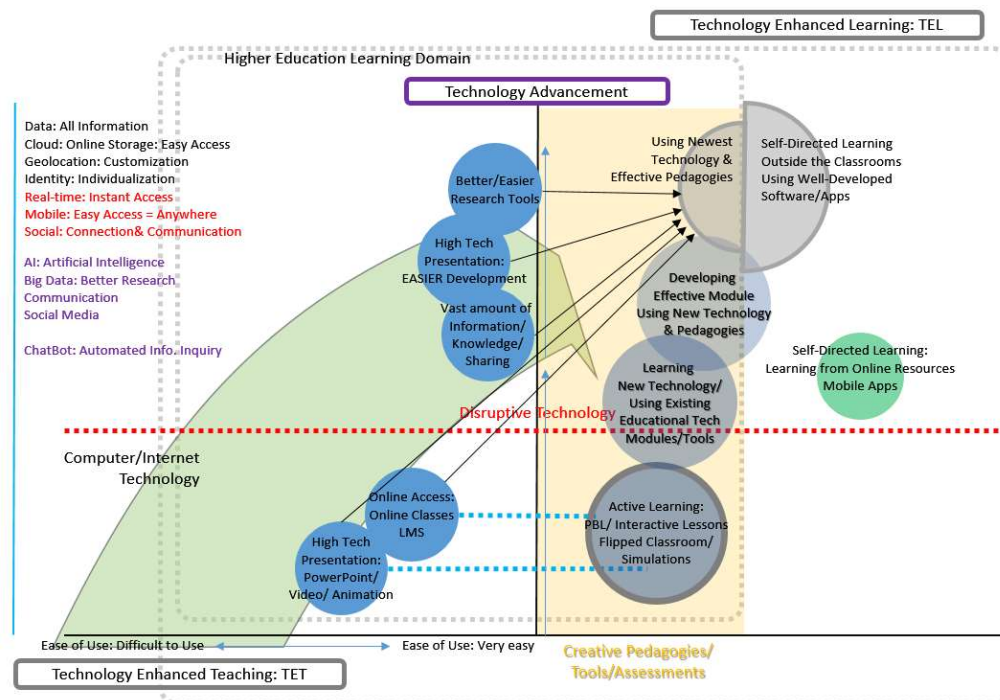
Higher Education Direction Map

Figure 5: Educational Empower and Disruptive Technology

Disruptive technology is here. The whole system is disrupted, and academia has to adapt and adopt technology for a better education. Therefore, the higher education institution has to be clear on the directions in order to support the instructors in technical aspect, new pedagogies and the educational system as a whole. The diagram shown illustrates the path that higher education institution will have to take.

As a result of disruptive technology, higher education will change in two ways; technology will be an infrastructure of education and pedagogies and effectiveness of learning will be designed around the technology. New pedagogies will eventually arrive when instructors can master and design software of technology to facilitate learning in the better way. Instructors now, may well have to turn towards becoming a guiding coach who needs to explore and experience these ever-changing times.

At the same time, instructors, with the expertise, will be content creators, programmers, and assessors. Self-directed learning modules with monitoring systems will be a main goal for higher education. With the help of AI and computer systems, students learning processes will be customized, enhanced, and aligned with new learning objectives and pedagogies, not only in the field of language teaching, but in all higher education disciplines. As mentioned earlier, the improvement of education relies on, mainly, instructors' capacity to learn new technology, create content, and adapt to new pedagogies. Meanwhile, organizations could try to direct these instructors to the best academic career paths.

As we can see, education depends heavily on technology and educational development also has to align with disruptive technology. The model points out the lack of instructor capacity to cope with the changes. Therefore, the model suggests a bigger picture of educational empowerment; the direction of technology support at a policy level, instructors' self-development in order to utilize technology efficiently, and new educational research and pedagogies that are aligned with new technologies.

6. Conclusion

Too often what is missing is an appreciation that teachers' underlying conceptions of teaching influence their general approach to teaching and their more specific approach to using technology. At the heart of developing the professional practice of academics in using technology is not the necessity to make them more technologically competent. Instead, it is the need for teachers to reconsider the appropriateness of their conceptions of teaching and their more general approaches to teaching. While we value the contribution of technology to supporting student learning, we strongly contend that technology itself is not the agent of change: it is the teacher.

The key of developing professional practice of academics in using technology is not the necessity to make them more technologically advanced. Instead, it is the need for teachers to reconsider the appropriateness of their conceptions of teaching and their more general approaches to teaching. Even though, technology seems to play a great role in this change, the real agent of change is still the teacher.

Disruptive technology is here to stay and unfortunately, it will disrupt again. Higher education and all instructors are facing the challenge as long as they understand the nature of technology and the nature of learning. The followings are suggestions that are worth considered;

1- Different disciplines, subjects and levels MUST have different approaches to new technology and pedagogy. This requires instructor's knowledge and experiences to foresee the learning process, what students struggle with, what technological skills with the newest technology students need to overcome the task and learning and thinking order student will experience in classes.

2- Instructors knowledge and skills of newest technology is a must. Obsolete technology and traditional mindset have to be abandoned. As technology changes rapidly, instructors must foresee the pedagogy and tools chosen will be effective and valid for long term.

3- Instructors must be open to new educational theories in terms of pedagogies and assessments. Traditional teaching was working for previous generations, but they cannot assume they will be working for the new environment, or their behaviors are undermined.

4 In-class research is needed now more than ever as many variables in education change rapidly and unpredictably. Student engagement issue is the key to understand how students learn. The simple mistakes in this situation is a shift of focus from "student learning" to "new ways of teaching".

5 As the article emphasizes on the change in organizational scale as the change needs a long-run solution, the HEI's resistance to change awaits. (Chandler, 2013, pp. 243-251).

Language teaching domain is facing a real threat, as most of the functions that a teacher does, can be taken away by a computer. Eventually, the teacher's role might shift slowly. Language teachers might have to learn how to create new contents and pedagogies that works with new technology. The nature of teaching and learning will change and it will be better if the teacher learns more about technology and new disrupted-online society and plan the change for better learning.

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JAPAN-CHINA POLITICAL RELATIONS UNDER THE ABE ADMINISTRATION (2012-2020)

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Abstract: This article examines political relationship of Japan and China from 2012 to 2020, when Shinzo Abe, Japan's longest serving Prime Minister, was in power. Abe is credited for significantly shaping Japan's economic, foreign and security policy. This article, therefore, considers three main issues under Abe administration that challenged Japan-China political relations – territorial disputes, historical animosities and Japan's new security system. It can be concluded that the relations between Japan and China worsened early under Abe's tenure since the Chinese feared that Japan could return to militarism and use its armed forces to project its power in the region. However, despite political tensions, their relations showed positive trends on the economic, and social and cultural fronts.

Keyword: Japan-China Relations, Abe administration, security policy, historical animosities

1. Introduction

A Brief Overview of Japan-China Relations

After Japan was defeated in the World War II, Japan came under the control of the Supreme Command for Allied Power (SCAP) led by General Douglas A. MacArthur. It imposed significant military, political, economic and social reforms. In term of foreign affairs, Japan was limited by the United States' containment policy which aimed to strategically halt the spread of communism during the Cold War. Japan, therefore, was initially barred from developing close relations or setting up economic exchange, with China after the war.

However, World War II led Japan's economy to shrink considerably. Japan reconsidered contact with China, which had been its main trade partner before the end of the war. Thus, Japan developed the principle of "*seikeibunri*", separating the political issue from economic ones, and re-establishing unofficial relations with China- in the form of private-to-private exchange, rather than government-to-government.

The turning point for Japan-China relations was in 1972, when Japan and China normalized diplomatic relations. Through the normalization, their relations were improved, but not as rapidly as they expected. Japan-China relations were promptly developed under Deng Xiaoping, the president of China after the death of Mao Zedong. In 1978, the Treaty of Peace

and Friendship was signed. Under the treaty, a series of diplomatic initiatives were implemented to strengthen bilateral relations through international trade, international investment and foreign aid. China quickly became Japan's largest trading partner and the primary source of Japan's foreign direct investment (Bjorn& Linus, 2012, p. 216).

The relationship of the two countries was not entirely smooth. It was interrupted by Tiananmen Square massacre in 1989, during which the Chinese government attacked and killed pro-democracy protestors. Responding to the incident, many Western countries-imposed sanctions on China. Japan, as a member of Group of Seven (G7), was also pressured to take an action, so it decided to impose sanctions on the Chinese government. However, the sanctions against China did not last long, since the political and economic instability of China would threaten the regional economy (Chang, 2019, p. 275). The bilateral relationship then returned to normal.

After 1992, Japan became increasingly aware of the growth in China's economic and military power that might challenge the dominance of Japan in the East Asian region. The bilateral tension increased after Japanese Prime Minister Koizumi Junichiro visited Yasukuni Shrine in 2001. It led to a number of large anti-Japan demonstrations in China in the later years showing that mutual perceptions of both countries were becoming increasingly negative.

In the 2000s, their relationship had both positive and negative dimensions. For instance, in 2005, Japanese Prime Minister Abe Shinzo visited China for the first time in five years, signing a bilateral agreement which was reached to establish a relationship between the two countries based on strategic reciprocity. Then, there were the official visits by high-ranking officials between the two countries many occasions. However, negative relations persisted on issues like the territorial dispute over offshore islands. It continued to be one of Japan's main security concerns during Abe's second term.

2. Research Objective

This article aims to evaluate the political relationship between Japan and China under the Abe administration from 2012 to 2020. It analyzes this relationship through three main issues: territorial dispute, historical animosities and Japan's new security system.

3. Literature Review

The relationship between Japan and China ranges from peaceful cooperation to downward spirals of confrontation and even military conflicts (Emmott, 2008; Denny 2005). Security issues have become important in Japanese policy-making process in recent decades. Among the factors that stimulates the Japanese government to pay more attention on foreign and security issues is the rise of China. It presents Japan with challenges across several dimensions. Through the study of Japan's response to the rise of China, Hughes (2009) argues that Japan has responded by attempting to maintain its default engagement strategy to China, instead of competing with China directly. Japan has continued to activate not only bilateral frameworks for cooperation on economic, social, and cultural fronts, but also trilateral frameworks involving the US. At the same time, Japan has tried to assure the presence of US in the region as way to balance against China's rising power. The idea was supported by Bjorn and Linus (2012) who agree that Japan has attempted to handle China's rise by balancing or containing

the growth of Chinese power. Particularly, since tensions over the disputed Senkaku (Diaoyu) islands has increased, the Japanese government devoted attention on the security policy.

Many scholars have pointed out that security strategies and policies increased during the second-term Abe administration (Giulio, 2015; Nakanishi, 2015; Maslow, 2015; Sakaki, 2015; Dobson, 2017). Abe launched a new security strategy composed of three pillars: increasing capacity for engaging peacekeeping, maintain its alliance with the US, and enhancing cooperation with other countries, such as India, Australia, New Zealand and so forth. Although it can be argued that the strategy was in line with previous administrations, Abe pursued them more forcefully (Giulio 2015; Sakaki, 2015).

The term "proactive pacifism" has widely been used by the Abe administration as a guiding principle for its national security policy. Formerly, proactive pacifism was applied to a principle of international cooperation that saw Japan work with other countries to actively contribute to international security and peace-keeping. However, in Abe era, proactive pacifism was used by Abe to pursue his goal of establishing Japan as normal power, one where military force was not categorically rejected (Sakaki, 2015). Following the principle of proactive pacifism, the exercise of collective self-defense was aimed to be further developed. Maslow (2015) argues that it strengthened the relationship between Japan and the US. Parallel to the collective self-defense, Abe has heavily invested in improving Japan-US relations in order to enhance the role in the US security alliance.

Some scholars have pointed out the impact of shifting Japan's security capacity under the Abe administration. Hughes (2015) argues that it appears to be a high-risk approach as Japan seeks autonomy from the US's security policy. Dobson (2017) also supports such argument by pointing that although Abe's approach is more coherent to global governance, it has resulted in Japan shifting away from traditional internationalism and increased tensions with the US. Furthermore, from economic perspective, the escalation of political tensions has impacted the economic relationship between the two states. Chiang (2019) argues that it has led to a decline in international investment and international trade globally. Although bilateral political relations have improved, it is uncertain if economic ties can be easily restored since there are still several unsettled territorial and historical conflicts.

4. Research Methodology

This article uses primarily qualitative research through documentary research. A variety of documents were used such as books, research reports, academic journal articles, evidences, empirical data, policy statements, and newspaper articles related to the security policies, especially in Abe era (2012-2020). Both of primary and secondary documents were used in this documentary study. The data was collected with criteria of authenticity and credibility. The collected data is analyzed by a descriptive analysis method in order to know the dynamic of two countries' relations, particularly in political aspects.

5. Results

Japan-China Political Relations Under the Abe Administration

In 2012, Abe won a landslide victory in the general elections and won an LDP presidency contest that led him to preside as the new Prime Minister of Japan, the same year Xi Jinping became President of China. The Abe administration from 2012 to 2020 marks a turning point for Japan and China relations, particularly on the security front. This paper considers three main issues under Abe administration that challenged the Japan-China political relations: territorial dispute, historical animosities and Japan's new security system.

1) *Territorial Dispute*

When Abe came to the power in 2012, Japan was confronting a dispute over the Senkaku (or Diaoyu) islands. Tension over the islands had existed between Japan and China for a period of time. The islands are located between Taiwan, Japan and mainland China, and have historically been uninhabited and ignored by both countries. The two countries claim sovereignty over the islands since both countries desire the fishing rights farther offshore and because it appeared that there might be undersea oil supplies near the islands. When Deng Xiaoping was in power, in an effort to develop a better relationship with Japan in 1978, the dispute over the ownership of the islands was put aside and not seen as a serious concern. It became, however, highly tense again when Hu Jintao presided as the President of China.Hu Jintao strongly insisted on safeguarding the territorial sovereignty over the islands (Vogel, 2019, p. 336).

In 2012, the Japanese government decided to purchase three of the Senkaku (Diaoyu) Islands. Koichi Gemba, the Foreign Minister of Japan at that time, argued that purchasing the islands was one of the best options to minimize the impact on bilateral relations (Koichiro, 2012). The Japanese nationalization of Senkaku islands sparked wide spread protests across China and resulted in an increase of Chinese government vessels intruding into Japanese waters. It led to the relations between two countries that become more tensed.

In political aspect, the territorial dispute raised Japan's concern about its insufficiency of security system. Japan was facing pressure from China's behavior as China expanded and intensified the activities in Japan's territorial water. Moreover, the growth of China's military power and the increase of its defense budget has vital importance for Japan. It emphasized the necessity for Japan to strengthen its own defense capacities and expand cooperation with other countries in order to tackle these security challenges (Maslow, 2015, p. 758). Therefore, the territorial dispute has driven Japan to embrace military power to further pursue its national strategy in reforming security system.

The issue led to a breakdown between the leaders of the two states. During 2012-2014, China repeatedly refused Japan's request to hold a meeting between the leaders of the two countries (Vogel, 2019, p. 396). The tension between two leaders only began to ease when Prime Minister Abe attended a summit of the Asia-Pacific Economic Cooperation (APEC), and met President Xi Jinping in Beijing in 2014.

2) Historical Animosities

It was not only the dispute over territorial sovereignty but also the Abe's visit to Yasukuni Shrine in 2013, a place that enshrined the souls of soldiers convicted as a class-A war criminal, which strained relations. Abe's motivation for visiting were previously for domestic reason. Abe's political base was largely right wing, and his maternal grandfather, Nobusuke Kishi, was also arrested as a suspected class-A war criminal after Japan was defeated in the World War II. This visit to Yasukuni shrine symbolically reflected his conservative and patriotic identification.

The historical issue has been considered as a barrier to develop constructive relationship between Japan and its neighbours, particularly China and South Korea.

The Chinese suffered significantly from Japan's aggressive militarist power during 1937 to 1945. This issue is still sensitive for their relationship. From China's perspective, a visit to Yasukuni Shine reflects a lack of remorse for what their troops cruelly made in the past, and still pay respect to those who attacked China at that time. Furthermore, it arouse China's fears and suspicious that the Japanese militarist harbor ambitious for a revival (Vogel, 2019, p. 407). Nevertheless, from Japanese perspective, visiting the Shrine is seen as a way to respect their ancestors who sacrificed their lives for the country.

The visit was met with a strong condemnation by the Chinese people who viewed the Shrine as a symbol of Japanese militarism during the World War II. Therefore, for the remainder of Abe's term in office, he would not visit Yasukuni Shrine again.

Furthermore, the Chinese are also concerned about historical knowledge, particularly about the Nanjing Massacre in 1937, might be softened or omitted from, in Japanese textbooks. To the Chinese, Nanjing Massacre epitomizes the cruelties of Japanese militarism. Japan's attempts to soften the horror of the Sino-Japanese wars in high school textbooks might result the next generation of Japanese students not learning about atrocities committed by the Japanese soldiers during the Nanjing Massacre. The textbook issue, therefore, has been still the discussable issue that obstruct Sino-Japanese relations recently.

3) Japan's New Security System

Since the Japan's defeat in World War II, China has been worried about the revival of Japanese militarism. The visit to Yasakuni Shrine was regarded as a sign that Japan was again returning to militarism. This concern grew when Abe took power in 2012. He showed a commitment to strengthen Japan's national defense. Since Japan was concerned about its insufficient security system, in the light of North Korea's growing missile program and the rise of China's economic and military power. More generally, Abe has initiated and pursued a series of security policy reforms that resulted in establishment of a National Security Council and the attempt to reinterpret and amend Article 9 of the Japanese constitution.

The establishment of a National Security Council modeled after the US National Security Council, was considered as the core of Abe's newly evolving security system. The institution was located within the Cabinet Secretariat and consisted of the Prime Minister, Minister of Foreign Affairs and Minister of Defense, as core members. It was tasked with formulating diplomatic and defense policies for Japan. The National Security Council was closely linked

with the US Security Council. Moreover, the institution showed signs that Abe was prioritizing the military over diplomacy (Maslow, 2015, p. 755).

To respond to the challenge of security risks, Abe proposed to reinterpret Article 9 of the Constitution that is directly relevant to security policy. It aimed at easing the restrictions on the use of the armed forces and military resources which MacArthur mentioned in the 1947 Constitution. The Prime Minister sought a way to expand the use of the military beyond individual self-defense. Amending Article 9 requires the two-third of the parliament and the referendum. Abe, however, was unable to achieve the required voted in parliament or even for referendum. Consequently, Abe continued to reinterpret Article 9 broadening the scope of military action within the framework of collective self-defense in cases of emergency. Through the referendum on this issue, most Japanese remained opposed to changing this article because they felt the tasks of military composed of territory defense, disaster mitigation and UN peacekeeping missions in cooperation with the US (Sakaki, 2015, p. 21). The proposal of the Japan Government to amend and interpret article 9 of the Constitution then has been rejected by the resistance of their citizens.

Ease of the Tensions

The conflicts between the two countries were situated only in the early stages of the Abe administration. The relations with China began to gradually improve when the diplomatic instruments were adopted in 2018. Prime Minister Abe attempted to reconcile with Chinese President Xi Jinping, which had been distant over the past years by holding an official meeting for the two states' leaders. Abe made a state visit to Beijing on October 2018, the first time in nearly seven years that Japanese prime minister had visited rather than attending the multilateral conferences. The two leaders engaged in amicable discussion on many issues including maritime security, economic cooperation, regional and international affairs and China's Belt and Road Initiative. Although discussions took place was in the midst of the growing competition between the US, the existing power, and a rising China, Japan agreed to increase cooperation with China, to contribute to peace and prosperity of the Asia-Pacific region, while maintaining its alliance with the United States on the basis of diplomacy and security (MOFA, 2018b). Moreover, President Xi Jinping scheduled to make a state visit to Japan in 2020.The visit between the two political leaders is considered as a turning point that increased trust and empathy between them.

6. Discussion and Conclusion

The Relations in Post-Abe Era

The relationship between Japan and China can be explained as love-hate Relationship. On the one hand, they have close economic ties in the form of bilateral trade, investment and foreign aids. On the other hand, both anti-Japanese sentiment in China and the anti-Chinese sentiment in Japan continue. It can be said that the "hate" part was shaped by their historical conflict, particularly prior and during the World War II. Moreover, in recent decades, the territorial issue has also led to dispute. Tensions increased when Abe came to his second-term power in 2012 and launched a new security system, which led to a series of attempted security

reforms. Relations between Japan and China suffered because of Chinese fears that Japan could return to militarism and use its armed forces to project power in the region.

Nevertheless, the phrase "cold politics and hot economics" was customary to use to explain the relationship between Japan and China. Although the political relationship has progressed slowly, the business relationship has been extensive. Japan conducted the principle called '*seikeibunri*' (separation of politics and economy) since the end of the World War II. During that time, Japan's diplomatic policy typically depended on its strategic alliance with the United States, an alliance that limited its relations with China. Through the *seikeibunri* policy, however, Japan was able to continue building a relationship with China on business matters in order to deepen its national interests.

Under the Abe administration, economic relations continued to grow. Although worries about the rapid growth of China's economy in the recent decade exist, accessing to Chinese market, as the world's most populous country, has been advantageous for boosting Japan's economy. Trade relations have increased since China joined the WTO in 2001, but declined slightly after 2010. However, it revitalized after 2014. Moreover, in another aspect, the social and cultural cooperation between two countries remains largely positive.

Recently, the rise of China's power is one of the main factors that have shaped Japan's strategy toward China. Therefore, in post-Abe era, Japan will litely continue its security and foreign policy. Furthermore, Japan will seek security cooperation with other countries rather than the US, such as India, Australia and New Zealand, will be increased in order to restrain China's dominance. ASEAN will also be one of Japan's destinations to strengthen the relations balancing the powers with China.

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MONTAG'S TRANSFORMATION IN THE DYSTOPIAN WORLD OF RAY BRADBURY'S FAHRENHEIT 451

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Abstract: This academic paper aims to explore Fahrenheit 451's protagonist, Guy Montag's transformation throughout the story to investigate how he has changed in the dystopian society where freedom is limited and information is distorted and if he succeeds in his transformation. The textual analysis is mainly employed in this article. His transformation is divided into four categories: transforming from indifferent to inquisitive; ignorant citizen to knowledgeable man; conforming to the society to rebelling against the society; and belonging to the society to the alienated person. Each state of transformation demonstrates his self-development. It enlightens him and gains him new knowledge that the state he lives in is full of false information and also discovers that he is not truly happy because he does not realize that he is forced to live the restricted life which he does not have any aims and does not genuinely have feelings for anything around him.After being through those transformations, he is, finally, successfulin seeing the world in the completely different perspectives and can start his new life outside the dystopian state.

Keywords: Montag's transformation, dystopia, Fahrenheit 451, Ray Bradbury

1. Introduction

Dystopia is "an apocalyptic version of future world with man taken over by the machine and technology playing havoc with human life. Information science, atomic energy, global surveillance, rapid mechanization and weapons of mass destruction for global warfare called for science fiction" (Anwar,2016, p. 247). Anwar (2016, p. 247) also remarks that "the tone of dystopia is of despair and the feel it gives is that of fear. The dystopian literary works in the 20th and 21st century arose from the "doubts and concerns that the modern civilization experienced after the horrors of the World Wars and the destructive side of technological advancement" (Anwar, 2016, p.249). Fahrenheit 451 by Ray Bradbury depicts the life of people being "dark, scary and cold". Their lives are separated from what is going on in the real world. They do not know that there is the war exists outside their world (Anwar, 2016, p.248).

Living in the dystopian world is very hard to change the way of life and thoughts because most of the citizens are ignorant. They do not really know what is exactly right or wrong. Most of them do not have any clues that the government restrains their freedom. Like most people in this story, they think they have the happy life from the illusion world that the state creates. The state establishes the illusion of the perfect world by distracting their citizens from the world outside. It brainwashes people to know only what it wants them to perceive. The states lure people into the world of entertainment by making them to watch "parlor walls" (television) and listening to the "seashell" (the device to listen to the entertainment that the state wants to broadcast). However, the protagonist, Montag, comes to realize that his perception about the world he lives in is not the world he wants to be. He, thus, starts to find out what goes wrong with his society. According to Ikhsanti (2015, p.20), the government in this story oppresses its citizens in five ways: "exploitation, marginalization, powerlessness, cultural imperialism, and violence". From this point, he gradually changes himself in several means. Furthermore, the state also uses the subtle way to control its people. The fireman is presented as "a police state" whose duty is to destroy books by burning. In addition, the state uses the machine which is called the Mechanical Hound to monitor if anyone violates the state's rules by possessing books. It is the representative of the advanced technology (Ersöz, 2015, p108). The opposite kind of thoughts which is called binarism also appears in Fahrenheit 451. Captain Beatty is loyal to the state whereas Montag tries to rebel against the state (Abass and Sc, 2019, p.1149).

The protagonist, Montag, has had self-development throughout the story. Self-development in the dystopian world is considered rebellious since the state loves its people to be under its control. To be under the state's control, one does not need self-development. The state does not want its people to develop or change at all since the development would lead them to have new perspectives in life which may lead them to disagree with the state's schemes and will greatly stir the state's stability. Yet, Montag does not let himself be under the state's authority for his entire life. He dares to choose his own way of life. He does not care whether he will be punished as long as he can regain his freedom and make his own decision in life. His action is related to the theory called Existentialism. This philosophical thinking focuses on the essence of human's existence. Its main idea is that humans are totally free to make their own decisions. At the same time, they are entirely responsible for the outcome of their decisions. It is the individual's right to choose his/her characteristics and identities (Crowell,2020).The state's controlling cannot lead anyone to have their identity or existence. On the contrary, the state intends to erase people's existence.

The social construction also creates self-estrangement for humans since they need to conform to the social rules. They do not do things according to their own choices. Yet, the social rules lead ones to feel alienated both to the society and one's self. People feel estranged to the society because they are just following the rules because it is their duties. They do not do it because they want to. They feel like they are parts of others not being the complete 'self'. At the same time, they would be upset because they do not have their own choices. As a result, their true self is not found.

In Fahrenheit 451, after having been the obedient citizens for many years as the loyal fireman, Montag's awakening makes him realize that the state deprives him of his freedom in many aspects such as freedom to feel, think and act. He, therefore, yearns for freedom to choose his

own life. As a result, various types of his transformation are seen for the entire story.This academic article, therefore, investigates how he transforms throughout the story and whether his transformation succeeds and he can find the freedom at the end of the story by using textual analysis as the main method to examine the protagonist's process of transformation. The central character's actions, behavior, speech, and thoughts will be scrutinized along with the related contexts. Furthermore, the concept of Existentialism is also concerned as how the major character can discover his self through the transformation he makes.

2. Results and Discussion

Transformation of Montag can be categorized into four types: from indifferent to inquisitive person, ignorant citizen to the knowledgeable man, conforming to the society to rebelling against the society, from belonging to the society to the alienated person. His transformation arises from the desire to have freedom in different ways as the mean to escape from the state's oppression.

2.1 From Indifferent to Inquisitive Person

Montag starts to realize that people should have freedom to feel and think which opposes the state's intention. The influence of Montag's transformation from indifferent to inquisitive person respectively lies on the two characters, Clarisse and the old woman. At the beginning of the story, Montag is indifferent. He is not interested in anything surrounded him nor curious about anything at all. He does his job and lives his life the way he has done for a long time without trying to ask himself any questions. He is just like other citizens in the state who live their lives superficially and think they are happy. He becomes inquisitive because of Clarisse. The appearance of Clarisse as his new neighbor causes the great changes in his life. The arrival of Clarisse totally opens the new perspectives in life for Montag. She makes him begin to inquire about things around him and his true happiness. Clarisse is inquisitive of everything around her. She observes nature and appreciates its beauty: "I rarely watch the 'parlor walls' or go to races or Fun Parks. So, I've lots of time for crazy thoughts, I guess. Have you seen the two-hundred-foot-long billboards were only twenty feet long? But cars started rushing by so quickly they had to stretch the advertising out so it would last" (Bradbury,1995, p.7), whereas Montag has never observed it before. She asks him several questions that he cannot really find the answers and those questions also disturb him and make him think more carefully. For example, she asks him these questions: "Do you ever read any of the books you burn? Is it true that long-ago firemen put fires out instead of going to start them; Are you happy?" (Bradbury,1995, pp.5-7). Especially, the last question: "Are you happy?" stirs Montag's thought although he answers her that he is happy. But when he enters the house, he contemplates Clarisse's question if he is truly happy. He has a chance to observe things around his house. He has a chance to listen to himself ("that other self or "subconscious") that is free to think of anything (Bradbury,1995, p.8). When he enters his house, he suddenly becomes aware of the things he hides in the ventilator grill: "Of course I'm happy. What does she think? I'm not? he asked the quiet rooms. He stood looking up at the ventilator grill in the hall and suddenly remembered that something lay hidden behind the grill, something that seemed to peer down at him now. He moved his eyes quickly away" (Bradbury,1995, p.8). The things that are hidden in the ventilator grill are books which mean he is curious about books before

he meets Clarisse. The action of him of glancing at the grill and suddenly look away signifies that he is afraid to examine them since it is against the law of the state.

Meeting Clarisse is like starting to see the whole new world for Montag. He begins to ponder his surrounding and his way of life. It arouses his curiosity about the things that he has been wondering for a while. Clarisse is not brainwashed like other people at her same age. She is not distracted by the entertainment the state offers to its citizens such as parlor walls or Fun Parks. Those entertainments distract people's attention from reality that the government tries to hide. The state makes people live the happiness life so that they will not question whether the state restricts them from their freedom. The fun time will make people forget and not bother about finding any truth in their society. They are too busy having fun activities to realize that the happiness is just the illusion.

Clarisse gains a lot of knowledge that is hidden by the government from her uncle. Notably, what she tells Montag is about what happened in the past and it is disappeared at the present time. Actually, he does not know before that those things used to exist in the society. For example, she informs him about the porches that each house used to have:

> Across the street and down the way the other houses stood with their flat fronts. What was it Clarisse had said one afternoon? "No front porches. My uncle says there used to be front porches. And people sat there sometimes at night, talking when they wanted to talk, rocking, and rocking, and not talking when they didn't want to talk. Sometimes they just sat there and thought about things, turned things over. My uncle says the architects got rid of the front porches because they didn't look well. But my uncle says that was merely rationalizing it; the real reason, hidden underneath, might be they didn't want people sitting like that, doing nothing, rocking, talking; that was the wrong kind of social life. People talked too much. And they had time to think. So they ran off with the porches. And they had gardens, too. Not many gardens anymore to sit around in. And look at the furniture. No rocking charis anymore. They're too comfortable. Get people up and running around. My uncle say…and…my uncle …and…my uncle…" Her voice faded.

(Bradbury,1995, p.60)

From this paragraph, Montag learns that the government does not have good intention in eliminating the porches from every house. It is for the sake of the state's stability not for the good of its civilians. Here, people's limited freedom is reinforced since having conversations with one another may allow them plenty of time to think of what is happening in the society and that may cause harm to the state's security. Particularly, people are not allowed to have the normal social life where people gather together and talk and express their opinions since showing one's thoughts is something the state is afraid of. The government does not like their people to think of anything. It just wants people to live the life the way it wants the civilians to be. The social life people in this state have is the time they spend with the parlor walls. Parlor

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walls or televisions are the main way of people to spend their leisure time with. Actually, Montag wants to interact with other people but he does not have the opportunity to do that. When he sees that Clarisse's, family is talking to one another, he is very curious to know what they are talking about.

Montag absorbs new knowledge that bothers him later on. He begins to know that the government does not really have the good intention toward its citizens. He learns that some information is distorted by the state and it invents the story the way it wants the society to be. Clarisse also gives him some knowledge that makes him skeptical about the society he lives in. His communication with Clarisse enlightens him to explore his true feeling, his relationship with his wife, and the history of firemen's duty. She tries to raise the prohibited issues such as reading books in the conversation with Montag: "Do you ever read any of the books you burn?" (Bradbury,1995, p.1). Meeting Clarisse is like seeing another world, the world that he has not realized that it would exist in the society. This new strange world that Clarisse opens up to him is totally contrasted from his wife's Mildred's world. Her world is empty. She is the very good example of the loyal citizens who has never cared to question anything. She spends her daily life listening to the seashell and watching parlor walls. This is clearly seen when Montag's feelings are suddenly changed when he enters his house and his bedroom after having conversations with Clarisse. She is like his reflection. She makes him become conscious and starts to scrutinize his inner self. After he arrives home, he tells himself that he is not happy.

> He felt his smile slide away, melt, fold over and down on itself like
> a tallow skin, like the stuff of a fantastic candle burning too long
> and now collapsing and now blown out. Darkness. He was not
> He was not happy. He was not happy. He said the words to himself.
> He recognized this as the true state of affairs. He wore his happiness
> like a mask and the girl had run off across the lawn with the mask
> and there was no way of going to knock on her door and ask for it
> back.
>
> (Bradbury,1995, p.9)

Montag's house emphasizes the emptiness he and his wife feel but his wife does not realize it. On the contrary, he suddenly has the epiphany that he is not truly content: his house that is full of parlor walls and his wife who has never cared for anything or anyone except for the seashell and the parlor walls are also empty. When he finds that everything in his house is empty and he is not sure if his relationship with his wife called love, he becomes aware that something is missing in his life.

> Furthermore, Clarisse sees the good side in him. She does not think he is similar to
> others. On the contrary, he has a good heart and kind.
> How did it start? How did you get into it? How did you pick your
> work and how did you happen to think to take the job you have?
> You're not like the others. I've seen a few; I know. When I talk,
> you look at me. When I said something about the moon, you looked
> at the moon, last night. The others would never do that. The others

would walk off and leave me talking. Or threaten me. No one has
time any more for anyone else. You're one of the few who put up
with me. That's why I think it's so strange you're a fireman, it just
doesn't seem right for you, somehow.

(Bradbury, 1995, p.21)

According to Clarisse, he has the potential to learn new things. She makes him gain his self-worth, and self-awareness. She makes him seek for his true self. Talking with her awakens him in several aspects of life. He sees life in different angles: he explores his genuine feelings; he seems to identify what is happiness and unhappiness, observe things around him, see things differently that he has never observed before. He notices that Clarisse's house has the lights on and the family members are having conversations. He is curious to know what they are talking about and wants to listen to them. Unlike others in this state, he yearns for communicating with others. Talking to each other makes Montag feel that they are interested in one another.

Clarisse raises his self-awareness. The question that Clarisse asks him if he is truly happy keeps recurring in his mind. At first, he answers her immediately that he is happy but later on he is not sure about his previous response. She makes him really examine his own feelings until he finds out that he is not happy at all. He is surrounded by superficial people and things. He becomes aware that he is empty and the society is full of emptiness. She also arouses the sensitivity inside him. He starts to explore people and things around him. He observes his wife closely and tries to pay more attention to their relationship. He asks her where they first met but she does not remember and thinks it is such a ridiculous question to ask. He also realizes that his wife is not content either but she does not seem to know it. She takes so many sleeping pills that Montag has to call in the Emergency to rescue her from being unconscious:

…I want to talk to you. He paused. You took all the pills in your bottle
last night.
 "Oh, I wouldn't do that," she said, surprised.
 "The bottle was empty."
 "I wouldn't do a thing like that. Why would I do a think like that?"
she said.
"Maybe you took two pills and forgot and took two more, and forgot
again and took two more, and were so dopey you kept right on until
you had thirty or forty of them in you."
"Heck," she said, "what would I want to go and do a silly thing like
that for?"
"I don't know," he said.
She was quite obviously waiting for him to go. "I didn't do that,"
she said. "Never in a billion years."

(Bradbury, 1995, p.17)

Montag cannot help comparing Clarisse with his wife, Mildred since they totally have different characteristics and perspectives. Clarisse wakens the "other side of him", the side that is waiting to change to the better life and to liberate himself from the state's restraints. On the contrary, his wife lives in the state of blurry. She does not seem to have the complete conscience. For example, she does not know what happens to the night she takes a lot of sleeping pills and that Montag has to call for the emergency. She tells him she cannot remember anything and that she insists she would never do something stupid like that. Her action reinforces her emptiness. She is superficially happy because of the entertainment the state offers to her. Deep down in her mind, she does not truly know what she wants in her life. As a result, this situation stirs him even more that the true happiness is not like this. There must be some ways else to find the genuine delight.

Apart from Clarisse's influence, the bravery of the old woman who insists on dying with her book's upsets Montag so much that he needs to find the answer of what is inside the books that make the old woman not afraid of being burnt. Seeing that old woman burning alive troubles him since then. He also feels ashamed of himself for not brave enough to stand up for anything in his life. Unlike Montag, the old woman is not afraid of death. She dares to express her genuine feeling: her loves toward her books; her determination to die with her books. Furthermore, her love for books arouses his curiosity about the importance of them:

> It's not just the woman that died. Last night I thought about
> all that kerosene I've used in the past ten years. And I thought about
> books. And for the first time I realized that a man was behind each
> one of the books. A man had to think them up. A man had to take a
> long time to put them down on paper. And I'd never even thought that
> thought before. He got out of bed.
>
> It took some man a lifetime maybe to put some of his thoughts
> down, looking around at the world and life and then I come along in
> two minutes and boom! it's all over.
>
> (Bradbury,1995, p.49)

Here, the audience can see that Montag has learned the big lesson in his life after he sees the woman burns herself at her house. His attitude toward burning is suddenly changed. At the beginning, he is completely content with burning books which is described earlier in this article but then he feels guilty for burning those books. He starts to be aware of the importance of the books: it must take the writers so long to write them. The situation of the woman burning herself keeps haunting him: "No, not water; fire. You ever seen a burned house? It smolders for days. Well, this fire'll last me the rest of my life. God! I've been trying to put it out, in my mind, all night. I'm crazy with trying" (Bradbury, 1995, p.48).

Since Montag's thoughts are gradually developed, he does not want to burn books anymore but he still has to do his duty. He, however, attempts to comfort himself that what he burns is not human beings but things. In fact, he does not perceive the books only as "the things" anymore. Books start to have more meaning to him. Actually, he does not want to burn the books in the

old woman's house since the beginning. He feels awkward. He, thus, tries to console himself to think that he does not harm anyone. He just cleans up everything.

> Next thing they were up in musty blackness swinging silver hatchets at doors that were, after all, unlocked, tumbling through like boys all rollick and shout. "Hey!" A fountain of books sprang down upon Montage as he climbed shuddering up the sheer stairwell. How inconvenient! Always before it had been like snuffing a candle. The police went first and adhestive-taped the victim's mouth and bandaged him off into their glittering beetle cars, so when you arrived you found an empty house. You weren't hurting anyone, you were hurting only things! And since things really couldn't be hurt, since things felt nothing, and things don't scream or whimper, as this woman might begin to scream and cry out, there was nothing to tease your conscience later. You were simply cleaning up. Janitorial work, essentially. Everything to its proper place. Quick with the keroscene! Who's got a match!

> (Bradbury,1995, p.35)

Notably, Clarisse and the old woman appear in the story for only the short period of time but have the great impact on Montag.They are both horribly eliminated from the society: Clarisse disappears without the real reason; the old woman burns herself with her book collection. Yet, it leaves a lot of questions to Montag which leads him to discover more about his curiosity that risen upon those two characters.

2.2 From Ignorant Citizen to the Knowledgeable Man

Montag becomes aware that he has the right to know all the knowledge in the books and other information that the state hides from the society. He gradually changes from being an ignorant person to the knowledgeable man. Besides Clarisse and the old woman that stir his curiosity about books and the world, Faber and the groups of the intellects in the forest fulfil him with the knowledge he has never heard before. He sees the government and society in very different ways than before. Earlier in the story, he does not question anything in his life. He strictly lives under the state's rules. He has done his job happily. He does not see his duties of burning books as guilt but all he can perceive from burning books is pleasure: "It was a pleasure to burn" (Bradbury, 1995, p.1). As seen from Montag's case, knowledge is very dangerous to the state's stability. Knowledge causes people to critically think and when they think of something carefully, it might rise with questions and then they would be curious to find the right answer for their inquisition. At first, the government attempts to make its citizens think that there is no better place in this world than the society they inhabit. The state has the total right to control the information it wants its people to know. Civilians, therefore, perceive very limited information and knowledge since they are only allowed to know what the state wants them to. Most importantly, they are prohibited to read books. As a result, Montag is a loyal fireman who is eager to do his duty without asking whether it is right or wrong. He also perceives what the state wants them to know: he has never realized before that the fireman duty is reversed from

the past: the firemen used to prevent fire instead of putting out fire in the past. He does not seem to care anything surrounding him.

He learns to notice his wife's behaviour and realizes that she is not truly happy either. He finds that both of them are empty. Their lives are meaningless. They do not have purpose in life. What is different between Montag and Millie is that Montag does not succumb to be the ignorant person whereas Millie does not care about anything at all. Montag seems to have hope while Millie is hopeless. He attempts to find where the happiness is gone. On the contrary, his wife never cares to figure it out. He tells Faber that he knows that his life is missing something but he does not exactly know what it is. But he assumes that books might be the answer: "I don't know. We have everything we need to be happy, but we aren't happy. Something's missing. I looked around. The only thing I positively knew was gone was the books I'd burned in ten or twelve years. So, I thought books might help" (Bradbury,1995, p.44).

The important person who enlightens his knowledge about the books and world is Faber. He is the one who reveals the secrets in the books. Captain Beatty is the representative of the government who conveys the messages to its civilians. He gives the reasons why books should be burnt whereas Faber reveals the treasures found in them. Captain Beatty distorts the truth while Faber uncovers it. Faber gives lecture about books to Montag about how important the books are:

> ...It's not book you need, it's some of the things that once were in books.
> > The same things could be in the 'parlor families' today. The same infinite detail and awareness could be projected through the radios and televisors, but are not. No, no, it's not books at all you're looking for! Take it where you can find it, in old phonograph records, old motion pictures, and in old friends; look for it in nature and look for it in yourself. Books were only one type of receptacle where we stored a lot of things we were afraid we might forget. There is nothing magical in them, at all. The magic is only in what books say, how they stitched the patches of the universe together into one garment for us. Of course you couldn't know this, of course you still can't understand what I mean when I say all this. You are intuitively right, that's what counts.
> > > > > (Bradbury,1995, pp78.-81)

The conversations Montag has with Faber through the green bullet Faber invents make Faber be able to educate Montag all night long. It is, thus, makes Montag understands about books and life even more. He is a lot more confident than before because he gains a lot of knowledge from Faber : "...His mind would well over at last and he would not be Montag anymore, this the old man told him, assured him, promised him. He would be Montag-plus-Faber, fire plus water, and then, one day, after everything had mixed and simmered and worked away in silence, there would be neither fire nor water, but wine" (Bradbury, 1995, p.99).

2.3 From Conforming to the Society to Rebelling against the Society

When Montag realizes that conforming to the society does not make him truly happy, he decides to act against the state to find the meaning and goal in his life- to escape from the emptiness and to achieve his meaningful life. At the beginning, Montag is the loyal citizen of the state like most people. He loves his job as the fireman. He enjoys burning books without any questions. He does not even know what books are about. He just does his duty. He is brainwashed to think that books are dangerous and he does not want to prove whether what the state tells him is true. He believes in everything the state addresses to their citizens. For him, what the state tells him is wrong is wrong for him. As seen in the opening scene, the story is described how happy he is while he is burning books.

> It was a pleasure to burn.
> It was a special pleasure to see things eaten, to see things blackened and changed. With the brass nozzle in his fists, with this great python spittingits venomous kerosene upon the world, the blood pounded in his head, and his hands were the hands of some amazing conductor playing allthe symphonies of blazing and burning to bring down tatters and charcoal ruins of history. With his symbolic helmet numbered 451 on his stolid head, and his eyes all orange flame with the thought of what came next, he flicked the igniter and the house jumped up in gorging fire that burned the evening sky red and yellow and black. He strode in a swarm of fireflies. He wanted above all, like old joke, to shove a marshmallow on a stick in the furnace, while the flapping pigeon-winged books died on the porch and lawn of the house. While the books went up in sparkling whirls and blew away on a wind turned dark with burning.
>
> Montag grinned the fierce grin of all men singed and drives back by flam...
> He knew that when he returned to the firehouse, he might wink at himself, a minstrel man, burnt-corked in the mirror. Later, going to sleep, he would feel the fiery smile still gripped by his face muscles, in the dark. It never went away, that smile, it never ever went away, as long as he remembered.

> (Bradbury, 1995,pp.1-2)

The narrative above demonstrates that firemen have power to eliminate books and it is such an honorable job that does the great favor to the state. He is proud of burning those books without knowing how precious all the knowledge in the books are. His greatness as the firemen is described when he is burning all the books. The narrator describes his burning by referring his burning action to the "great python" which means that it is very mighty. Actually, "great python" has the negative meaning since it spits the venom which is very threatening to people just like the brass nozzle that destroys all the books with fire. He does not realize that the fireman's duty is totally distorted from the past: extinguishing the fire.

He starts to rebel against the society when he realizes that there is another side of his life and another side of the world- his self that he has never discovered and the world that is more interesting than his present world. He transforms from the loyal citizen to the rebellious one in two different ways: physically and psychologically transformation. Montag is very loyal to the state. He is very contented with his job as a fireman. He is happy to burn books. He does not question about his job or any other things the government has done to their citizens. He, however, transforms from the loyal civilian to the rebellious one when he gains some knowledge about the importance of the books. He begins his first rebellious action by not wanting to go to work and pretending to be sick. His first rebellious is, however, not successful since Captain Beatty visits him when he is absent from work. He knows that something wrong with Montag and it must be about books. So Captain Beatty's true intention for visiting Montag is to give him the correct thoughts about books so that Montag will not act against the law. Captain Beatty attempts to tell him that people's ultimate desire is happiness so the state gives them happiness and that is all they want:

> You must understand that our civilization is so vast that we can't have our minorities upset and stirred. Ask yourself, What do we want in this country, above all? People want to be happy, isn't that right? Haven't you heard it all your life? I want to be happy, people say. Well, aren't they? Don't we keep them moving, don't we give them fun? That's all we live for, isn't it. For pleasure, for titillation? And you must admit our culture provides plenty of these."
>
> (Bradbury, 1995m p.56)

It demonstrates that how much the state wants its people to be superficial so that they will not spend their time thinking about something more complicated. When people are happy, they will not want to seek for something new because they do not know whether those new things will give them happiness or sadness. People who are accustomed with happiness will not dare to rebel against anything because the rebels have to struggle and fight for what they want which will give them the hard time and they will never be sure whether rebellion will gain the victory or not. Unlike those citizens, Montag's fear of violating the laws and the state's punishment gradually subsides. No matter how hard Captain Beatty tries to convince him to return to obey the state's laws, Montag's mind has changed and it will never go back to where it was before. After that he also enlightens that the government restricts its citizens' freedom and knowledge. Since then he dares to rebel against the state's rules. He reads the books he hides in his house although he does not truly understand the content inside. He finds a person who knows the books well and can teach him what is inside it. After beginning to rebel against the state, he transforms from a passive to a brave man. He dares to read the poem, "Dover Beach" aloud to Mille's friends until they cry:

> Mrs. Phelps was crying.
> The others in the middle of the desert watched her crying grow very loud as her face squeezed itself out of shape. They sat, not touching her, bewildered with her display. She sobbed uncontrollably. Montag himself was stunned and shaken.

"Sh, sh," said Mildred. "You're all right, Clara, now, Clara, snap out of it! Clara, what's wrong?"

"I—I," sobbed Mrs. Phelps, "don't know, don't know, I just don't know, oh, oh…"

Mrs. Bowles stood up and glared at Montag. "You see? I knew it, that's what I wanted to proved! I knew it wouldn't happen! I've always said, poetry and tears, poetry and suicide and crying and awful feelings, poetry and sickness; all that mush! Now I've had it proved to me. You're nasty, Mr. Montag, you're nasty!"

Faber said, "Now…"

Montag felt himself turn and walk to the wall slot and drop the book in through the brass notch to the waiting flames.

"Silly words, silly words, silly awful hurting words," said Mrs. Bowles. "Why do people want to hurt people? Not enough hurt in the world, you got to tease people with stuff like that!"

"Clara, now, Clara," begged Mildred, pulling her arm. "Come on, let's be cheery, you turn the 'family' on, now. Go ahead. Let's laugh and be happy, now, stop crying, we'll have a party!"

"No," said Mrs. Bowles. "I'm trotting right straight home. You want to visit my house and my 'family', well and good. But I won't come in this fireman's crazy house again in my lifetime!"

"Go home." Montag fixed his eyes upon her, quietly. "Go home and think of your first husband divorced and your second husband killed in a jet and your third husband blowing his brains out, go home and think of the dozen abortions you've had, go home and think of that and your damn Caesarean Sections, too, and your children who hate your guts! Go home and think how it all happened and what did you ever do to stop it? Go home, go gome!" he yelled. "Before I knock you down and kick you out the door!".

(Bradbury, 1995, pp.97-98)

It is seen that this poem is full of emotions and when those women who live their superficial lives and hardly care for anything around them listen to it, they are disturbed by those distress described in the poem. It seems like they cannot bear any kinds of sorrow at all. They, therefore, weep out of the uneasiness for hearing it. Montag dares to speak about the book to other people. He himself is not emotionless anymore. He feels angry at those women for not caring about their family. Ironically, Mrs. Bowles wonders why people have to hurt people whereas she has never encountered the true pain for her entire life because she lacks the emotions. In fact, poetry is a form of art which its values lie on the aesthetics. Poetry shows humans' life and feelings so that people will learn to understand one another. On the contrary, Mrs. Bowles does not have

any clues how beautiful the poetry is. Montag is audacious to indicate his thoughts which are entirely dissimilar to others.

Furthermore, he does not want to do his job anymore: "I can't do it, he thought. How can I go at this new assignment, how can I go on burning things? I can't go in this place" (Bradbury) He is brave to burn Captain Beatty. He is brave to have a plan to escape. Aside from the above, the group of the intellects in the forest encourages him to rebel against the society. Actually, it is not only Faber who enlightens Montag but Montag also makes him become alive again. Before this, Faber feels guilty for not doing anything against the state but now he is proud of himself that he will be a part of Montag's plan to strike against the government:

> I feel alive for the first time in years. I feel I'm doing what I should've donea lifetime ago. For a little while I'm not afraid. Maybe it's because I'm doing the right thing at last. Maybe it's because I've done a rash thing and don't want   to look the coward to you. I suppose I'll have to do even more violent things,exposing myself so I won't fall down on the job and turn scared again...

> (Bradbury,1995,p.125)

From the above, Montag can be called a hero in the sense that he motivated Faber who is coward since he hides himself only in his house to fight for knowledge and freedom.

2.4 From Belonging to the Society to the Alienated Personto the Society

Montag chooses not to follow the social rules anymore. He makes a decision to be the alienated person in the society in order to find the meaning in life with his new journey. He also accepts the consequences that will happen. He, thus, gradually dares to   Montag has been a part of the society for all of his life but it does not make him content to belong to the society. Having the sense of belonging and accepted in the society does not always make people satisfy with one's life. Here, Montag conforms to the state's rules and are loyal to his job but he is still empty. Belonging to the community does not make his life better. There is still something missing and that missing piece is the thirst for knowledge. When he has knowledge, he begins to be aware that the state does not treat its civilians well. Their freedoms and their rights are restricted. Yet, most people do not notice the disadvantage and oppression they get from the government. The feeling of emptiness and missing something in life lead Montag to become alienated. He discovers that the state distorts the truth in the past and prevents its citizens from human nature: people are indifferent. They hardly have emotions about things surrounding them. Montag does not succumb to this limitation. He is angry with the state and wants to strike against it. He chooses to leave the state and escape to the forest where there are a group of the intellects who also flee from the state. Surprisingly, Montag is not the only alienated person in this society. There are some people who feel estranged and flee the state before him.
These alienated people contravene the government's rules by saving knowledge and history from being destroyed. Each of the intellect memorizes one of the important books so that the

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knowledge will remain despite the books being burnt. Entering this group, Montag is also responsible for memorizing the knowledge from the Book of Ecclesiastes:

> …You want to join us, Montag?
> "Yes,"
> "What have you to offer?"
> "Nothing. I thought I had part of the Book of Ecclesiastes and maybe a little of Revelation, but I haven't even that now."
> "The Book of Ecclesiastes would be fine. Where was it?"
> "Here". Montag touched his head.
> "Ah." Granger smiled and nodded.
> "What's wrong? Isn't that all right?" said Montag.
> "Better than all right: perfect!" Granger turned to the Reverend.
> "Do we have a Book of Ecclesiastes?"
> "One. A man named Harris in Youngtown."
> "Montag," Granger took Montag's shoulder firmly. "Walk carefully. Guard your health. If anything should happen to Harris, you are the Book of Ecclesiastes. See how important you've become in the last minute! …
>
> (Bradbury, 1995, pp.143-144)

Here, Montag is visible. He becomes somebody who is important and is accepted in the group. Although he is alienated from his former society, he is accepted and belongs to the new group which is much more suitable for him. This highlights that his new society is the place where people who have knowledge will be welcomed and admired. On the other hand, people who lack knowledge would not be recognized. These kinds of people are the dangerous ones for the society.

Becoming alienated is like having a new life because he finally survives from the Mechanical Hound that attempts to arrest and kill him. Moreover, he is like the new person in the new place. This can be seen when he wades across the river. He takes off his clothes and change to Faber's. The new place, the forest, he escapes to is also the new and strange place for him. The place he has never know it exists: "He was moving from unreality that was frightening into a reality that was unreal because it was new"[5]. He perceives the new definition of fire. Fire he sees in the forest is not as scary as the one where he used to live. Here, fire is the positive meaning. It gives warm to people instead of destroying things. The intellects who are considered the alienated have hope. They wish one day, they will be able to spread their knowledge to the others.

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3. Conclusion

The protagonist, Montag, does not satisfy with his life because he feels empty and wants to find what is missing. While other citizens seem to be content with the way government treats them, Montag discovers that there is something wrong about the state. It oppresses its civilians in many ways. As a result, he has developed throughout the story. This story, hence, examines how he transforms himself and if he succeeds in transforming. His transformation can be categorized into four types: from indifferent to inquisitive, ignorant citizen to knowledgeable man, conforming to the society to rebelling against the society and belonging to the society to the alienated person**.** As seen from the investigation, knowledge is the main key to make people believe or disagree with the authority. If the citizens do not have any knowledge or have the false information from the state, they will obey the states' rules. But once they receive knowledge and become aware that the state brainwash them, those people will mostly rebel against their government.

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VILLAGE TEMPLE OR NETWORK HUB? - THE CASE OF WAT PHOTHIKARAM

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Abstract: This paper examines the attempts of a village monk to mobilize global resources in the service of grassroots community development. Phrakhru Phothiwirakhun of Roi Et province has spent the past two decades working to equip his temple with various facilities aimed both at giving villagers access to services and resources and at ensuring the continued centrality of the temple in village life. These facilities include an ICT/Digital and vocational-training center, an OTOP production center, a financial institution, and a co-op convenience store among others. I argue that it is also an attempt to reimagine institutions typically associated with supermodernity and non-place and reorient them so that they function as entities of the community – to re-embed them in place. He accomplishes this by implementing his projects in such a way that the temple acts as a "network hub," occupying a space of betweenness centrality in local-extralocal interaction.

Keywords: development, monks, glocalization, place, Thailand

1. Introduction

This paper is an ethnographic account of a temple-as-community-center created by Phrakhru Phothiwirakhun, a self-identified **"**development monk**"** and abbot of *Wat* Phothikaram in Roi Et, Thailand**.** It is an attempt to elucidate the current state of development monasticism and understand how networked localist ideology is manifested in village-level development practices**.**

The development monk (*phrasong nak phatthana* or *phra nak phatthana***)** movement arose in Thailand in the late 1960s and early 1970s, primarily in opposition the implementation of large-scale development strategies enacted by the government during this period**.**[2] These monks saw aspects these top-down, market-driven projects as ideologically opposed to Buddhist teachings **(**Nishikawa, 2001**)** and thus promoted what they considered to be more Buddhist forms of

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[2] Most notably, the First National Economic and Social Development Plan

development. The movement has since expanded to include a wide range of activities, ranging in scope from sustainable economics to villager health to environmental conservation. When I use the term here, I will be referring to Lapthananon's (2012a) definition as monks who "regularly engage in development activity with villagers or the community in a way that effects their living conditions or way of life" (p. 7, translation mine). Contemporary monastic development activism is characterized by what I have called "networked localism" – the mobilization of extralocal networks, actors, and resources in order to re-embed the processes and products of development in local relations, history, and identity.

Phrakhru Phothiwirakhun's activism is emblematic of this approach. He has spent the past two decades working to equip his temple with various facilities aimed both at giving villagers access to services and resources and at ensuring the continued centrality of the temple in village life. These include an ICT/Digital and vocational-training center, an OTOP production center, a financial institution, a co-op convenience store, a radio station, a cultural center, and a children's learning center, among others. All of these are aimed at making the knowledge, and technologies, conveniences available in the local community. However, Phrakhru Phothiwirakhun's community center is not merely about granting access. I argue that it is also attempting to reimagine institutions typically associated with what Augé would call supermodernity and *non-place* (1995) and reorient them so that they function as entities of the community - to re-embed them in *place*. He accomplishes this by implementing his projects in such a way that the temple acts as a "network hub," occupying a place of *betweenness centrality* in local-extralocal interaction.

2. Research Objectives

The purpose of this research was to understand the social mechanisms by which networked localism functions to simultaneously grant local access to extralocal resources and re-assert the relevance of the temple and its surrounding community in a global context.

3. Literature Review

Although monks have had an active role in community development in Thailand for many decades, there has been surprisingly little academic literature published that focuses specifically on the development monk movement. Instead, development monks are often either relegated to brief anecdotes in broader discussions of Thai Buddhism or community development in Thailand. Many other works (especially those published before the 1990s) discuss monastic involvement and Buddhism's role in social activism in Thailand while not explicitly using the term "development monk." Much of the earliest examples of this kind of research focused primarily on outlining the general ways in which Buddhist teachings can be applied to socioeconomic philosophy and policy (e.g., Piker, 1973; Sivaraksa, 1975; Keyes, 1983). Much of the work published in the late 1980s to early 1990s on Buddhist activism similarly focused on the sociopolitical application of Buddhist teachings, but was written by activist scholars (e.g., Sivaraksa, 1987; Phongphit, 1988; Sivaraksa & Ginsburg, 1992). Especially influential during this period was Prayudh Payutto, a monk and intellectual whose seminal works included *Looking to America to Solve Thailand's Problems* (1987) and *Buddhist*

Economics (*Sethasat Naeo Phut*; 2005[3]), in which he detailed the problems with a Western economic system being adopted and implemented in Thailand and advocated for a uniquely Thai system based on Buddhist principles. Pinit Lapthananon was one of the few scholars at the time who published ethnographic research looking at development monks as a movement and the projects they were implementing on the ground. His book, *Botbat Phrasong Nai Kanphatthana Chonabot* (The Role of Monks in Rural Development), an ethnographic account of development monks in northeast Thailand, helped set the stage for future scholarship on "development monks" in Thailand (1986).[4]

The late 1990s and early 2000s saw an uptake in the academic literature describing Thai development monks, mostly based on research conducted in the 1990s. Unlike the prescriptive treatises of the previous decade, this research was often more focused on how Buddhism was being applied by monks in actual development practice (e.g., Izumi, 2000; Nozaki, 2003; Sakurai, 2007; King, 2009). Much of the research during this period focused on monks engaged in environmental work (e.g., Lancaster, 1997; Darlington, 1998; Rungwichaton & Udomittipong, 2001) and their collaboration with NGOs and other activists (Akaishi, 2001; Delcore, 2003; Sakurai, 2008). Particularly influential in my research on networked localism was Parnwell's work on what he called "neolocalism" that was prominent among development monks, NGOs, and other activists in Thailand (2007). He described this as an attempt to relocalize development, "clawing back" local control over the development process (Parnwell, 2005, Parnwell & Seeger, 2008).

There has been exceedingly little research on monastic development activism conducted after the 1990s. One exception is Lapthananon's *Development Monks in Northeast Thailand* (2012b), which includes research he conducted in 2003-2004, and describes the beginning of the trends in monastic development practice that I will describe here. In addition, there has been some recent scholarship conducted by monks in monastic universities who have participated in existing projects at other temples and in development-monk networks (Bamphen, 2006; Oupakutto, 2013; Hemnithi & Yodmalee, 2018).

This paper examines a case that is typical of development monks' practices over the past decade, which have been characterized by the integration/mobilization of extralocal actors, symbols, and technology in order to reaffirm the role of the temple and local community in the modern global context.

4. Research Methodology

This paper is based on long-term ethnographic fieldwork conducted in northeast Thailand beginning in 2013 and continuing into the present, consisting of participant observation and semi-structured interviews with development monks and their lay collaborators.

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[3] Originally published in 1988.

[4] Although he does not explicitly use the term, "development monk," in this book.

My primary key informant was Phrakhru Phothiwirakhun (hereafter referred to as "PKP"), a development monk in the villages of Ban Pho Noi and Ban Pho Sisawat and the ecclesiastical district officer for Prathumwat district (Roi Et province). He is also the secretary for the Phaendin Dhamma-Phaendin Thong Development Sangha Networks Organization (PDSNO; the predominant regional development monk organization in the northeast) and the regional representative for The Foundation for Dhamma Deliberative Development (DDD; currently the most active national development monk organization). I acted as his assistant at various organizational meetings and events, observing and participating in the planning and execution of local development projects, as well as conducting interviews with the monks and lay collaborators in attendance.

All interviews were conducted in Thai, and all translations presented below are mine. Transliterations of Thai words/names are presented using the Royal Thai General System of Transcription except where there already exists an official or preferred English spelling that differs from this system.

5. Results

In 1995, PKP established the *Sun Ganrian Chumchon Chaloem Phragiad Wat Phothikaram* (The Community Learning Center in Honor of Wat Phothikaram), a program aimed at improving economic conditions in the village by teaching villagers marketable skills such as typing. Nearly ten years earlier, he had studied typing in the nearby province of Maha Sarakham and determined that the villagers in his community could also benefit from such vocational training. He managed to obtain a copy of the curriculum but was unable to acquire a license to teach it in his temple. Undiscouraged, he created a program himself, consisting of eight lessons, after which the students who finished the course would act as volunteer teachers for the next group of trainees. PKP often refers to this process as a "villagers teaching villagers" approach, and it has been a pervasive philosophy throughout all of his subsequent development work.

In the beginning, he had no dedicated classroom in his temple so was instead using the temple's *sala phak sop* (a pavilion used for storing bodies awaiting cremation) as a learning space, as it was the least used of the temple's facilities. He borrowed temple money to buy three computers, on which the sixty-or-so villagers participating in the program would take turns, and which were in use from 5:00 AM to midnight daily. This evolved, with support from local officials and the Ministry of Information and Communication Technology, into the temple's ICT center (now "digital center"). Over the years, PKP has slowly added various facilities connected with the learning center with the goal of helping villagers to attain knowledge and vocational skills and promoting what he refers to as "local wisdom" (*panya thongthin*). In addition to the digital center, these include a children's preschool learning center, a village library, a radio station that broadcasts news stories translated into the *Isan* dialect, and a small "museum" for displaying tools and equipment traditionally used in the area to aid in farming and household chores. All of these projects – even those that are comparatively direct attempts at affording economic opportunities to the villagers are rooted in pedagogy. They are implemented with the goal of teaching the villagers about sustainability and development based on Buddhist principles. After the 1997 financial crisis, King Bhumipol proposed the adoption of a

"sufficiency economy" (*sethakhit pho phiang*) economic development philosophy, which advocated limiting consumption and attempting to curb what he saw as unsustainable economic growth. Although this notion gained little traction with the Thaksin administration, it found a resurgence after the 2006 coup d'état, where it formed the basis of a number of campaigns aimed at local villages. Coinciding with this, PKP began using the temple's community learning center in order to teach the villagers about sufficiency economy and the ideals of community responsibility, self-reliance, and the re-rooting of local economy in traditional practices that it promotes. The most recent addition to the *Wat* Phothikaram community center is a combination café and meeting space for villagers and outside visitors to the temple. Phrakhru Phothiwirakhun mobilizes these institutions and facilities in order to bring the villagers and extralocal actors together, using social, institutional, and technological networks to transform the village into a place in which there are resources and opportunities and that is also firmly rooted in local tradition, relations, and identity - what he refers to as a "smart village."[5]

The project for which the temple is best known is the Community Digital Center in Honor of *Wat* Phothikaram (*Sun Dichitan Chumchon Chaloem Phragiad Wat Phothikaram*; hereafter referred to as the "digital center"), and it is arguably PKP's most successful endeavor. Of the various facilities at the temple, the digital center is most emblematic of PKP's practices as a whole and, as such, offers the greatest insight into his attitudes regarding localist development activism and local/extralocal connectivity. As mentioned above, it began as a series of typing courses aimed at providing villagers with basic vocational skills. As access to knowledge and economic resources became both more readily available and increasingly dependent on internet access/literacy, PKP made it the centerpiece of his temple-based development activism. It began with the creation of an ICT center (The Community ICT Center in Honor of *Wat* Phothikaram) located on the grounds of *Wat* Phothikaram. This attracted the attention of the Ministry of Information and Communication Technology, with whom he collaborated in opening similar centers in a number of temples throughout the region (financed by the ministry). While the center began primarily as a means to grant local villagers access to extralocal knowledge and resources by focusing on vocational training, its role has since shifted to emphasize digital access, providing high-speed wi-fi connectivity and other internet related services in the temple and ensuring that the temple (and, by extension, religion and locality) remains relevant in an era characterized by digital connectivity. As smart phones and other devices have become more ubiquitous, villagers have enjoyed greater personal access to online networks. The temple digital center has concurrently worked to bolster its online presence, primarily by becoming extremely active in social media-based promotion and the formation of online village networks.

Although his focus has shifted to high-speed internet access, PKP still offers computer training courses for all ages and a wide variety skill and experience levels. The basic classes are usually taught either by one of the temple monks or fellow villagers with expertise in the relevant area. The pupils in these lessons often consist of village children, novice monks, elderly community members, or older monks who had heretofore eschewed the use of modern information

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[5] Using the English in a reference to "smart" technology.

technology. For the more advanced classes, especially those involving programming or web-design, he invites local volunteers, often from the nearby university. These classes are typically attended by local entrepreneurs, police officers, and government officials.

At the time of its inception and for a number of years thereafter, the temple's ICT center served a dual purpose. One was to act as a training facility as described above. Its other role was as a place at which the villagers, especially children, who did not have computers in their homes (or their pockets) could have the opportunity to use and become familiar with them. This was important, as it helped to establish the temple as a kind of access point. For many of the villagers, logging into social media, searching for information on the internet, or simply playing computer games required them to go to the temple to do so. Access to these extralocal resources was inextricably linked to the physical space of the *wat,* further underscoring its salience in village daily life. It is also an example of one of the defining characteristics of the networked-localist approach to development activism – the appropriation of extralocal technologies in a way that couches them in practices and institutions particularly relevant to local history, tradition, and communal relations. This emphasis on localization through access provision is still apparent in some respects but has become less relevant in recent years. PKP still offers computer access and training to elderly villagers who may not have internet communication devices in their homes or the knowledge of how to use them. He also occasionally arranges for specialists to teach higher-level technical courses (programming for websites using HTML, etc.) there. However, for many of the residents of Ban Pho Noi and Ban Pho Sisawat, however, the temple ICT center no longer plays the role of networked classroom and computer access terminal that it once did.

Much has changed in the years since PKP began this project and the ubiquity and relatively low cost of smart phones in recent years has meant that many of the villagers are carrying around ICT devices with them wherever they go. Furthermore, in 2011, the Yingluck administration announced a One Tablet Per Child (*Khronggan Taeblet Phisi Phuea Gansuksa Thai,* OTPC) with the goal of supplying tablets running the Android operating system to students in primary schools across the country. Although this program was later scrapped by the National Council for Peace and Order after the 2014 coup, it succeeded for a short time in granting village children regular access to IC technology in the home. During the early days of my fieldwork, I would often see children - even in remote villages with no internet access - huddled in a corner playing games on these devices. Many of the villagers in Ban Pho Noi and Ban Pho Sisawat have similarly become proficient in the use of IC devices and are frequent users of social media platforms for communication and no longer rely on the temple as an ICT access point.

A key characteristic of the networked localist approach, however, is the willingness of the activists involved not merely to adapt to changing conditions and new paradigms but to attempt to re-contextualize the products of change as vehicles for *place*-ness. PKP tends to accept (if not outright embrace) novelty - particularly with regard to advances in and expanded access to technology. Thus, as villagers gained greater access to and became increasingly active in mobile computing and online communities, he began to focus his efforts there. He has since endeavored to cultivate the temple's online presence, becoming especially active on social

media networks such as Facebook and Line. He now posts several times daily from the digital center's Facebook page. These posts are often inspirational words or hand-drawn cartoons offering benedictions or exhorting Buddhist philosophies with regard to life, community, and development. More often than not, however, they are simply accounts of the days' meetings, ceremonies, or activities accompanied by photo albums, often containing hundreds of individual images, which he typically uploads within hours of the event. He has uploaded thousands of such albums, making this Facebook page both an up-to-the-minute newsfeed and a vast photographic archive of past activities.[6] At any meeting, temple event, training session, or other activity there are, thus, likely to be several younger monks and lay assistants with cameras in hand taking a seemingly endless stream of photographs and videos.

It is important to note that, although it is a vehicle for the dissemination of a wide range of temple-related information that is unrelated to digital technology, this Facebook page is represented as that of the digital center more than of the temple as a whole. This serves to both relocate the center to a virtual space while simultaneously grounding its virtual presence in the actual space of the physical center. While the physical incarnation of the temple digital center is now often empty (except when special training courses are being held), its virtual incarnation is populated by thousands of people, both in the local area and elsewhere. It has both helped the center remain relevant despite the dwindling number of visitors and insured that villagers' engagement with computing technology and virtual networks remains connected to the sense of community, history, and locality – of *place* – that the temple represents. Similarly, it ensures that *Wat* Phothikaram's digital center remains a part of the ongoing dialogue regarding the ways in which digital technology is understood and utilized, particularly within the context of promoting the goals and values of the local community. PKP also sees the uploaded content, itself, as being a way in which the ICT center's online presence remains situated in the physical and cultural space of the local community. As he states:

Do we lose the system we have here in our community just because there is [technological] development like this? Does it mean we lose our traditions, our local culture? Look at Facebook [and the images uploaded there] and such. Where are those photographs taken? They are taken here. [They are not taken in] America or Europe. The thing that is presented in all of these is the local community. (personal communication, December 3, 2013)

For Phrakhru Phothiwirakhun and *Wat* Phothikaram, this kind of adaptive repositioning of the temple's ICT center has become even more explicit with the addition of "Café Potikaram"[7] in 2016. As part of a collaboration with the Ministry of Information and Communication Technology (MICT), it became the first of nearly 2,000 village high-speed internet access

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[6] Many photos of my own visits to the temple can be found here, including those of my first interview and tour of the temple, which were taken by a novice monk at PKP's behest and uploaded later that day.

[7] The transliteration here differs from that used elsewhere. This is because the name of the facility as displayed on the building Romanized as such. Elsewhere, I use the Royal Thai General System of Transcription (RTGS), in which this would be written as *Phothikaram*. Thus, although I spell the two differently here, there is no difference in the way the names of the café and the temple are written or pronounced in Thai.

points around the country for which there are plans as part of the ministry's DiCY (pronounced "dee-see") Digital Literacy Thailand project aimed at educating villagers about digital technology.

Café Potikaram is a single building, fashioned to look like the faux-Western-style coffee shops often seen alongside the rural highways that connect various urban centers throughout the country. It consists of a large patio that functions as a meeting/dining area with several long lacquered wooden tables and a small sliding serving window reminiscent of a drive through or outdoor diner. Although nothing is sold, villagers are free to help themselves to various teas and single-serving instant coffee popular in rural communities in the region.

The facility's appearance is also critical to PKP's strategy for maintaining the relevance of the temple in the villagers' technological lives. As of July 2016, it became the first *Sun Dichithan Chumchon* (Community Digital Center) for the Ministry of Information and Communication Technology (MICT)'s village internet access initiative. As part of this initiative, the ministry provided the temple with high-speed internet access, as well as a free three-day session to train volunteers in the village, who would, in theory, be tasked with training others in their community. For PKP, this digital center is another way in which he is adapting the temple's ICT center to the changing ways in which the villagers interact with internet technology. As I described above, most of the villagers now have access to mobile internet technology in their homes. While the original center with its desktop computers still exists and is officially part of the Community Digital Center, it now functions primarily as a classroom for occasional training sessions. This new center has become PKP's central technological project, the goal of which is to provide a high-speed internet connection and a comfortable environment in which the villagers can use their devices. At the time of its opening, PKP described to the me reasons for the center thusly:

In the past people would come to The Community ICT Learning Center in Honor of *Wat* Phothikaram in order to use the computers in the center. This is because most of them did not have smartphones or tablets or anything like that. Now, however, not many people come to use the center, as they all have mobile phones, smartphones, etc. So, we had to adjust, increasing the internet signal and making it a Community Digital Center. We also made it so they can watch movies, listen to music, and watch TV through applications or satellite (personal communication, July 30, 2016).

In order to maintain the temple's role as technological hub, PKP has adapted his methods to accommodate the changing ways in which villagers interact with technology. Furthermore, he understands it as an adaptation and extension of the development work in which he has already been engaged for nearly two decades. While in the past, the temple provided access to the basic information technology that the villagers were lacking, that function has become less relevant as access has become exponentially more ubiquitous and affordable. This digital center is the most recent example of PKP's willingness to adapt his strategies in an attempt to ensure the ways in which villagers interact with technology remain embedded in *place*. In this case, that means creating a space that entices the villagers to gather at a physical center in the community in order to use digital technology. It is both an attempt to provide access to technologies that

are otherwise not available to the villagers and to shape the ways in which villagers interact with the technology to which they already have access, doing so in ways that seek to reinforce the temple's central role in village life and to re-localize global networked systems.

6. Discussion and Conclusion

This shift in PKP's ICT-related projects highlights a key aspect that sets the networked localist approach to development apart from other types of community development strategies. It is not merely an attempt to grant villagers opportunities or access to resources that they otherwise would not have, but also an effort aimed at defining how villagers interact with those resources – namely, in a way that is contingent with the localist emphasis on *place.* The move from the ICT center as an access point to that as primarily an appropriation and attempted reconfiguration of the use of existing IC technology to which there is already access, and finally to the Community Digital Center is a clear demonstration of this. It is also an example of the importance placed on the temple's role as a "hub," mediating the network paths by which villagers interact with this technology.

A fundamental strategy by which networked localists approach the concept of **"access"** within development practice through the creation and/or strategic relocation of centralized access points**.** It is helpful to think of these access points in terms of **"nodes"** and **"hubs."** A node is typically understood as a point where links in a network intersect**.** In the case of the internet, for example, this could refer to the individual modems connected to the network**.** In the case of social media, this might mean the individual users with accounts on various platforms**.** Nodes are widely dispersed throughout a network and, when taken individually, have little impact on the structure or integrity of the network as a whole**.** However, as Zizi Papacharissi **(**2011**)** points out in *A Networked Self,* **"**these numerous small nodes coexist with a few very highly connected nodes, or hubs**" (**p**.** 4**)**, which she compares to the large airports in a few major cities that serve as connection points for all of the various smaller airports around the world**.** The question then becomes how one differentiates between a **"**node**"** and a **"**hub**."** Here I will distinguish the two using the notion of *betweenness centrality.* According to Freeman **(**1977**)**, points can occupy positions of what he refers to as *centrality.* Points exhibit *centrality* when they **"**stand *between* others and can therefore facilitate, impede or bias the transmission of a message**" (**p**.** 36**).** Nodes that facilitate connection between two or more points in a network can, thus, be said to have *centrality.* However, as Freeman goes on to point out, the degree of a given point's *centrality,* does not necessarily reveal any information as to its role in the integrity of the network as a whole **(**i**.**e**.,** whether or not it acts as a hub**).** He, thus, proposes describing points in terms of **"**betweenness-based centrality**."** Hansen et al. (2010) refer to this as "betweenness centrality," which they define as "a measure of how often a given vertex lies on the shortest path between two other vertices" and "of how much removing a [point] would disrupt the connections between other [points] in the network" (p. 40). I will, thus, define a "hub" as a node that exhibits (high) *betweenness centrality*[8] – it lies at a central point on enough

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[8] For the sake of simplicity, I will not refer to *betweenness centrality* by degree (i.e., "high" vs. "low" betweenness centrality). This is because I am using the term not to accurately measure the import of a particular node to the network as a whole, but as a device to understand the *intended* role of specific monastic development practices. That is, I am interested in how practices are implemented in order to attain/maintain high betweenness centrality,

important network connections that removing it would significantly disrupt the network as a whole.

This is a useful lens through which to view PKP's approach to his practice. Networked-localist practice is often an attempt to establish and resituate the "nodes" that make up local-extralocal networks in a way that facilitates greater participation of local actors in those networks and uses them to strengthen the authority, autonomy, and identity of the local community. In some cases, the successful deployment of multiple nodes in a variety of social spheres may lead to the monastic development practices functioning as a network hub. PKP's temple-as-community-center is not merely an attempt at helping to connect the local to the extralocal, but to be an active and intrinsic part of the connection process, itself – to be a hub. This, he accomplishes through working to facilitate both *access* to and *mobilization* of extralocal resources. The individual facilities in the temple can be understood as nodes that lie at the intersection of local-extralocal linkages. Taken together they are fundamentally an attempt to alter the ways in which the local interacts with extralocal systems in terms of 1) granting local actors access to extralocal expertise, technology, and material resources, 2) rendering the needs and conditions of local communities legible at the extralocal level, or 3) re-embedding extralocal systems and the institutions of supermodernity in *place* and locality in ways that extend across multiple social spheres.

By contrast, the majority of the projects headed by other networked-localist development monks I have observed have primarily been focused on a single type of access/legibility-related activity/facility (many of which overlapped with those being implemented at *Wat* Phothikaram). Phrakhru Phothitham Khosit, a development monk in Udon Thani province for example, works exclusively arranging for village projects to be sold through OTOP. Phra Athikan Wichian, another development monk in Roi Et province, has focused all of his attention with regard to local access and legibility on his ICT and media technology center. In cases such as these, the temples act as nodes, connecting villagers to extralocal networks and the resources available therein, but are too narrow to be considered attempts to fundamentally change the way village life as a whole relates to the extralocal. PKP, however, has constructed a complex consisting of a multitude of these kinds of nodes. Although each of the facilities in *Wat* Phothikaram fulfill a specific purpose that creates its own connection between the village and extralocal systems and entities, these nodes are linked through their connection to various social spheres and their spatial and symbolic affiliation with the *wat (*temple*)*. As such, the *wat*, itself, becomes a kind of hub as represented by a spatial location. It acts as the access point to a cluster of interlinked nodes, which in turn, serves as a stage for local/extralocal interaction and a major conduit through which ideas of community, locality, and modernity are mutually construed. It is important to note, however, that the network by which a hub is defined is, in part, an imaginary construct. By this I mean that it is artificially bounded – a process necessary in order to render it viable as an object of discourse. This means that a point's betweenness centrality (and, thus, whether or not it is to be considered a "hub") is contextual. Here, I refer to temple practices as "hubs" based on two kinds of context: (1) the position they occupy in

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but not in actually evaluating the degree of success to which these goals are achieved (assuming such an endeavor would even be possible based on ethnographic data). Thus, I will be treating *betweenness centrality* as a binary concept – insofar as whether or not a given practice is intended to function as a hub.

linking the local to the extralocal in a given social sphere and (2) the position these practices occupy in linking the local to the extralocal across multiple spheres in ways that significantly impact local-extralocal connection as a whole. Taken as a whole, PKP's temple-as-community-center is an attempt to make the *wat* into a hub based on the latter context.

This distinction between the *wat* as a node and *wat* as a hub is an important one, as it means that, in the case of the latter, these are not merely ancillary services provided by the temple in an effort to solve the individual access/legibility issues of the local community. When taken in concert, they form an attempt to reimagine the ways in which access to these systems and the relationship between *place* and that the institutions and tools of supermodernity are to be understood and engaged. Apart from facilitating direct *access* to extralocal resources through the creation and relocation of network nodes, networked-localist development monks also work to *mobilize* existing nodes to which villagers already have sufficient access. That is, they attempt to shape the ways in which these nodes are accessed and used in order to grant local actors greater autonomy, authority, and legibility at the extralocal level, as well as preserve the relevance of the temple and local community in people's daily lives. Although these nodes and hubs are points or clusters of points within a network that facilitate connections among other points, they are not merely passive conduits. In other words, they are not intended to behave simply as *intermediaries,* which Latour defines as "what transports meaning or force without transformation: defining [their] inputs is enough to define [their] outputs" (2005, p. 39). Instead they act as *mediators*, which "transform, translate, distort and modify the meaning of the elements they are supposed to carry" (ibid). This is key in that the networked-localist endeavor is one that attempts both to facilitate local/extralocal interaction (granting access to expertise, resources, conveniences, and familiar symbols associated with supermodernity) and to fundamentally alter the process and symbolic meaning of that interaction (by re-embedding it in *place*). Latour bids those of us in the social sciences to reexamine facets of social life that are typically treated as *intermediaries* and explicitly focus on how they may behave as *mediators*. It is through this process that we can attempt to transparentize the proverbial "black box" and better understand the active role that its components play in the production of meaning. This is precisely what the networked localists have set out to do. Theirs is an attempt to create specific kinds of *mediators* – nodes and hubs that convey resources, etc. while also fundamentally transforming their symbolic meaning – and to render as visible that process of transformation. This conscious attempt to create these kinds of *explicit* mediators is a hallmark of networked-localist practice.

Although PKP's temple facilities are often described in terms of their intermediary functions (giving villagers access to internet technology, savings accounts, etc.), they are not mediators disguised as intermediaries. Instead, he describes the whole of his activities in the temple as a "model" (*tonbaep*) to which villagers and others attempting similar endeavors can refer. This is a driving force behind the active promotion of his practice through social media, presentations to other monks and lay activists, demonstrations for temple visitors, and large festivals and events held at the temple. It is also evident in the pedagogical aspects inherent to all of his temple practices. In addition to providing certain kinds of access, each of the facilities at the temple are underscored by an educational component. They are implemented with the intention of teaching the villagers how to incorporate the tools and symbols of the extralocal

into a community values-oriented framework. The nodes at the temple are, thus, not merely implicit mediators, but are set up in such a way as to demonstrate the process by which this mediation can take place.

This creates an important contrast to those development activists who have primarily only been concerned with allowing access. Many traditional development monks (those whom I would not consider to be networked localists) with whom I have spoken discontinued their activist practices when they felt that villagers had gained more-or-less sufficient access to financial and educational resources. A statement I frequently heard was some variation of "the villagers are already developed." They often cited the success of previous development projects or changes in government policies regarding local development as reasons for this shift, a view that is predicated on access being the primary goal of localist/Buddhist development practices. This poses a significant contrast to the ideologies and practices of many of the networked localist monks practicing today, particularly those of PKP. PKP is not only attempting to facilitate access to extralocal knowledge and resources, but to facilitate local access to these resources in a specific way – that is, through the temple. Maintaining the relevance of the *wat* and of the local community, as a whole, in the lives of the villagers is, in many ways, more important than simply insuring access. As he explained to me at our first meeting:

If we do not do something like this [utilize and provide access to these types of resources], young people will see religion as something for a different [older] generation, not theirs. But if we do something to entice young people to come into the temple on their own, they will come out of self-interest. However, once they are here, others will also benefit" (personal communication, January 18, 2013).

It is important to him that these resources are provided as part of the *wat'*s role in the local community. When the temple serves as a hub – a place that exhibits "betweenness centrality" – linking local and extralocal actors, institutions, and resources, these connections become inextricably bound to religion and the central place it has traditionally occupied in the village. Consequently, as villagers have gained access to certain extralocal resources (such as readily available internet access) by means other than through the *wat,* PKP has strategically repositioned his activities, pursuing new ways to maintain the temple's centralized role in the community.

This is especially apparent in the description of the Community Digital Center described above. When PKP first embarked on his endeavor to create an ICT center in his temple, it was primarily about *access.* It was an attempt to grant villagers access to extralocal knowledge and modern technology that was otherwise unavailable to them (at least at the village level) and to do so in a way that emphasized the relevance of community and locality, a typical feature of the networked-localist approach to community development. By locating the point of access in the temple – traditionally understood as the symbolic representation of the local community – PKP was both reinforcing the centrality of the *wat* in village life and symbolically positioning these resources to be accessible from within the context of history, relatedness, and identity – of *place*. It places emphasis on history in that it reinforces the *wat*'s traditional role as the repository of local means. It attempts to cultivate social relatedness in that it is meant to be a

gathering point for members of the community and to combat the dispersion of the village population that results from villagers being forced to seek such resources elsewhere. Finally, the *wat* has often served as shorthand for village life in rural Thailand. It has traditionally been the community center, synonymous with local identity.

Once villagers had greater access to the technology and its use, these connections of IC technology to *place* could not be maintained merely through the provision of access. However, if the temple was going to continue to function as a hub shaping and facilitating connections between the local and extralocal, it was critical that it continue to have an active presence in this arena. It, thus, became important that PKP retain the relevance of the temple ICT center within that new paradigm. The temple's role in information technology began as that of a computer access terminal and training facility. When villagers no longer required access to the basic technology, it shifted away from being an access point to become an online vehicle for the promotion and dissemination of temple activities and information in an attempt shape the ways in which villagers interact with the technology to which they to which they already had access. The ICT center's most recent incarnation as the Community Digital Center in Honor of *Wat* Phothikaram aims both to provide access to networks and technology previously unavailable in the local community and to mobilize its existing technological resources in a new way. This kind of adaptation is a strategic repositioning, aimed at ensuring that the *wat* continues to occupy a position of "betweenness centrality" in a changing milieu.

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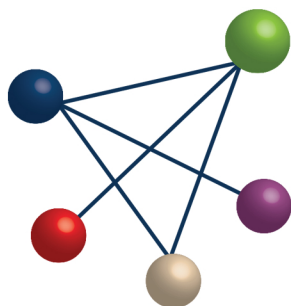
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