ANALYSIS FOR THE ALTERNATIVE INDICATOR OF THE IMPORT OF TEXTILES IN THAILAND BY USING GOOGLE TRENDS

PRESENTED TO

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(i) INTRODUCTION

As many people have been following monthly government data proposing the economic outlook, there is still a lack of real-time data which is also important for understanding the current level of economic activity. The main objective of this research is to analyze the application of real-time data that provides daily and weekly updates on the number of search inquiries in a variety of sectors, i.e., Google Trends, and answer the question "Can the alternative indicators be used for timely monitoring and predicting the current economic situation?" This research mainly focuses on Thailand's Imports of Textiles and Apparels as this sector has been contributing significantly to the country's gross domestic product (GDP) for a long time. In 2019, according to the World Integrated Trade Solution (WITS), Thailand imported $14.37 billion worth of textile and apparel products.

With the rise of free trade, economic gains come mostly from what the nation imports rather than exports (Jessop, 2021). Free trade occurs when individuals are free to purchase products and services from whoever and wherever they favor, without government intervention, so that individuals can specialize in their areas of expertise and maximize customer welfare. As Thailand is one of the developing countries, imports are very essential because they provide opportunities to grow economies, produce higher-quality goods, and increase income by bringing a new product to a market. Also, they allow Thai residents to purchase foreign items without having to travel or pay extra taxes.

There are lots of countries and regions participating in this trade flow. Thailand's top 10 trading partners for textiles and apparel imports in 2019 were China, Vietnam, United States, Japan, Other Asia nes, India, Indonesia, South Korea, Italy, and Hongkong respectively *(Appendix A: Figure 1.0)*. At the same time, its top 10 trading partners for those exports were the United States, Japan, China, Vietnam, and Myanmar, Indonesia, Cambodia, Belgium, India, and Bangladesh respectively *(Appendix A: Figure 1.1)*. Overall, most exports and imports came from East Asia and the Pacific market.

Due to the low price level of Chinese products, China has always been the first top ranked partner of Thailand Imports for more than a decade. The country's Textiles and Apparel Imports from China from 1988 to 2019 increased sharply from 156,016.91 to 2,024,819.11 in US$ Thousand *(Appendix A: Figure 2.0)*. Not only China but also Japan, the United States, and Other Asia, nes have been playing significant roles in Thailand's Textile and Apparel

Imports since 1988 *(Appendix A: Figure 2.1~2.4)*. In other words, the country has been importing these types of products from those three countries at a huge amount of trade value every year. Compared to China, the trend of these imports from these three regions is a modest upward slope but still at a significant level. Once Pakistan ranked as one of top textile exporters in Thailand in the past 23 years, the amount of Thailand textile imports from this country has been decreasing overtime. Other countries took its place and became the major exporters instead.

Many Thai business owners or designers found their way in doing business by importing fabrics from other countries for the production of final goods to reduce their cost of production. Moreover, some types of fabrics are not available in the country so importation is the only choice for them. By doing this, they can produce the final goods based on their favorite designs. Not only intermediate goods but also final goods are imported to Thailand. There are many imported clothing foreign brands such as ZARA, PULL&BEAR, and UNIQLO operating their stores in both offline and online channels in Thailand. These brands are very well known and acceptable worldwide.

Even though the textile and apparel industry in Thailand seems to be on the rise, the country faced many economic problems that led to the downturn of the import of this industry. In 1997, many Asian countries suffered in the Asian Financial Crisis, causing an economic meltdown. All industries, including Textiles and Apparel, were negatively affected. Due to the cooperation between many countries and economic obstacles, the amount of Thailand imports dropped significantly during that time. Even though Thailand struggled with hard times, the economy recovered up rapidly. Textiles and Apparel Imports came back to normal after that. Moreover, during the COVID-19 pandemic, the importation of textile and apparels has been disrupted. Thai residents can import those products during this time less than in normal time. All imports are delayed, causing an irritation of Thai consumers. However, there is still a hope that the economy will recover as soon as possible.

As there are lots of situations impacting the trend of textile and apparel imports which are denoted as significant points, some fluctuations of real-time data can occur. Therefore, this research will further analyze whether the Google Trends provides the data correlated with the real data from government sources.

(ii) LITERATURE REVIEW

This research points out the trend of Textile and Apparel Imports in Thailand to look over the national economic activities by using both monthly government data (conventional indicator) and real-time data (alternative indicators). There are many research papers related to the main point of this research, which can be separated into three categories;

(i) Literature related to research methods

Pornpattananangkul (2008) experimented on the behavior of Thai people in Bangkok who import fashion clothes from abroad By using the Pearson Correlation, she found that most young people purchase imported clothes because those clothes are on-trend and have creative designs. Moreover, imported clothes have a high quality that is coherent with their price.

Yueakngoen and Piriyarungsan (2018) studied the seller behavior of imported women's clothes from China on the e-commerce platforms that provide Thai language services. The result shows that sellers who rely on service-based management use Chinese websites, e.g., Taobao, Alibaba, and Bebefamily as the intermediaries to select and import such clothes. With the rapid development of technology, more and more sellers sell those imported products via online platforms, e.g., Instagram, Facebook, and Inwshop.

Putjad (2019) applied the sampling method and Chi-square test to determine factors that affect purchasing behavior towards the import of clothes from China. The result indicates that the marketing mix factors, including product, price, place, and promotion, have a positive relationship with the demand for imported clothing.

(ii) Literature related to data sets

Pornpattananangkul (2008) used a sample of 200 adolescent males and females aged 15 to 22 years old. The data was collected at department stores in Bangkok because it is a place where imported clothes are sold a lot. The type of research is the survey-based method in which respondents fill out a questionnaire. Imported clothing purchase behaviors were determined by the frequency and amount of purchase, and the cost of imported clothes from abroad.

Yueakngoen and Piriyarungsan (2018) collected the quantitative data of the purchasing behavior towards the import of clothes from China which is composed of documentary research

and in-depth interviews. They found out that there are three forms of importation: (i) self-managing of the entire process; (ii) self-managing of the partial process; (iii) service-based management of the whole process.

(iii) Literature related to sub-topics

According to the Division of Industrial Economic Research (2021), the import of textile and apparel products dropped significantly in the second quarter of the year 2020 or right after the COVID-19 pandemic started. However, Thailand and its trading partners have tried so hard to reduce the impacts of the situation. Current manufacturing lines have been modified to create medical textile products, e.g., facial masks, to cope with the disease. The government also initiated several campaigns, e.g., "Half-Half Co-payment" and "We Win" to stimulate the purchase of goods and services, including the textile industry.

- **Search Gap**

According to the literature review above, there are some search gaps found in the section related to data and methodology. From the literature related to data sets, all data are obtained from the survey or interview. There is no data obtained from the publicly accessible database. Consequently, there could be some errors, making them receive less trust and reliability from readers. Moreover, due to the lack of updated data, the insights of today's trends are unknown, causing difficulty in applying policy recommendations to the present. From the literature related to methodology, even though there is a use of advanced regression techniques, mistakes could occur as well because of the unreliable data from the data collection process.

(iii) DATA & METHODOLOGY

- **Data**

The research used two datasets for further research methodology: conventional and alternative economic indicators. Economic indicators that are formally generated and provided by government agencies are known as conventional economic indicators while the data that are highly correlated with the conventional indicators are known as alternative indicators.

A longitudinal study was conducted over the period between January 1, 2010, and September 31, 2021 (10 years and 9 months). The conventional economic indicator is the Import of Textiles Index in Thailand, retrieved from the Private Consumption Index and Components (Seasonally Adjusted) section of the Bank of Thailand (BOT). The alternative indicators come from Keyword Search Statistics from Google Trends (*Appendix B: Table 1.0*). Using Google Trends allows users to see how searches are being made in a certain location and within a particular category.

- **METHODOLOGY**

After collecting the Import of Textiles Index from the BOT, the data were normalized to convert numeric columns in the dataset to use the same range and eliminate duplicate data. The program used for this mathematical calculation is Microsoft Excel, the software program that can help visualize and analyze the data. Now, the data is easier to sort through and ready to be used as the conventional economic indicator *(Appendix A: Figure 3.0)*.

The next step is to find the keyword search statistics that are highly correlated with the conventional indicator on Google Trends. The criteria in selecting search terms are that they should be relevant to the import of textiles. In other words, they should have similar trends of interest over time to the Import of Textiles Index. Then, the statistics on all keywords were normalized to be used as the alternative economic indicators.

To accomplish the objective of this study, a statistical method or regression analysis that estimates the relationship between one or more independent variables (X) and a dependent variable (Y), called the Ordinary Least Squares (OLS), is applied to run the Simple Regression Model. The goal is to validate the relationship between the conventional and alternative economic indicators. This research used linear regression because it is composed of several

independent variables. Based on the research data, the Import of Textiles Index in Thailand is denoted as the dependent variable while the Normalized Keyword Search Statistics are denoted as the independent variables.

The OLS Regression Function is:

$$Y_i^* = \beta_0^* + \beta_1^* X_i + \varepsilon_i \qquad \text{Eq. (1)}$$

With more explanatory variables of the model, the OLS regression function is:

$$Y_i^* = \beta_0^* + \beta_1^* X_1 + \beta_2^* X_2 + \ldots + \beta_n^* X_n + \varepsilon_i \qquad \text{Eq. (2)}$$

Where Y_i = Normalized Import of Textiles Index in Thailand (Dependent variable)

X_i = Normalized Keyword Search Statistics (Independent variables)

β_0 = Y-intercept (constant term)

$\beta_1, \beta_2, \ldots, \beta_n$ = The slope coefficient of each independent variable

ε_i = The model's error term (also known as the residuals)

The statistical software program that helps in doing the regression is STATA. It is commonly used by researchers in many fields of study, including Economics. After running the regression function on the STATA program, the output of linear regression would be carried out. Then, the T-test and P-value test are required to check the significance of each regression coefficient in the model. At the same time, the result can also be interpreted by checking the R-squared value. By doing this, the relationship between the dependent variable and independent variables can be identified and further analyzed.

(iv) Result Analysis

- **Results**

Seven search terms were found to have similar interest over time to the Import of Textiles Index *(Appendix B: Table 1.1)*. Those seven independent variables are เสื้อจีน, เถาเป่า, เสื้อผ้านำเข้า, Textile, Zara, Pull&Bear, and Uniqlo.

Based on the equation (2), the OLS Regression Function for this analysis is:

$$Y_i^* = \beta_0^* + \beta_1^* X_1 + \beta_2^* X_2 + \beta_3^* X_3 + \beta_4^* X_4 + \beta_5^* X_5 + \beta_6^* X_6 + \beta_7^* X_7 + \varepsilon_i \quad \text{Eq. (3)}$$

The output of linear regression on the STATA program shows in the Table___. Then, the complete OLS Regression Function is:

$$Y_i^* = 0.65 + 0.08X_1 + 0.41X_2 + 0.07X_3 + 0.10X_4 + 0.03X_5 + 0.03X_6 - 0.03X_7 + \varepsilon_i \quad \text{Eq. (4)}$$

Where X_1 = Normalized Statistical Index for the search term "เสื้อจีน"

X_2 = Normalized Statistical Index for the search term "Textile"

X_3 = Normalized Statistical Index for the search term "Zara"

X_4 = Normalized Statistical Index for the search term "Pull&Bear"

X_5 = Normalized Statistical Index for the search term "Uniqlo"

X_6 = Normalized Statistical Index for the search term "เถาเป่า"

X_7 = Normalized Statistical Index for the search term "เสื้อผ้านำเข้า"

The output of linear regression can be interpreted in four computational results. First, the preceding equation (4) shows that the normalized keyword search statistics for เสื้อจีน, Textile, Zara, Pull&Bear, Uniqlo, and เถาเป่า have a positive correlation with the normalized import of textiles index. However, the normalized statistics for "เสื้อผ้านำเข้า" and the normalized

import of textiles index have a negative correlation. According to seven independent variables, the Y-intercept and slope coefficient can be interpreted below:

β_0^* = 0.65 means that when all normalized keyword search statistics are equal to zero, the normalized import of textiles index is equal to 0.65, holding other factors constant.

β_1^* = 0.08 means that when X_1 changes by 1 unit,Y_i^* changes by 0.08 unit in the same direction, holding other factors constant.

β_7^* = -0.03 means that when X_7 changes by 1 unit,Y_i^* changes by 0.03 unit in the opposite direction, holding other factors constant.

(Note that the interpretation for β_2^*, β_3^*, β_4^*, β_5^*, β_6^* is similar to β_1^*. The difference between them is only the value because of the positive correlation between them.)

Second, the R-squared value is 0.7580, meaning that about 75.80% of variation in the conventional indicator is explained by variation in alternative indicators. The R-squared value is close to 1, implying that the relationship of conventional and alternative indicators are highly correlated. Third, all the slope coefficients are statistically significant at 0.05 level since they are different from zero. Lastly, according to the T-test statistic, the T-value for each independent variable is higher than 1.96 and the P-value of which is lower than 0.05. It can be concluded that they are statistically significant at 0.05 level of significance. There is enough evidence to say that alternative indicators can be used for timely monitoring and predicting the trend of the conventional indicator.

- **Key advantages of using these data and methodology**

To answer the main objective of this research, data and methodology provides the trends of conventional and alternative economic indicators and the understanding of the relationship between both indicators that can be further analyzed. The data shows that the overall trend of the import of textiles is upward, implying that Thailand's import of these products has grown considerably. When the country faced some financial or economic problems, the import of textiles dropped. Nevertheless, it came back to a certain normal level rapidly due to the economic recovery. Moreover, the results from the methodology indicates some reasons behind the high correlation between the conventional and alternative indicators in this case.

First, alternative indicators are composed of both Thai and English search terms. Thai people are more familiar with Thai than English, so they usually search normal keywords in Thai on Google, i.e., เสื้อจีน, เถาเป่า, and เสื้อผ้านำเข้า. The interest over time of "เสื้อผ้านำเข้า" (import of apparels) shows the demand of this import category. As mentioned above that Thai residents import textiles and apparels significantly from China, they mostly search the keyword "เสื้อจีน" (textile and apparel from China). Also, people search the keyword "เถาเป่า" (Taobao) because the channel that is very popular to import such products from China is Taobao, a Chinese online shopping platform. According to Yueakngoen and Piriyarungsan (2018), their result is consistent with this analysis that indicates the importance of the service-based management to select and import such clothes by using Chinese Websites.

On the other hand, people search for some relevant keywords in English, i.e., Textile, Zara, Pull&Bear, and Uniqlo. The search term "Textile" is directly related to the conventional economic indicator. Also, some well-known imported clothing foreign brands operate their stores in Thailand. People search "ZARA," "PULL&BEAR," and "UNIQLO" when they demand for textile and apparel products of those brands.

- **Limitations of using these data and methodology**

Even though the R-squared value is already high, the relationship between the conventional and alternative economic indicators can not be a hundred percent substitutable. There may be some other independent variables that affect the dependent variable in the regression model. By using Google Trends, users have to find such search terms by themselves. In this research, seven search terms were randomly selected based on the interest over time or popularity. However, there may be other unpopular words that are related to the import of textiles but it is difficult to find all keywords that have such a high potential.

Another limitation is that the search terms do not always represent the demand of such imports all the time. To import products from abroad, Thai residents may contact the manufacturers in person or go directly to the main websites as the intermediaries for importation. As a result, the accuracy of the data and methodology may be disrupted.

The last limitation is that there could be some mistakes or some extra noise in the data. As Google Trends data is currently calculated using a sampling approach, it fluctuates from

day to day. This results in an inaccuracy of the data, making it difficult to say that the interpretation of the result is totally reliable. Thus, there should be more concerns on these issues as well.

(v) Conclusion and Policy Recommendations

- **Conclusion**

The data collected which are the Import of Textiles Index in Thailand (Seasonally Adjusted) and the Google Keyword Search Statistics can be efficiently used for the research methodology. By using the OLS regression method to run the Simple Regression Model by the OLS method, the result analysis can clearly answer the research question that the data obtained from the Google Trends can be used for the prediction of the Import of Textiles because of two reasons. First, the R-squared value is quite high. Second, all slope coefficients of the seven alternative economic indicators are statistically significant. Therefore, Google Trends data does not only reflect characteristics of the economy's present circumstances, but perhaps also reveal the insights of future trends in economic players' behavior.

- **Policy Recommendations**

By using the Google Trends Data as an alternative indicator to the Import of Textile Index, the interpretation of the trend is more accurate because the data is now daily, not monthly. The government can analyze the trend specifically at any point of time. This would help them carry out more effective policies in the future. Consequently, the government should analyze the trend of the Import of Textile Index for further policy implementation.

The government should adopt this analysis to maintain the balance of export and import of textile products. When the import of such products is too high or too low, the government should take a major role to effectively intervene in the market. By doing this, the national economy would run smoothly.

- **Future improvement for this research**

One thing that should be further investigated in future work is whether Google Trends can be a helpful tool in analyzing the relationship between the conventional and alternative indicators by using other advanced regression models. Moreover, there should be further predictions not only for the Import of Textile Index, but also other indicators such as sales of passenger transportation, VAT of hotel and restaurant, and non-residents expenditure. By doing this, it would be possible to detect the accuracy of the methodology and also help in creating appropriate policies to be implemented in all areas of the national system.

(vi) Bibliography

- **Appendix A: Figures**

Figure 1.0 Thailand 2019 Export Partner Share

Figure 1.1 Thailand 2019 Import Partner Share

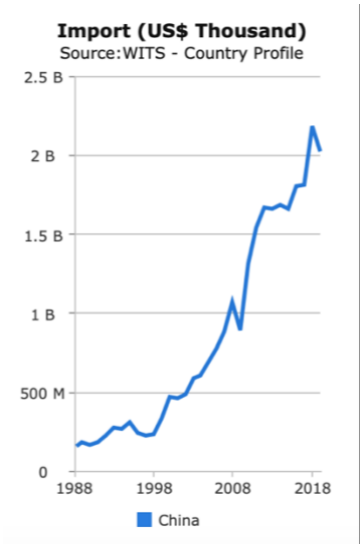

Figure 2.0 Thailand Textiles and Clothing Imports from China in US$ Thousand 1988-2019

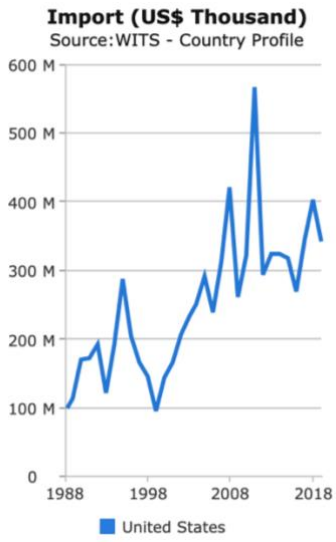

Figure 2.1 Thailand Textiles and Clothing Imports from the US in US$ Thousand 1988-2019

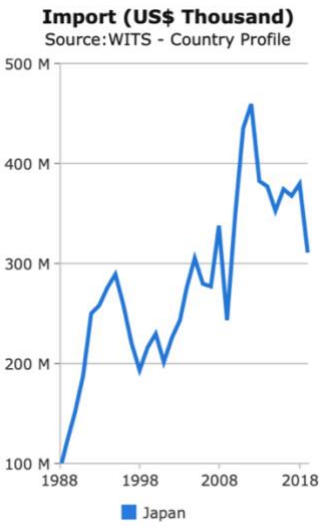

Figure 2.2 Thailand Textiles and Clothing Imports from Japan in US$ Thousand 1988-2019

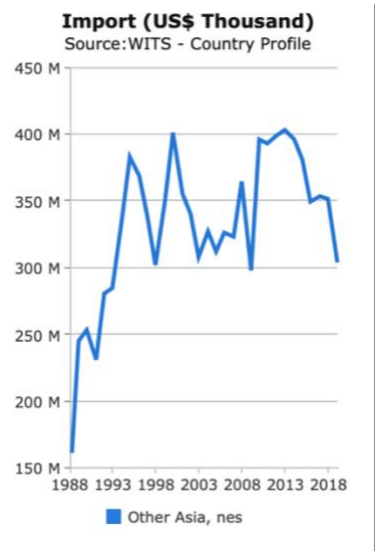

Figure 2.3 Thailand Textiles and Clothing Imports from Other Asia, nes in US$ Thousand 1988-2019

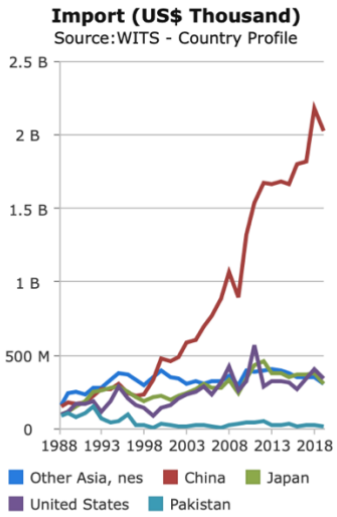

Figure 2.4 Thailand Textiles and Clothing Imports by Country and Region

Normalized Import of Textile Index from January 2010 to July 2021

- **Appendix B: Tables**

Data	Sources of Data	Unit
Import of Textiles in Thailand	Bank of Thailand	Index
Keyword Search Statistics	Google Trends	The number of interest over time for search terms

Table 1.0 Sources of Data

```
. reg ImportoftextilesIndex เสื้อยืดThailand textilethailand zarathailand pullbeart
> hailand uniqlothailand เสื้อเชิ้ตtaobaoThailand เสื้อผ้าสตรีTThailand
```

Source	SS	df	MS		
				Number of obs	= 141
				F(7, 133)	= 59.51
Model	11.0447422	7	1.57782031	Prob > F	= 0.0000
Residual	3.52646504	133	.026514775	R-squared	= 0.7580
				Adj R-squared	= 0.7452
Total	14.5712072	140	.104080052	Root MSE	= .16283

Importoftex~x	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
เสื้อยืดThailand	.0804198	.034474	2.33	0.021	.0122316	.1486081
textilethai~d	.4116562	.111924	3.68	0.000	.1902749	.6330375
zarathailand	.0732371	.0295606	2.48	0.014	.0147674	.1317068
pullbeartha~d	.1038911	.0345004	3.01	0.003	.0356508	.1721315
uniqlothail~d	.0266648	.012599	2.12	0.036	.0017446	.051585
เสื้อเชิ้ตtaoba~d	.0327384	.0153304	2.14	0.035	.0024155	.0630614
เสื้อผ้าสตรีT~d	-.030722	.0098864	-3.11	0.002	-.0502768	-.0111672
_cons	.6535075	.1161015	5.63	0.000	.4238631	.8831518

Table 1.1 Linear Regression Analysis in STATA

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