EE406 Final Project report

Presented to

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Introduction

Recently, Thailand is a low income country that is now improving itself to be a middle income country. As a result of its exponential growth, poverty has decreased at a significant rate. GDP in Thailand enlarged at a rate of 7.5 percent from 1960 to 1996, and 5-6 percent from 1999 to 2005, moreover the Asian Financial Crisis have caused people to be fired in large amounts so this lead to high unemployment rate,but then after the crisis huge amount of people continue to get employ again which help millions of people to have more money. In recent years, economic grow at decelerate from 4.2% to 2.4% between 2018 and 2019. Weaker export demand, reflecting the impact of US-China trade tensions, slower government investment, and a drought that harmed agricultural manufacturing were the main cause of GDP decline. Thailand's future growth, if it is to achieve high income within 2037, is also jeopardized by critical development challenges. Inadequate educational achievements and skill matching, which threaten future productivity and opportunity for the younger generation, as well as growing geographical inequality, with remote areas underperforming in economic and welfare indices, are among these issues.

Due to a reduction of demand in the market, which affected restaurant and tourism, supply chain disruptions, and diminishing domestic consumption, Thailand's rate fell by 6.1 percent in 2020. Despite the third wave of the COVID-19 pandemic, the economy increased by 2% in the first half of 2021, and it is not expected to recover to before covid19 state until 2023. The objective of this paper is to use the VAT of hotel and restaurant of Thailand to measure Thailand economy during 2015 to 2021 and also include the size of the impact of Covid-19 to the hotel and restaurant industry.

Literature review

1.)COVID19 impact on hotel and restaurant industry

- Journal of Management Science, Vol. 23, No. 1 (January-June 2021),Due to the Pandemic during year2019 , Thailand need to improve and adapt many operation to cope with the covid19 both service and private sector not only the concerned in service prices, but also in terms of business capacities, which most likely to decline as people demand less for hotel business as they afraid of getting infected by covid19. This has sparked a lot of study into how the coronavirus illness 2019 influences marketing and hotel management by employing three-dimensional components like artificial intelligence and robotics to plan the economic equilibrium process. Because Thailand's consumer demand is strong and its manufacturers are few, the country is adjusting to use digital technology in service work to decrease customer-service worker contact. In terms of foreign exchange, India's tourism and travel business is among the greatest.Travel operators and service sectors in India are having a hard time doing business due to the country's closure and people fearing travel and the need for them.
- Impact and resilience of hotel and restaurant operators during COVID-19 from Bank of Thailand.Analysis from the Outside-In principle. The Crisis of Covid-19 This is owing to the occurrence of the "black swan" phenomenon, which occurred unexpectedly. The hotel and restaurant industries were directly impacted more than any other industry. The findings revealed that hotel and restaurant owners concerned about the state of COVID-19: Small hotels (52.6 percent) were the most concerned, followed by large hotels (50.5 percent) and mid-sized hotels (50.5%). (41.2 percent). The result from constant competition, and has the advantage of being able to accommodate a larger number of tourists than hotel enterprises, both large and small. The hotel industry is influenced by three factors: 56.3 percent by business, 37.3 percent by tourism and macroeconomics, and 6.5 percent by travel. Small hotel businesses will experience more severe challenges than large and medium-sized hotels if there is another outbreak, according to research.

- Ms. Supharin Charoenpanich, Head of Economic Warning Analysis Division Economic Situation Analysis and Warning Department (FAT),Show a result of the Covid-19 outbreak, From December 2019 until the present, a total of 1,161,200 persons have been infected in Thailand, bringing the pandemic under control as of August 2021.And the government's economic recovery for the past two years, during which the restaurant industry has been one of the most successful.Infection rates are lower in provinces with high rates of infection.All of this resulted in a total revenue of 200,838.15 million baht for the restaurant industry in 2020, a drop of 200,838.15 million baht from the previous year.Cost management is a challenge for restaurant owners.
- Lunkam Puttachard Jan22,2021, The COVID-19 outbreak has compelled governments all around the world to impose lockdown measures to restrict international travel , resulting in a historic decline in visitor arrivals globally. In 2020, worldwide tourist arrivals will have declined by 72 percent year on year, with a -82 percent YoY drop in the Asia-Pacific region. The worldwide pandemic situation is at a critical position right now. Many countries, including Thailand, have been affected by a fresh wave of illnesses. As a result, the number of new patients continues to increase. The tourist sector in Thailand has seen a considerable decrease. In the first 11 months of 2020, the number of international tourists plummeted by 81.4 percent year on year. China, with a YoY decrease of 87.7%, and India, with a YoY decrease of -85.5 percent, led the way, with Thailand having the lowest number of international tourists.
- Sukanya Sirikeratikul May22,2020 .Thailand's tourism sector and the Thai economy have been significantly hit by COVID-19. It is estimated that tourist arrivals will plunge by 65 percent from 39.8 million in 2019 to 14 million in 2020. The sharp decline in the number of tourists has also led to an almost disappearing number of lodging bookings. On May 4, the government eased its lockdown measures by allowing eight types of businesses to open. Even though dine-in restaurants can now reopen, they are still restricted to ensure social distancing. Many restaurants shifted their focus to delivery and takeaway, which have become the key sales drivers.

- The goal of this research is to look at the impacts of COVID-19 on restaurant marketing and management practices, as well as to offer a three-pronged research plan to help the restaurant business expand its expertise. This study is based on a review of the relevant literature on social media food marketing. In order to come up with a study agenda, the authors also looked at trends in hospitality services. This article offers a three-dimensional research agenda for Covid-19: artificial intelligence (AI), digital media advertisements, and the significance of social media commercials. Different sorts of artificial intelligence (mechanical, thinking, and emotion) may develop diverse study routes at the intersection of health emergencies and restaurants in light of the COVID-19 pandemic.
- The restaurant industry, which employs one of the country's largest workforces, was disproportionately impacted by the COVID-19 epidemic's economic slump. The purpose of this qualitative study was to understand more about the workplace constraints that the restaurant industry encountered during the COVID-19 epidemic by looking at their personal stories. The analysis was used to find patterns in data from sixteen interviews with persons working in or previously working in the restaurant industry. The uneffective policy led to the fear of COVID19 for the restaurant workers as we could have job insecurity,uncertain income, and a scarcity of consumer surplus on healthcare service identified as the top five themes, all of which increased occupational stress and made respondents unsure of returning to the restaurant industry. The community developed within the eateries provided assistance and connections, which helped to relieve the problem.
- People have been stocking up on cheaper, ultra-processed meals as a result of the lockdown measures and loss of income. COVID-19 reaction and preparedness has become a focal point for the healthcare sector. Malnutrition in mothers and children causes stunted growth in offspring, as well as an increased risk of illness and impaired cognition.
- This study attempts to address that gap by analyzing all business-related posts on the coronavirus subreddit "r/coronavirus" and identifying the key research streams guiding the post-coronavirus research agenda. Design, technique, and strategy We found postings on the impact of coronavirus on business using data from Reddit, notably the coronavirus

forum. Findings The major worries about the coronavirus impact on business are divided into four categories. critical service provision, bricolage service innovation, responsible buying practices, and market structure in times of crisis. Value of originality The paper cites four key themes that have evolved as a result of the coronavirus commercial effect and that merit further investigation. Our findings can inspire service research to conduct research that matters to business and aid individuals in vulnerable situations in a post-coronavirus environment, thanks to unique insights provided quickly after the coronavirus epidemic.

- The new coronavirus epidemic has wreaked havoc on hotel operations, affecting demand for hotel services and guest behavior, as well as hotel organizations' financial stability and, as a result, hotel staff. Because a hotel company is linked to a variety of supply chain partners, any issues with hotel operations are passed upstream in the supply chain. The purpose of this article is to provide an overview of the COVID-19's impact on the hotel industry, as well as strategies for dealing with the new reality, such as safety measures, technology application, service quality, marketing communication, human resource management, and supply chain management. Many scholars feel that in the post-COVID-19 climate, the bulk of these regulations will prevail because people will be more careful about their safety.Apart from its massive destructive impact, the current crisis will have some beneficial consequences, such as increased innovativeness, resilience, effective communication, and customer care for both internal and external consumers, all of which will improve hotel service quality.

Research Gap

This research got the data of restaurant and hotel index from the past and at that time there were no vaccines and effective policies yet so the result may not be accurate. In the paper above we used data from2019 to 2021 which is the latest data that we can find so there are some restrictions in this paper as we have limitations of the data and other factors that relate to the Hotel and Restaurant industry. As a result, the indications that are projected to have an impact on the restaurant and hotel industry may not be relevant in all cases.

Data and Methodology

Data

- In this paper, the analysis is based on the quantitative data which we get from the Bank of Thailand website. For the keyword which we use for running regression analysis. This paper tries to find out whether we can use the Vat on the restaurant and hotel index to indicate the economy or not and also how COVID19 has an impact on this industry.
- In this paper we also include some mobility index and nighttime light which we get the data from NASA website.

Methodolody

- For methodology I mainly use regression analysis and google trend to help support the result by using economic indicators which is VAT on hotel and restaurant index. After that I started to find 20 keywords that related to the hotel and restaurant industry to use in regression analysis but some will not be shown in this paper as the R square is too low. Next I normalize all the data in excel then run the regression. The last part is to analyze the correlation between conventional economic indicators or VAT on the hotel and restaurant index and the keywords we get from google trend.
- The regression that we use is linear regression which is a statistical approach used for identify the strength and type of a connection between one exogenous variable, usually signified by Y, and a collection of other parameters, known as regressor. For the formula

$$Y = a + bX + u$$

- Y stands for the dependent variable
- X stand for explanatory variables
- a stand for Y intercept
- b stand for slope coefficients for explanatory variable
- u stand for the error term
- The next method that I use in this paper is nighttime light, which I also use for running regression as well. I used this indicator because nowaday the satellite observations are increasingly being used to track the pandemic's development and its effects on Earth. From the epidemic's impact on businesses and transportation networks to tracking cities' slow recovery throughout the world. The idea of utilizing evening lights to understand pandemics isn't new; earlier research has demonstrated, for example, that nighttime lights may be used to predict seasonal measles outbreaks, which are connected to variations in population density as assessed by anthropogenic light emissions. Nighttime light observations provide a unique viewpoint on human behavior, socioeconomic trends, and the nature of human-Earth relationships. Remotely sensed evening light observations have proven to be an useful tool for better understanding practically every aspect of human activities on the globe.The number of scientific applications that use remotely

detected evening lights to measure our world is growing. The ability of nocturnal lights to represent many facets of human presence and activity on Earth is well acknowledged. They're being used to map global poverty, population density, migration, and movement patterns, among other things. As a result, they can be used to guide flood-resilience planning in flood-prone locations.

- The last one is the apple mobility index which can help us to predict the covid19. The COVID-19 pandemic is posing enormous global concerns. Mobility data has been used in a number of studies to investigate spatial trends over time. This study contributes significantly to our understanding of the pandemic's use of and access to human movement data, as well as future disease outbreaks.
- For both apple mobility index and Nighttime light I used the data to run the regression in excel to indicate the pandemic as follow from the formula

$$\ln(Y)=B0 + B1*\ln(X1) + u$$

$$\ln(Y)=B0 + B1*\ln(X2) + u$$

$$\ln(Y)=B0 + B1*\ln(X3) + u$$

Where Y stand for covid cases index

X1 stand for nighttime light index

X2 stand for driving apple mobility index

X3 stand for walking apple mobility index

B0 stand for Y intercept

B1 stand for slope of the equation

u stand for error term

Result and analysis

The regression results from jan 2015 to jan 2021 are presented in Table 1 to table5. This research consists of 73 sample sizes which is the test between Thailand VAT on hotel and restaurant index and google trend keyword. In this paper I use 20 keywords. The first 10 keywords will be related to the hotel and restaurant industry and another 10 related to COVID19 , since the keyword is too much to put all of them in so I will put only 5 of them with the highest R Squared in this paper. So the first one is regression between the VAT on the hotel and restaurant index and keyword บุ๊คกิ้งดอทคอม. I decided to use this keyword because this keyword may be related to the industry as I want to know about people moving out or moving in during COVID 19 and does it affect economic activity. The result shows that the R square is at 0.759 or around 76% which is above 60% so it is quite correlated with each other. In other words we also can imply that people's mobility may have an effect on this industry. But there were some issues as in this paper I do the VAT on hotel and restaurant so some SMES will not be included in this paper as it does not have VAT in the receipt.

For the third keyword is โรงแรม which have R square equal 0.35 or 35%. It can be implied that this keyword is not significant and not related to the economic indicator as the R square is less than 65%

Next keyword is โรงแรม ใกล้ ฉัน which have R square only 0.125 or around 12.5 % this can be imply as this keyword is not related to our economic indicator. The reason for choosing this keyword is due to COVID 19 occurrence. I expect that people will not search for this keyword as they can’t come out from their home in order to prevent the pandemic. This also can help us understand that COVID 19 may have an effect on this industry so I decided to use the keyword that is related to COVID19 as the next keyword.

For the fourth keyword I decided to use covid19 as the keyword because I think that this is the main problem for this industry. Overall this keyword has an R square of 1.6% so this means it is not related to the indicator as it may not affect this directly.

The last one is โคโรนา keyword which also have low R square at 13%. It can also be imply as this keyword is not effective and not related to the indicator as it not affect this industry directly.

For nighttime light index and apple mobility index. I decided to use only Bangkok because there was a restriction for accessing Thailand nighttime light and apple mobility index. So in Bangkok nighttime light has an R square of 59% which is less than 65% so it means that the nighttime light is not effective for using it to indicate the COVID 19 cases.

The next one is the apple mobility index. I run the regression by using Bangkok driving and Bangkok walking to indicate the COVID19. Walking apple mobility index has the R square of 15% meaning that it cannot be used to predict the COVID19 cases. Next is driving apple mobility index we can see that R square is at 66% so we can see that the R square of driving is higher than walking and it also above 65% so this means that driving apple mobility index can be used to indicate the COVID19 cases.

Policy Recommendations

Outbreak of Covid-19 Concerns about the pandemic and health 47.0 percent have an impact on business 40.5 percent. Most business owners are concerned about their employees' health and safety, which will have an impact on their families. They provide service to customers and project an image of cleanliness and safety that customers trust. The following is how hotel and restaurant businesses manage risks and prepare for the return of tourism. The first one is about Financial and cost management. The restaurant industry will set aside some funds and minimize costs when possible. The hotel industry, on the other hand, has chosen to downsize its workforce. Employee salaries are the most significant expense. Next is Products and distribution channels The hotel industry has modified its plan to boost online sales channels 93.7 percent while the restaurant industry has adjusted its approach to deliver more personalized service. In order to adapt to changing conditions, the hotel industry will focus on recognizing information and government policies and communicating inside the firm.

Policymakers must use a range of tactics in response to the epidemic, including immediate measures such as a temporary basic income as well as urgent reforms such as universal health care. Only then will we be able to recover from the COVID-19 epidemic and develop communities that are more resilient and long-term. Healthcare costs plunged 100 million people into poverty each year even before the epidemic. Nobody should have to choose between their financial well-being and their health. Investing in Universal Health Coverage is the best long-term recovery strategy (UHC). Most TBI systems would cost less than 1% of a country's GDP each month in most underdeveloped countries.

Another policy that the government can do is COVID FREE SETTING which consists of 3 important measures Covid Free Environment: Ventilation Hygiene is appropriate, clean, safe and keep distance.Next is Covid Free Customer or Covid Free Customer: The user must have a Green Card means complete vaccinations, or Yellow Card means you have been infected with COVID or have a negative ATK test at the specified time.

There are still many policies the government can do, for example subsidize domestic tourism, reduce VAT in industries that get the most impact, reduce social distancing but everyone should have been vaccinated.

Conclusion

The method in this paper is to find the data of both economic indicators and google trend to support the result. Furthermore I also use the Apple mobility index and Nighttime light for indicates the COVID19 .From the regression result that we get we can imply that most of the keywords that we have are not related to the indicator as the impact on VAT on hotel and restaurant may have another impact on other factors not COVID 19. Covid 19 may have an indirect effect on this industry so when run the regression the result may not be significant. Overall the only one that are correlated is บุ๊คกิ้งดอทคอม keyword. The Nighttime light and apple mobility index is not that significant so in my opinion these two indicators are not effective as the R square is not that high except the walking apple mobility index which has an R square at 66%. Overall The Nighttime Light Index shows that it has a low connection with the Covid19 instance. This index has a low potential for analyzing Covid-19 instances, implying that it has a low potential for analyzing Covid-19 cases. Next, when it comes to apple mobility, it's evident that walking has a higher R-square than driving, indicating that this index can only predict certain things.

For the policy part the government should help industries that are faced with the impact from Covid19 as they can't do their business. The government can help them in many ways such as reducing the VAT in that industry, subsidizing the industry , improving R & D, and giving good vaccines to all citizens for free.

Overall the VAT in hotel and restaurant industry cannot be used for indicates the economy directly as its just a small part for indicates the economic especially during this time as the COVID 19 occur hotel and restaurant industry face a lot of problem so the hotel and restaurant index will decline during this period it can help to indicates in some aspect but not directly. For the covid 19 impact on this industry, according to the research this industry has loss it share on GDP in significant rate but for the restaurant it still not change much as I use the VAT which will include only the medium and large size restaurant but the most impact one is the SMES so for the restaurant the shares decrease but not that much as people still order the delivery food from the restaurant. In the result part there are some limitations as some we cannot access to some data so the result we have may not be accurate as there is a limit on the data.

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Appendices

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.127461233							
R Square	0.016246366							
Adjusted R Square	-0.073185783							
Standard Error	1.035946805							
Observations	13							
ANOVA								
	df	*SS*	*MS*	*F*	*ignificance F*			
Regression	1	0.194956	0.194956	0.181661	0.67817			
Residual	11	11.80504	1.073186					
Total	12	12						
	Coefficients	*andard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*pper 95.0%*
Intercept	-0.007293597	0.287825	-0.02534	0.980237	-0.64079	0.626204	-0.64079	0.626204
X Variable 1	-0.130289444	0.305688	-0.42622	0.67817	-0.8031	0.542525	-0.8031	0.542525

Table1 covid19 keyword

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.361443619							
R Square	0.13064149							
Adjusted R Square	0.051608898							
Standard Error	47.91264815							
Observations	13							
ANOVA								
	df	*SS*	*MS*	*F*	*ignificance F*			
Regression	1	3794.681	3794.681	1.653008	0.224957			
Residual	11	25251.84	2295.622					
Total	12	29046.52						
	Coefficients	*andard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*pper 95.0%*
Intercept	73.74846154	13.28858	5.549763	0.000173	44.5005	102.9964	44.5005	102.9964
X Variable 1	-17.78267132	13.83119	-1.28569	0.224957	-48.2249	12.65957	-48.2249	12.65957

Table2 โรคติดเชื้อไวรัสโคโรน่า2019 keyword

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.597431483							
R Square	0.356924377							
Adjusted R Square	0.347866974							
Standard Error	0.807547538							
Observations	73							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	25.69855517	25.69855517	39.40692183	2.40799E-08			
Residual	71	46.30144483	0.652133026					
Total	72	72						
	Coefficients		*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-9.13867E-16	0.09451629	-9.66889E-15	1	-0.18846013	0.18846013	-0.18846013	0.18846013
Normalise โรงแรม	0.597431483	0.09517039	6.277493276	2.40799E-08	0.407667115	0.787195851	0.407667115	0.787195851

Table 3 โรงแรม keyword

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.871570184							
R Square	0.759634586							
Adjusted R Square	0.756249157							
Standard Error	0.493711295							
Observations	73							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	54.69369018	54.69369018	224.3835944	1.13128E-23			
Residual	71	17.30630982	0.243750843					
Total	72	72						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-8.3276E-16	0.057784536	-1.44115E-14	1	-0.115219093	0.115219093	-0.115219093	0.115219093
Normalize บุ๊คกิ้งดอทคอ	0.871570184	0.058184434	14.97943906	1.13128E-23	0.755553718	0.987586651	0.755553718	0.987586651

Table4 บุ๊คกิ้งดอทคอมkeyword

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.35398							
R Square	0.125							
Adjusted R Square	0.11298							
Standard Error	0.94182							
Observations	73							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	9.021841941	9.021842	10.171	0.002123737			
Residual	71	62.97815806	0.887016					
Total	72	72						
	Coefficient	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-7E-16	0.110231159	-6.1E-15	1	-0.219794688	0.219794688	-0.219794688	0.219794688
Normalise โรงแรม ใก	-0.354	0.110994013	-3.1892	0.002124	-0.575297923	-0.13266637	-0.575297923	-0.13266637

Table 5 โรงแรม ใกล้ ฉันkeyword

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.771271							
R Square	0.594859							
Adjusted R Square	0.574602							
Standard Error	0.88038							
Observations	22							
ANOVA								
	df	*SS*	*MS*	*F*	*ignificance F*			
Regression	1	22.76028	22.76028	29.36548	2.64E-05			
Residual	20	15.50138	0.775069					
Total	21	38.26166						
	Coefficients	*andard Erro*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*Jpper 95.0%*
Intercept	264.0659	48.19522	5.479088	2.31E-05	163.5324	364.5994	163.5324	364.5994
X Variable 1	-140.185	25.86914	-5.41899	2.64E-05	-194.147	-86.2226	-194.147	-86.2226

Table6 bangkok nighttime light

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.39838454
R Square	0.15871024
Adjusted R Square	0.11664575
Standard Error	0.00636505
Observations	22

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.00015286	0.00015286	3.77302199	0.066300273
Residual	20	0.00081028	4.0514E-05		
Total	21	0.00096314			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	2.03287292	0.0032766	620.42101	2.5255E-44	2.026038046	2.03970779	2.02603805	2.03970779
X Variable 1	-0.0019988	0.00102901	-1.9424268	0.06630027	-0.004145255	0.0001477	-0.0041453	0.0001477

Table7 apple mobility index walking

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.81537675
R Square	0.66483925
Adjusted R Square	0.64808121
Standard Error	0.01395878
Observations	22

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.00773015	0.00773015	39.6728579	3.78173E-06
Residual	20	0.00389695	0.00019485		
Total	21	0.0116271			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	2.03094619	0.00718571	282.636999	1.7009E-37	2.015957074	2.04593531	2.01595707	2.04593531
X Variable 1	-0.0142139	0.00225666	-6.2986394	3.7817E-06	-0.018921166	-0.0095066	-0.0189212	-0.0095066

Table8 apple mobility index driving