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Using Google Trends in Modelling Sales and Household Consumption Behaviours

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Abstract

From the keyword search "sale" in Google Trends, this research aims to re-examine the association between Google Trends keyword search and related topics in order to develop a marketing strategy towards sale performance and household consumption. The study analysed sales performance and household consumption using data during the period 2007-2020. The methodology was divided into two stages, the first of which involved identifying the relevant dimensions of five related topics using the ordinary least square regression logarithm. During the second stage, quantile regression was used to evaluate the association between Google Trends keyword search and related topics using a set of regression functions to account for non-normal errors and outliers. The results show that households using smartphones and household debt have a positive impact on both sales performance and household consumption, while internet usage by entrepreneurs is negatively influenced at all levels of household consumption but shows a highly positive influence on both low and high levels of sales (the lowest and highest quantiles). The results show further that price is sensitive to both sales performance and household consumption due to its strongly negative impact on the lowest and highest levels of household consumption, but there is a positive association with the highest sales level. Companies or entrepreneurs can visualize promptly specific directions on digital marketing strategy handling to rapid economic changes in order to increase sales performance. This finding used an exact methodology for calculating the association of Google Search in order to answer the significant factors association that would be essential for the practical research.

Keywords: Google Trends, Related topics, Sales performance, Household consumptions
JEL Classifications: M31, O21, O32

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1. Introduction

The rapid development of the internet led to the possibility of generating, storing, and accessing a large amount of data, which paved the way for the opening of the big data era. Big data storage and big data analysis have contributed to the improvement of the systematic scientific research, especially in the marketing strategies of many companies. It has been used in the industry to provide customer insights for transparent and simpler products.

One of the reasons for the great interest in using big data is to better understand consumer behaviour, which is constantly changing. These data sets are highly voluminous for traditional data management and can be used to handle business problems (Sivarajah et al., 2017). The use of big data analytics can be of great assistance to decision-making in many ways. It can be used to discover patterns and trends and to offer the right solution for consumers at the right time, contributing to enhancing companies' distribution channels and experiences. Moreover, social network searches are constantly seeking to credibly establish behaviours among customers and informational exchanges in order to become more innovative in solving commonly held problems in companies (Smith-Ditizio & Kendall, 2018). It can be used to complement official statistics or create higher sales performance indicators.

In 2006, Google launched a tool named Google Trends to visualise the popularity of searches over time, and it has achieved good results. Google Trends is a publicly available tool (https://trends.google.com/) that reports an index of the volume of Google queries, which can be filtered by category, search type, geographic location, and time range. Google Trends provides information that can be used to support companies' decision-making and carry out market problems and academic research. Google Trends search behavior is a crucial consideration for companies looking for new clients in order to create a marketing strategy that directly responds to customer demand. Online search queries have great potential to anticipate customer demand or decisions. For example, a variety of search words (keyword search) and related topics can be used to measure the relationship to overcome competition in the market. Google Trends is a free data exploration tool that lets marketers better understand what customers are interested in and curious about.

Most companies have sought and learned significant information regarding online customer behaviour and needs. Through the concept of search marketing, these companies have recognized the correlation between online and offline user activity (Althonayan & Sharif, 2010; Al-Karaghouli & Fadare, 2010). Organisations have come to understand how to track the interests of their customer base and measure individual perceptions through a variety of sophisticated techniques. All in all, companies should quickly learn to understand how to track user (customer) interest, measure individual perception, and customise their shopping preferences in order to potentially create marketing strategies.

Employing a marketing strategy that responds to customer behaviour has always been an important activity for a firm because it is closely related to its products and sales, market share, and the future development of distribution channels. This marketing strategy style reflects a company's investment in its marketing activities, including the level of technological investment and changes it makes, which often include an aggressive marketing style. An aggressive marketing strategy is increasingly being adopted by firms under the logical thinking of traffic marketing in the internet age. The

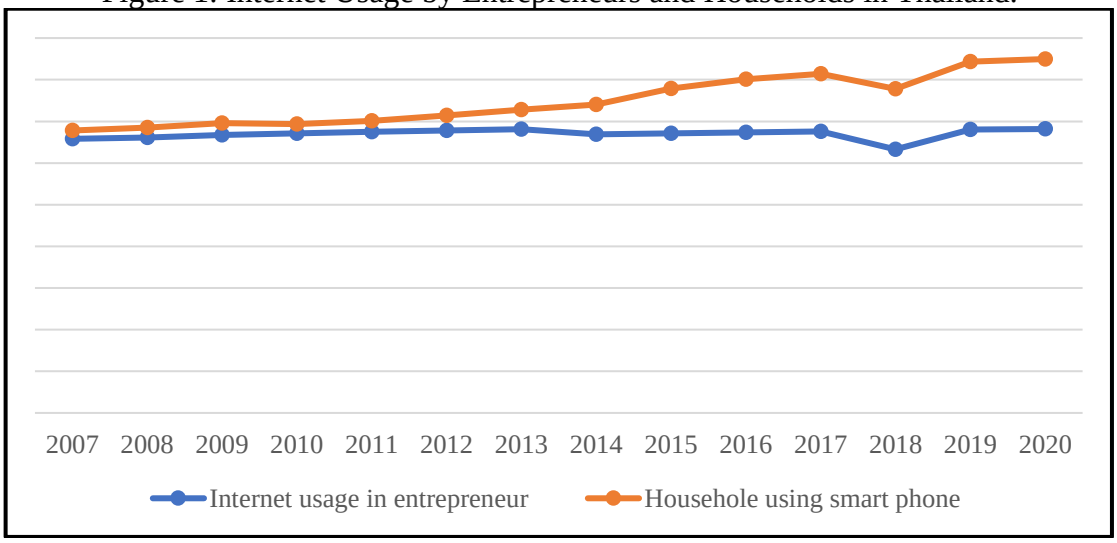
effect of the marketing strategy style will be created by the current condition of the global changing situation.

One of the most important advantages inherent in a marketing strategy that is responsive to Google Trends is that it is updated on an almost real-time basis. Google Trends provides access to large queries in real time, which is useful, and also shows information on related topics at the same time. It may be associated with various customer demands relating to product type, sales and marketing patterns, and customer convenience. Moreover, it quickly processes the entire data set representing all Google searches. Unfortunately, Google does not share the exact methodology that it uses when calculating the Google search volume indices. Thus, researchers should think about undertaking the most appropriate and feasible data analysis methods to answer a research question using empirical data to accurately respond both to customer demand and the company's social media marketers' needs to implement AI applications to improve their digital marketing strategy and sales volume.

It is clear that using powerful internet search to influence a strategic marketing approach plays a deterministic role in directing new customers and increasing sales figures. Various types of content and search will have diversified effects on online companies' sales performance and marketing channels (Geng et al., 2020).

If Google Trends searches can be analysed and used as a predictor of marketing strategy, firms can use searches to accurately monitor consumer demand, behaviour, interests, and type of marketing options, and to predict sales. It has important managerial implications for marketers who wish to increase consumers' engagement in social media platforms such as Facebook, applications, or YouTube. Social media platforms are not just another communication option. Marketers can use them to send one-way messages to target consumers when they visit a social media platform(s), which is a key feature that differentiates social media from other traditionally distributed channels as well as online communication channels (Triantafillidou & Siomkos, 2018).

Figure 1: Internet Usage by Entrepreneurs and Households in Thailand.



Source: National Statistical Office

Thailand has been developing its economy based on national and social development plans. The influence of social media is penetrating Thailand, and both entrepreneurs and Thai households with smartphones are increasingly using and relying on social media platforms (shown in Figure 1). Companies, and especially marketers, today face a range of challenges and are struggling to directly interact with customers

and control key marketing channels. It is an increasing challenge for companies to work across functions and fulfil their marketing strategy. Because of this, every business needs to convert large Google Trends queries into prospects by using an exact methodology to design marketing strategies to increase sales. A company may have more than one strategy in place at any given time using various large queries to calculate an appropriate and feasible model in order to plan marketing strategies, and so companies need to determine exactly where their business is currently positioned.

2. Literature reviews

2.1 Google Trends search and sales

Due to technology rapidly changing, the amount of consumer data currently being collected and stored as "Big Data" has grown exponentially. With the increase in "Big Data" usage, many companies and researchers have a powerful method to analyse the different attributes of customers influencing sales. One of the main applications that uses "Big Data" to analyse patterns and trends in internet searches is Google Trends. Google Trends is a public website that belongs to Google Inc. and offers search data from the Google search engine, showing the frequency of a keyword or group of keywords compared to other searches. It is clear that companies need to respond to these keyword search when creating marketing strategies by using this tool to assess business competitiveness and customer behaviour and demand. The prediction of entrepreneurship is motivated not only by academic researchers but also by marketers to achieve the companies' objective in order to provide various demand of customers. Google Trends is a website by Google that shows the top search queries on Google. It reflects searchers' interests in particular topics that are relevant to them in their lives and work. Most entrepreneurial executives often try to reach those customers, markets, and distribution channels to find opportunities to truly respond to those customer keywords. Regarding the keyword, Huynh (2019) investigated the influence of Google keywords, and he confirmed that the keywords such as new business and entrepreneurs have a strong motivation to create more firms to enhance sales in the technologically changing economy.

Because of rapid technological change, consumption interest currently influences both searches, market trends, and sales. Kim (2020) examined how online searches influence the sales of a business. He suggests that marketers should consider online search volume as a tool to improve revenue. This is because marketers certainly want to make it as easy as possible for consumers to search for their products, and customers may benefit from being able to perform easy online searches at specific websites. In terms of Big Data predictors, especially web search volumes, managers should primarily be incorporated into current customer demand toward the specific type of products and services to better understand future demand in order to create their digital marketing strategies or sales. Furthermore, the importance of incorporating data search predictors into daily demand can overcome competitors' sales volumes as social media indicators for benchmarking purposes (Tian et al., 2021). Real-time information on customer behaviours and economic dynamics is valuable to researchers, marketers, and policymakers. The current public interest in consumer demand was assessed by Google search data using the Google Trends service. Investigated keywords from Google Trends are the geographical distribution of search frequencies showing public interest that influences both consumer behaviours and marketers in order to create new competitive advantages for improving higher sales (Jun et al., 2018). In addition, they confirmed that public interest keyword searches using Google Trends is an important part of supporting

consumer behaviour, and both the keyword search and related topics can be used to assess both public opinion and consumer demand for a variety of topics in order to accurately create marketing strategies.

A new mechanism to attract new customers or to maintain current customers' satisfaction and loyalty is using smartphones to order goods via mobile applications (app) especially food. Some businesses, such as restaurants, provide these innovative channels to reach customers with high-quality services. Many restaurants use innovative channels to reach customers and provide them with high-quality services. By using these apps, customers are able to more easily and effectively access and order their food from a wide range of restaurants at times and locations that are convenient to them (Alalwan, 2020). New customers' attitudes towards using food apps are largely influenced by the level of trust, design, and product variety, and that is positively significant to the customers' satisfaction and their intention to reuse such apps, although their price is higher for the service fee.

Development of Google Trends

In this dynamic environment, both businesses'and consumer's needs are changing constantly. To keep up with the instantly changing behaviours in Thailand. Google Trends is a public website that belongs to Google Inc. It can reflect public and consumer interests that might potentially translate into consumption's actual behaviour (Nakavachara & Lekfuangfu., 2018). Google Trends was launched in 2006. It offers data based on Google Search that shows how frequently a particular keyword search term is entered in comparison with all other search terms in different regions and languages (Google, 2017). Google Trends can be used to analyse media attention, search interests, and related topics or between multiple topics (this is the main source of this research). As a result, the Google Trends service was developed by Google Labs to enable the analysis of queries and electronic news articles in Google's databases of searches and news articles in order to determine what is popular (Rech, 2007). A more practical goal is to create new values in diverse areas through Google Trends by clarifying its potentials and limitations and promoting a better understanding of behaviour and the characteristics of customers. The purchasing behaviour of customers in this era of e-commerce has been evaluated as being of significant interest to businesses and practitioners in various ways (Lee & Lee, 2015).

2.2 Household debt and consumption

Household debt has received much attention from the public sector because it is reflected in the ratio of household debt to gross domestic product (GDP). As a result, this has led to rising concerns that Thailand's elevated household debt might affect private consumption and economic growth in the long run. Household debt is defined as all liabilities of households, including consumer debt, household debt, family debt, and personal debt. In the economics literature, households often refer to both individuals and families. In the business literature, consumers refer to both individuals and families. In economics, the consumption function is the relationship between consumer spending and the various factors determining it. In this paper, we use consumers to refer to household debt because it is defined as all liabilities of households, both individuals and families.

Household debt and credit have become an increasingly important payment method for consumers across the globe, particularly in developing countries. Lee and Lee (2021) showed that households with more favourable credit usage behaviour tend to pay for irregular payment practices regardless of the wants and needs. They also found that households with higher incomes were generally less likely to pay by credit card because they would have a greater ability to understand and manage repayment responsibilities

than lower-income households, as credit has seen the fastest rise in consumer debt in practice during a financial crisis.

Many consumers have become more willing to take on debt for consumption because of greater access to credit and its convenience (Soll et al., 2013). In addition, it has also been found that less numerate individuals tend to underestimate the monthly payment and always pay the minimum amount on each new statement. With the increasing levels of consumer credit, households with a family who was younger, with a higher level of education, and with a larger household size were more likely to hold a larger number of favourable specific attitudes toward using credit. Also, household income was a positively meaningful indicator of consumption in the country (Chien & Devaney, 2001). As household debt has increased rapidly, could it be a sign that the economy is recovering, and consumer confidence is rising? In theory, the credit system in the economy transforms surplus cash balances into loanable funds, which then return to circulation as credit to households and businesses. Household debt is an important aspect of a modern economy, and it plays a significant role in households' financial well-being by affecting their country's consumption and investment. Credit can serve as a consumption-smoothing mechanism by allowing households to finance higher consumption patterns. In particular, household spending on consumption goods in total is relative to their disposable income and gross domestic product (GDP). On the other hand, the impact estimator for household consumption is not significant with household credit (Banerjee et al., 2015). They found that microcredit programs in India do not affect food consumption. They also explained that microcredit seems to have played a very small part in consumption but is highly significant to the new business treatment.

In terms of the relationship between household debt and consumption, Meniago et al. (2013) pointed out that consumption was found to have a positive effect on household debt. This meant that households taking on more debt to buy things like new homes and cars is likely to boost economic growth and increase GDP. Moreover, Lombardi et al. (2017) also provided th insights into the impact of household debt on the economy. The study showed that an increase in household debt boosts a country's consumption and GDP growth in the short run but tends to lower GDP growth in the long run.

2.3 Household income and consumption

The relationship between income, both household and personal, and consumption is the important category of social transfers relating to the expenses necessary in health, education, and wealth. This is linking distributional results to relevant macro-economic indicators such as GDP, total or average household income, individual consumption and saving figures. The higher household income provides opportunities for investment, which can potentially lead to increased consumption and accumulated wealth. Furthermore, higher-income households can not only afford alternatives to consumption, but also reach a greater variety of investment opportunities and have access to special products associated with higher satisfaction. On the other hand, lower-income households devote a higher proportion of their income to such indispensable products than higher-income households. Zhu et al. (2020) explored the relationship between household consumption and income growth in China. The results indicate strong evidence that consumption will continue to increase with households' rising income. Meanwhile, the inequality of lower-income growth has a larger impact on consumption among households with a reducing income.

Due to the changing technology of digital financial devices, digital financial inclusion, which is the provision of digital device access to formal financial services,

should be suited to daily needs to improve marketability and transmit and receive the transaction details of customers' preferences, including convenience. Yu et al. (2021) examined the overall impact on the consumption structure by using the financial devices of consumption and household income. The study confirmed that increasing household income positively influences household consumption by using financial devices including wealth, easing, and facilitating payment methods. Lin and Zhang (2022) also confirmed that household income positively affects consumption of asset holdings and shrinks the household consumption gap. In addition, they suggest that marketers and policymakers should totally consider technological devices for planning marketing strategies and make full use of the inclusive social benefits of digital financial construction toward accumulated sales. Regarding the relationship between wealth, household income, and consumer expenditure, the real wealth of Spanish households' income has a significant positive effect on consumer expenditure, particularly lower-income households' disposable income. Such households plan their consumption almost exclusively on the basis of their declining and unstable income, resulting in lower consumption expenditure (Martín-Legendre et al., 2020). In another recent study, Anghel et al. (2018) examined exhaustively the evolution of income, wealth, and consumption inequality in Spain. The study found that household expenditure on consumer durables by low-income households decreased during the crisis.

Among the main determinants of both household and personal consumption, Travassos et al. (2021) pointed out that elderly and young adult-headed households have different consumption patterns than younger-headed households. Namely, the elderly and young adult-headed households with higher income increase their consumption expenditure on healthcare and food to a greater extent than do younger-headed households. In line with personal income and consumption, income per capita growth (personal income) in China has a relatively large demand for products that affect public health, such as alcohol and tobacco (Chen et al., 2016). Undoubtedly, both household and personal income are highly dependent on consumption to finance their expenses. On the other hand, some products, called inferior goods, generally see a decrease in sales whenever incomes increase. Income was hypothesized to have a negative relationship with used products due to their being viewed as inferior goods by consumers (Norum & Norton, 2017). Moreover, some lower-income households are more willing to extend credit by using the consumer credit option to meet their current goods and service needs (Kolios, 2020)

2.4 Price and consumption

The price of goods or services in a marketplace determines the amount of consumer demand. Because it often affects demand and sales, price represents the value of a product or service in the market that customers are willing to pay. Both households and individuals plan their consumption over their lifecycles with the intention of optimising their consumption throughout their lives. Assuming this rational planning behaviour, there is a linear relationship between consumption, income, and wealth. Households at the top of the distribution, household income quantile play for an increasing share of total wealth. The changes in the estimated value of consumption impact the increasing price index (Martín-Legendre et al., 2020).

Most marketing practices assume that consumers will buy when prices are low, but this may not always hold true. Son and Jin (2019) analysed the relationship between perceived price and willingness to purchase goods from college students in the south-eastern region of the USA. The authors discovered that consumers do purchase high-priced products when they feel that the price is fair. Price fairness is defined as a customer's judgment concerning the highest satisfaction. The difference between a

seller's price and a comparable other party's price is reasonable and acceptable. However, price fairness judgement is not based only on price. Product quality, seller reputation, and brand name are also used to judge price fairness. Therefore, consumers consider many factors, including perceived price, when judging the proportion between utility and loss in the outcome (Xia et al., 2004). Bodur et al. (2016) and Cho (2015) supported the idea that consumers are willing to buy products when they perceive that they have superior quality.

Regarding consumption values, price strategy and promotion are commonly used in the marketing sector and have been studied in numerous studies. Some researchers have attempted to explore the relationships among different consumption values and purchase behaviour. Cao et al. (2021) demonstrated that price, satisfaction, and emotional and social values had significant and positive influences on purchase behaviour. These influences consisted of product quality, conditions (such as discounts, credit, convenience, and sales), and consumer demographics, which can change over time depending on the situation. For example, Kushwah et al. (2019) confirmed that social and emotional value have a positive association with consumer options and marketing conditions. In this notion, a more detailed understanding of the relationship between perceived price and willingness to purchase is crucial in helping marketers and practitioners establish optimal pricing and marketing strategies.

3. Objective of research

The purpose of this research is to examine the association between Google Trends keyword search and related topics in order to develop marketing strategy toward sales performance and household consumption. In this study, the keyword search is "sale," and there are five related topics consisting of media and communication, debt, income, entrepreneur profession, and price.

The study employs the most important factors, in accordance with related topics, that influence sales performance and household consumption. These related topics (variables) are commonly utilized for making decisions to buy goods and services. The description of related topics and previous literature used in this study is listed in Table 1.

Table 1: The Description of Related Topics and Previous Literature.

Related topic	Measurements and variables	Supported studies	Year
Consumption	Household consumption (CONSU)	- Anghel et al - Travassos, G. F., Coelho, A. B., & Arends-Kuenning, M. P. - Chen et al	2018 2021 2016
Media and communication	Households using smart phone (HOU_PH)	- Yu et al - Lin, H., & Zhang, Z.	2021 2022
Debt	Household debt (HOU_DE)	- Lee & Lee, - Soll, J. B., Keeney, R. L., & Larrick, R. P. - Chien, Y. W., & Devaney, S. A. - Meniago et al. - Lombardi, M. J., Mohanty, M. S., & Shim, I.	2021 2013 2001 2013 2017
Income	Household income (baht / month) (HOU_INC)	- Zhu et al. - Yu et al	2020 2021

Related topic	Measurements and variables	Supported studies	Year
		-. Lin, H., & Zhang, Z.	2022
		- Martín-Legendre et al	2020
		- Norum, P., & Norton, M	2017
Price	Consumer price index (PRICE)	- Martín-Legendre et al	2020
		-. Son, J., & Jin, B. E.	2019
		- Xia et al.	2004
		- Cao et al	2021
		- Bodur et al	2016
		- Cho et al	2015
Entrepreneur profession	Internet usage in entrepreneur (ENT_INT)	- Tian et al.,	2021
		-Geng, et al.,	2020
		-Triantafillidou, A., & Siomkos, G.	2018
		- Kim, H.	2020
		-Althonayan and Sharif	2010
		-Al-Karaghouli and Fadare	2010

Source: Author's own study
Information sources: EBSCO Discovery Service, Emerald, Science Direct, and Google Scholar

4. Methodology and data

The methodology was divided into two stages: the first was aimed at identifying the relevant dimensions of the related topics on sales and household consumption using the ordinary least square (OLS) logarithm regression. The second stage intended to examine the determinant of such related topics in different dimensions on sales and consumption using an econometric model, quantile regression.

This research employed secondary annual statistics covering 2007 to 2020, a period of 14 years for each variable. The reason for this selection data of the time period is consideration for availability, which is the major combination in any empirical investigation.

4.1 Econometric Model

The OLS regression approach requires the assumptions of homoscedasticity and the normal distribution of the error term. The quantile regression approach (QR) presents several advantages compared to conventional estimation methods, such as ordinary least squares. It provides summary statistics on both the central part and the tails of the distribution of the response variable, allowing for a more complete investigation of the influence of specific covariates. The quantile regression technique was used to compute a set of regression functions, each corresponding to a different quantile of the distribution of conditional volatility. Quantile regression produces similar results to OLS regression, but QR is more robust to non-normal errors and outliers (Koenker & Bassett, 1978), while OLS can be inefficient if errors are highly non-normal. Furthermore, it can easily compare regression coefficients of specific quantiles to least squares estimates. The interpretation is very similar: a one-unit increase in the predictor variable associated with the estimated coefficient produces a change in the dependent variable expressed by the coefficient obtained for the specific quantile of the response variable. The model examines the composition of sales and consumption as follows:

Model 1:

$$\ln(SALE)_t = \beta_0 + \beta_1 \ln(HOU\_PH)_t + \beta_2 \ln(HOU\_DE)_t +$$

$$\beta_3 \ln(HOU\_INC)_t + \beta_4 \ln(ENT\_INT)_t + \beta_5 \ln(PRICE)_t + \varepsilon_{it} \quad (1)$$

Model 2:

$$\ln(CONSU)_t = \beta_0 + \beta_1 \ln(HOU\_PH)_t + \beta_2 \ln(HOU\_DE)_t +$$

$$\beta_3 \ln(HOU\_INC)_t + \beta_4 \ln(ENT\_INT)_t + \beta_5 \ln(PRICE)_t + \varepsilon_{it} \quad (2)$$

when:

When:

SALE	=	Total sales in Thailand as a proxy for sales.
CONSU	=	The amount of annual household consumption in Thailand
HOU_PH	=	The amount of annual household use of smartphones in Thailand as a proxy for media and communication.
HOU_DE	=	The amount of annual household debt in Thailand as a proxy debt.
HOU_INC	=	The amount of annual household income as a proxy for income.
ENT_INT	=	The amount of annual internet usage by entrepreneurs as a proxy for their profession.
PRICE	=	Price index as a proxy for price.

Data source: National Statistical Office. Ministry of Commerce.

Models 1 and 2 are estimated to examine the determinants of different related topic parameters on sales and household consumption. The quantile regression approach was employed in this study, and an attempt has been made to compare it with simple OLS estimates. The determinants of sales and household consumption and independent variables chosen in this study were to use the logarithm of the annual data to measure this performance. The reason for this decision was to take advantage of statistical tools to improve on features that are normally distributed when obtaining data.

4.2 Why variables are chosen?

From the Google Trends keyword search for "sale", there are five related topics: media and communication, debt, income, entrepreneur profession, and price. The model examines the composition of five related topics (independent variables) and Google Trends keyword searches (dependent variables) to analyse time-series data during a period of 2007 to 2020 to evaluate sales and consumption behaviours to maximize customer satisfaction by focusing on purchasing abilities. The adoption model is important in explaining sales and consumption behaviours. The research result is deemed appropriate as the model if customers perceive them as something new, even if they have been around for a long time.

Sales are the main pillars of every business. Businesses need to be aware of consumer buying power because it affects what products and services people spend their money on. Consumer buying power and consumption behaviour are vital elements for businesses to understand. Reasonable or fair price, marketing trend strategy, and credit have become essentially tied to the consumer's ability to make a purchase with the amount of money they have available to them. Typically, the higher the purchasing power a consumer has, the more buying power they have.

It is certain that a marketing trend strategy such as online customer views posted on the company's website with content platforms is considered an important source of

product information and plays a crucial role for customers because of its influence on sales (Somprasertsri & Lalitrojwong, 2010). Hence, content platforms activate consumers to engage in information seeking consumption, which nowadays often involves searching the web using the internet accessibility made possible by smartphones. A consumer's online behaviour search could potentially lead to online product purchasing. In order to support their purchase decision, the credibility of the sellers is evaluated as a powerful marketing tool to attract customers as well as increase household consumption (Ladhari & Michaud, 2015). Consumption will increase with households' rising income. Meanwhile, the lower-income households have a larger influence on the consumption of households with a reducing purchasing power (Zhu et al., 2020). Because of the reasons mentioned above, credit is a powerful tool to increase purchasing abilities, and these variables are chosen to explain sales and household consumptions.

5. Empirical Results

The correlation analysis employed in this study is shown in Table 2, and the statistical summary is exhibited in Tables 3 - 5.

5.1 Correlation matrix

The Pearson correlation matrix was used to check for multicollinearity problems, and the results are reported in Table 2. Table 2 shows the correlation between the independent variables (IV) and dependent variables (DV). Households using smartphones (HOU_PH) are highly and positively correlated with household income (HOU_INC), internet usage by entrepreneurs (ENT_INT), and the Consumer Price Index (PRICE). Moreover, household income (HOU_INC) is also highly and positively correlated with internet usage by entrepreneurs (ENT_INT) and the Consumer Price Index (PRICE). However, the correlation among other variables is smaller. It is important to treat any econometric problem related to serial correlation or multicollinearity. Myers (1990) indicated that a variance inflation factor (VIF) value of greater than 10 is a concern. Accordingly, the VIF values are well below 10, at 4.20 for model 1 and at 1.00 for model 2. Therefore, multicollinearity is not a problematic issue or concern for this study.

Table 2: Correlation Matrix

Variables	**ln(SALE)**	**ln(CONSU)**	**ln(HOU_PH)**	**ln(HOU_DE)**	**ln(HOU_INC)**	**ln(ENT_INT)**	**ln(PRICE)**
ln(SALE)	1						
ln(CONSU)	.200	1					
ln(HOU_PH)	.569	.547	1				
ln(HOU_DE)	-.095	.499	-.086	1			
ln(HOU_INC)	.254	.614	.873	.184	1		
ln(ENT_INT)	.529	.386	.923	-.029	.835	1	
ln(PRICE)	.456	.694	.871	.312	.910	.779	1

Source: Author's own study
Information sources: National Statistical Office and Ministry of Commerce

Table 3: OLS Regression Result of Total Sales (SALE) and Household Consumption (CONSU)

Variables	**Model 1 Dependent variable, Sale ln(SALE)**		**Model 2 Dependent variable, Household consumption ln(CONSU)**	
	Coefficient	**p-value**	**Coefficient**	**p-value**
Intercept	14.552	0.000	2.866	0.000
ln(HOU_PH)	.479	0.004***		
ln(HOU_INC)	-1.858	0.029**		
ln(PRICE)			.800	.006***
R^2	0.570		0.482	
Adjusted R^2	0.491		0.439	
F-statistic	7.276		11.158	
Prob. (F-statistic)	0.010		0.006	
DW	1.328		1.513	
Main VIF	4.202		1.000	
No. of observations	14		14	

*Note: Significant level; *** p < 0.01, ** p < 0.05*
Source: Author's own study
Information sources: National Statistical Office and Ministry of Commerce

5.2 Ordinary least square and quantile regression analyses

The study further applied stepwise multiple regression to examine the association between sales (SALE) and household consumption (CONSU) and five related topic measurements (shown in Table 1). Table 3 shows the results, which consisted of two models: stepwise multiple regression of sales (SALE) and household consumption (CONSU).

Model 1 examines the association between the five IVs of the study and SALE. In this model, the results show that households using smartphones (HOU_PH) have a significantly positive association with sales (SALE) (as the coefficient is 0.479 and is significant at 1 percent). An almost 0.5 percent increase in the households using a smartphone (HOU_PH) will increase the sales (SALE) by 1 percent. This result shows the importance of households using a smartphone to increase and expand the sales of a company. This indicates that households using a smartphone are beneficial and positively motivate the sales performance of a company, and it is clear that HOU_PH is a significant determinant of SALE. The result is consistent with the literature of Kim (2020), which confirmed that marketers should consider online search volume as a tool to improve sales.

The first model also shows that household income (HOU_INC) has a negative association with sales (SALE), with a coefficient of -1.858 and is significant at 5 percent; a 1.858 percent increase in household income (HOU_INC) leads to a decrease of 1 percent in sales (SALE). The result reveals that higher household income leads to a decrease in the company's sales. This may mean that higher household income appears to be negatively linked to the purchase (goods and services). Economic theory also indicates that some goods may be inferior. In other words, as income increases (decreases), demand for goods falls (rises). Norum and Norton (2017) concluded that household income has a negative relationship with purchasing second-hand products because they are viewed by consumers as inferior goods. Also, while lower-income households are less able to buy the goods and services they need, they prefer a credit option from sellers to buy products and reach high satisfaction.

In the second model, PRICE shows significant relationships with household consumption (CONSU) with a coefficient of 0.800 at 1 percent significance levels. This

result reveals that price plays a significant role in increasing household consumption. The coefficient is 0.800, which shows how important this determinant is for household consumption. The reason may be consumers' purchase intention and willingness to pay for the product quality implications. There is some empirical evidence from Bodur et al. (2016) and Cho (2015) that consumers are willing to buy products when they perceive superior product quality, and Son and Jin (2019) confirmed that consumers' willingness to purchase goods increases when they feel that the price is fair and offers them the highest satisfaction.

In statistics, an outlier is a condition that occurs when a data point is significantly different from other observations. Outliers can change the meaning of the data. This research used the quantile regression approach (QR) to examine the relationship between dependent variables (sales, household consumption, CONSU), independent variables, and related topics consisting of households using smartphones (HOU_PH), household debt (HOU_DE), household income (HOU_INC), internet usage by entrepreneurs (ENT_INT), and the consumer price index (PRICE). QR provides summary statistics on both the central part and the tails of the distribution of the response variable and is more robust to non-normal errors and outliers (Hao & Naiman, 2007). The benefit of quantile regression is that it examines the relationship between IV and the varied components of the distribution channel related to the DV. The quantile regression results for sales (SALE) and household consumption (CONSU) are exhibited in Tables 4 and 5.

Table 4: Quantile Regression Results of Total Sales (SALE)

Variables	**Model 1. Dependent variable, Sale ln(SALE)**					
	Q = 0.25		**Q = 0.50**		**Q = 0.75**	
	Coefficient	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**
Intercept	14.562	0.000	15.562	0.009	10.668	0.000
ln(HOU_PH)	0.852	0.000***	0.545	0.316	0.024	0.766
ln(HOU_DE)	0.947	0.000***	0.168	0.864	-0.029	0.844
ln(HOU_INC)	-3.411	0.000***	-3.730	0.043**	-3.563	0.000***
ln(ENT_INT)	0.208	0.000***	0.345	0.666	0.456	0.004***
ln(PRICE)	-0.997	0.000***	1.968	0.672	6.098	0.000***
Pseudo R square	0.521		0.558		0.652	
No. of obs	14		14		14	

*Note: Significant level; *** p < 0.01, ** p < 0.05 and * p < 0.1*

Source: Author's own study

Information sources: National Statistical Office and Ministry of Commerce

Table 5: Quantile Regression Results of Household Consumption (CONSU)

Variables	**Model 2. Dependent variable, Household consumption ln (CONSU)**					
	Q = 0.25		**Q = 0.50**		**Q = 0.75**	
	Coef.	**p-value**	**Coef.**	**p-value**	**Coef.**	**p-value**
Intercept	2.850	0.000	3.545	0.038	4.596	0.000
ln(HOU_PH)	0.231	0.000***	0.366	0.054*	0.341	0.006***
ln(HOU_DE)	0.459	0.000***	0.675	0.056*	0.640	0.006***
ln(HOU_INC)	0.251	0.004***	0.275	0.592	0.237	0.428
ln(ENT_INT)	-0.366	0.000***	-0.536	0.060*	-0.493	0.008***
ln(PRICE)	-0.723	0.004***	-1.675	0.272	-2.056	0.036**
Pseudo R Square	0.710		0.605		0.448	
No. of oobs	14		14		14	

*Note: Significant level; *** p < 0.01, ** p < 0.05 and * p < 0.1*

Source: Author's own study

Information sources: National Statistical Office and Ministry of Commerce

The quantile regression method was used to analyse the proposed model to describe the conditional distribution of the dependent variables, SALE and CONSU. The analysis considered three quantile interval ranges: Q = 0.25, Q = 0.50, and Q = 0.75, presented in Tables 4 and 5. These two tables report the estimated results of three different quantile regression models. The Pseudo R-squared statistics indicate that the model, as fitted, explains the variability in the SALE and CONSU quantile regression models.

From Table 4, at first, household income (HOU_INC) appears to be the most important factor affecting SALE. The result indicates that household income (HOU_INC) tends to have a powerful negative impact on SALE with three different quantiles of SALE at $p < 0.01$, $p < 0.05$, and $p < 0.01$ level respectively. This indicates that household income (HOU_INC) negatively impacted all levels of SALE. The result illustrates that lower-income households were less able to afford to buy goods and services that they needed. But these households potentially preferred to use credit to buy products. So, these lower-income households are more willing to extend credit in order to meet product demand, and these households may also use the available consumer credit option to meet their current goods and service needs. This finding was supported by Kolios (2020) which investigates the effect of labour market demand and monetary policy on households' attitudes toward debt.

Secondly, internet usage by entrepreneurs (ENT_INT) and PRICE are clearly essential factors affecting SALE at the 0.25 and 0.75 quantiles at $p < 0.01$ level. Internet usage by entrepreneurs (ENT_INT) has a positive relationship with SALE while PRICE has a negative relationship with SALE at the lowest quartile level (lowest SALE level) but has a positive relationship with SALE at the highest quartile level (highest SALE level). In this finding, companies (entrepreneurs) with innovative actions by using the internet in their marketing operations and options might find it beneficial for them to be more competitive and to have increased sales in the long term. This finding was confirmed by Cuevas-Vargas et al. (2021) and Kubickova et al. (2021). They found that innovative marketing strategies, such as social promotion and distribution channels, stimulated firms' sales.

In the case of price, customers are sensitive at price, particularly on firms using technological marketing. Because these firms enable businesses to reduce their costs, firms can lower their prices leading to an increase in sales (Kizim et al., 2019; Bilovodska, 2017). Meanwhile, in the case of higher prices, Bodur et al. (2016); Cho (2015); Son and Jin (2019) suggested that consumers' willingness to buy products

increases when they perceive them to have superior quality, and when they feel that the price is reasonable and gives them the highest utility and satisfaction. This is the reason why price has a positive relationship with sales at the highest level ($Q = 0.75$, $\beta = 6.098$).

Finally, both households using smartphones (HOU_PH) and those with household debt (HOU_DE) show a significant association with sales (SALE) with coefficients of 0.852 and 0.947 respectively, and significant at 1 percent only on the lowest quantile of SALE (the smallest level of SALE). The result reveals that households using smartphones (HOU_PH) might have a positive effect on sales (SALE) because these channels can be facilitating methods for increasing demand for products, transportation operations, and shrinking the household product gap of demand (Lin & Zhang, 2022; Bilovodska, 2017). Furthermore, these customers use credit more frequently for both low and high prices, including being more willing to take on debt for the purchase of high-value products because of its convenience and ability to meet current demand (Soll et al., 2013).

From Table 5, firstly, three factors are most important and determine household consumption (CONSU) at all levels of household consumptions comprised of households using smartphones (HOU_PH), household debt (HOU_DE), and internet usage by entrepreneurs (ENT_INT). These factors show significant relationships with household consumption (CONSU) with three different quantiles at $p < 0.01$, $p < 0.1$, and $p < 0.01$ levels, respectively. Interestingly, households using smartphones (HOU_PH) and household debt (HOU_DE) have positively impacted household consumption (CONSU), while internet usage by entrepreneurs (ENT_INT) has a negative relationship with household consumption (CONSU).

Positive associations between households using smartphones (HOU_PH) and household consumption (CONSU) indicate that customers are able to more easily and effectively consume their goods and services at any time and in any location with convenience (Alalwan, 2020). Singh et al. (2017) supported the idea that households using smartphones for online shopping are becoming the first option for more and more consumers, as it allows them to choose products on the basis of product reviews.

To evaluate the positive association with household debt (HOU_DE), customers might prefer credit payment methods, particularly for expensive products. These customers will benefit from promotions offering late payment (Zielke & Komor, 2020). In high-priced categories, entrepreneurs may promote long-term credit offers in order to increase consumption, which may work well in emerging countries.

Regarding the negative relationship between internet usage by entrepreneurs (ENT_INT) and household consumption (CONSU), the quality of the digital marketing, is important for customer perception of product information and high competitiveness. This digital marketing problem may occur because customers cannot connect to a server and cannot understand the platform service, including concerns about their data security (Ruiz-Alba et al., 2022; Lányi et al., 2021). Marketers should clearly communicate the digital platform with current technological capabilities through the right information and communication channels and also reduce digital marketing problems in order to increase their prospective customers contribution to higher consumption.

PRICE, secondly, showed negative significance with household consumption (CONSU) ($\beta = -0.723$ and $\beta = -2.056$) at the lowest and highest quantiles of $p < 0.01$ and $p < 0.05$, respectively. This result indicates important factors in terms of both OLS regression as a result of consumption (CONSU) and quantile regression of total sales (SALE). This finding can be explained as follows: different customers are sensitive to prices, and prices have a direct effect on consumers because when prices increase, the quantity of goods decreases. Meanwhile, many consumers are more likely to consume a

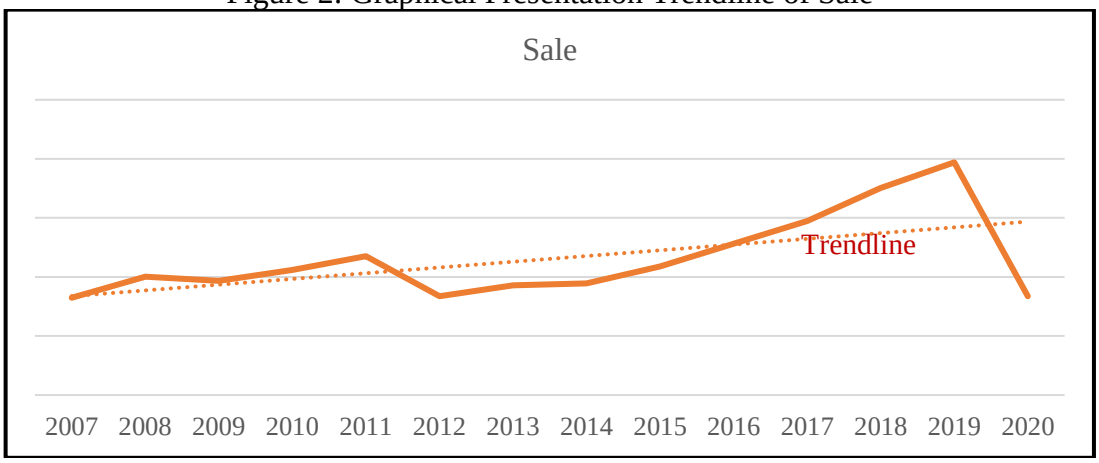
product when they are aware of its cost and are willing to pay a high price for it when that price is considered reasonable and makes their highest utility and satisfaction.

Finally, household income (HOU_INC) showed no significance in both the neutral and largest quantiles of household consumption, while it positively influenced the lowest quantile of household consumption (lowest income level, $\beta = 0.251$) of $p < 0.01$. The result points out that increasing household income creates a higher consumption demand and meets their current consumption needs, and they expect that their future income will increase (Kolios, 2020).

5.3 Graphical presentation

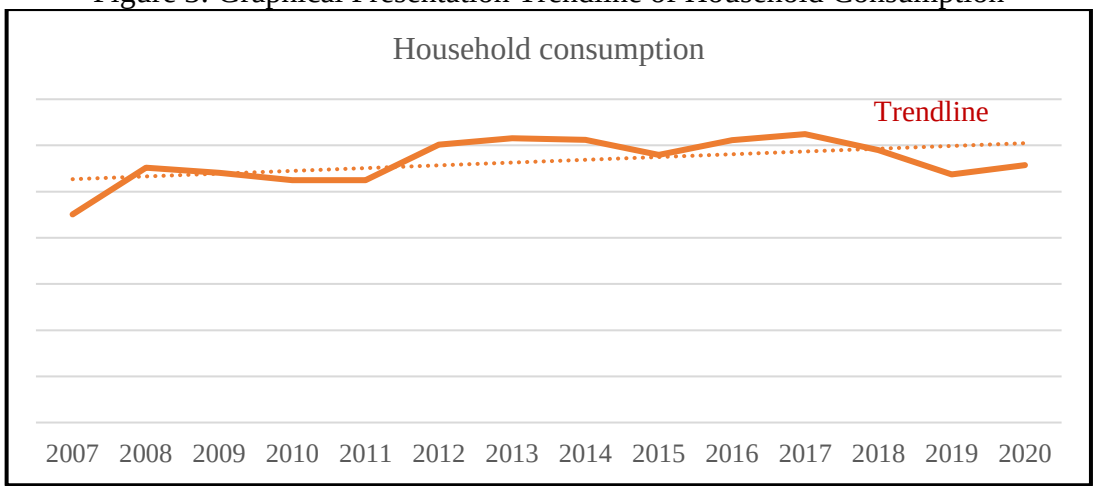
To present more convincing data, a graphical presentation series method derived by a trendline was used to make any estimations for the future years in the methodology of the present research. A trendline analysis by generating one linear equation was the supported part of the work in order to be more convincing that the statistical results obtained for estimation were consistent with the data used. Trendline estimation was found to be suitable for use as a consistent analysis tool for future outcomes (Atalan et al., 2020)

Figure 2: Graphical Presentation Trendline of Sale



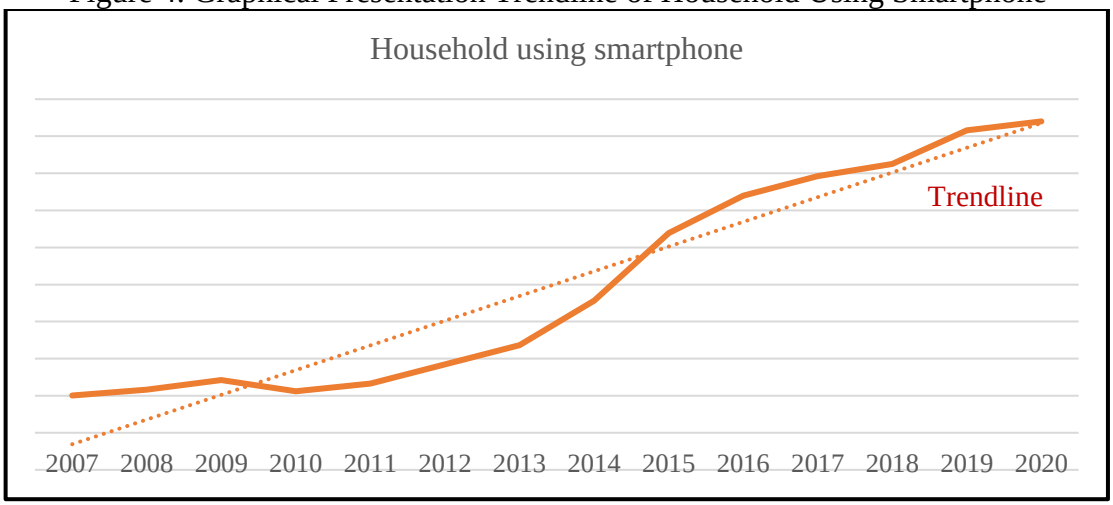
Information source: National Statistical Office

Figure 3: Graphical Presentation Trendline of Household Consumption



Information source: National Statistical Office

Figure 4: Graphical Presentation Trendline of Household Using Smartphone

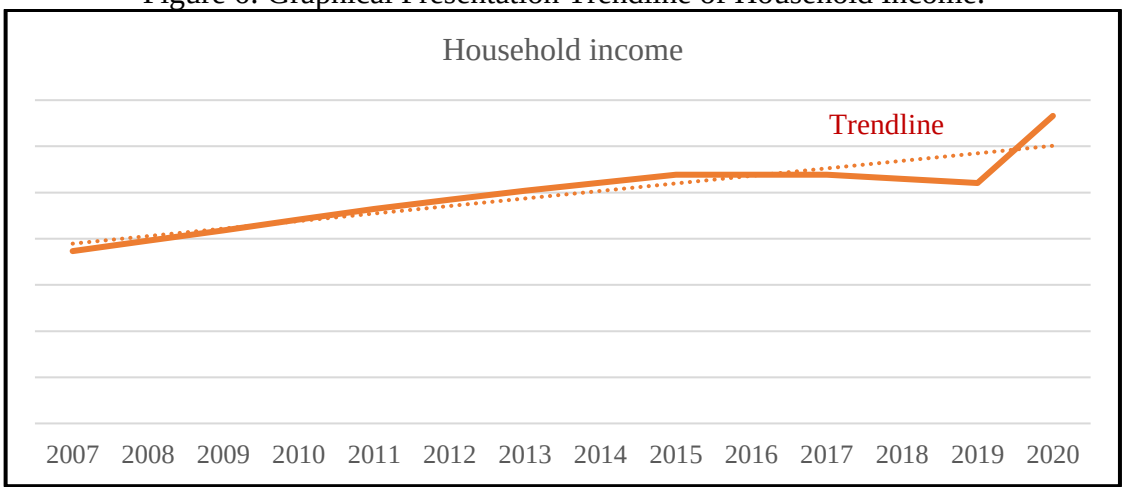


Information source: National Statistical Office

Figure 5: Graphical Presentation Trendline of Household Debt

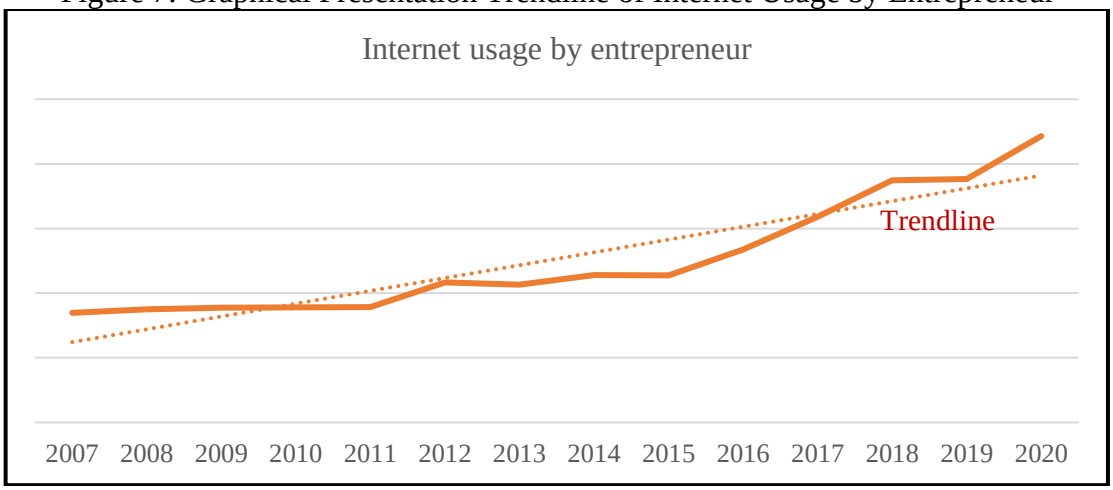
Information source: National Statistical Office

Figure 6: Graphical Presentation Trendline of Household Income.



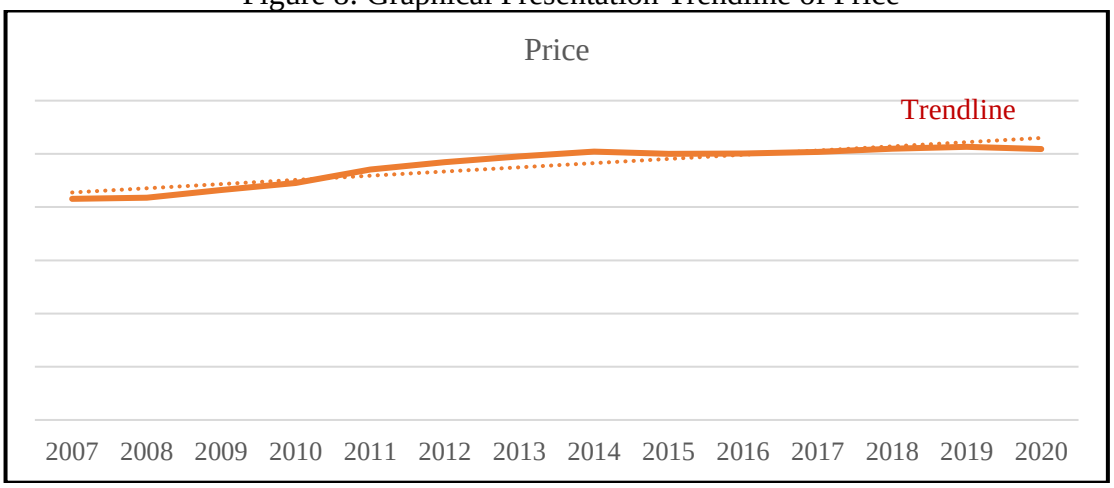
Information source: National Statistical Office

Figure 7: Graphical Presentation Trendline of Internet Usage by Entrepreneur



Information source: National Statistical Office

Figure 8: Graphical Presentation Trendline of Price



Information source: Ministry of Commerce

The two dependent and five independent variables of the model have been used to estimate the prediction of sales and household consumption in the future. As a result, researcher emphasizes that households using smartphones, household debt, household income, internet usage by entrepreneurs, and price are reflecting an increase in trendlines and appear to be the important factor affecting sales and household consumption. Figures 2 - 8 show that there was a regular increase in the average of sales, household consumption, households using smartphones, household debt, household income, internet usage by entrepreneurs, and price between 2007 and 2020. This demonstrates that the five independent variables are relatively reflecting sales and household consumption in the coming years. A trendline is a visual representation of support and resistance in any time frame and indicates the best fit of some data using a single line or curve.

According to the quantile regression model, households using smartphones (HOU_PH) have significant relationships and a positive impact on household consumption (CONSU) with three different quantiles (Q = 0.25, Q = 0.50, and Q = 0.75). In addition, internet usage by entrepreneurs (ENT_INT) has a positive relationship and is significant with sales at the lowest and highest quantiles (Q = 0.25 and Q = 0.75) at $p < 0.01$ level. And, the household income (HOU_INC) appears to be the most powerful factor affecting sales with three different quantiles (Q = 0.25, Q = 0.50, and Q = 0.75) at

$p < 0.01$, $p < 0.05$, and $p < 0.01$ level, respectively. This indicates that trendline estimation was supported by a regression model and was suitable to examine the association between Google Trends keyword search "sale" and related topics in order to more convincingly to develop sales performance, including household consumption.

6. Conclusion

With the keyword search "sales" from Google Trends and five related topics, the factors associated with the sales of a company's products that can be principally concluded from this finding are the technological developments of both entrepreneurs and households. Moreover, household income, household debt, and price are also critical factors determining a company's sales growth. Entrepreneurs using digital technology such as business websites in marketing strategies is a common challenge since many businesses know how vital digital and mobile channels are today for acquiring and retaining customers in order to generated sales increases in the long term. Eentrepreneurs' technological development, such as digital marketing, is considerably less expensive than other marketing operations. In addition, specific prices, marketing conditions, product information, and promotion options such as credit vary based on a range of possibilities for various customer needs. Meanwhile, many households, including individuals, own a smartphone and are using that smartphone device for news, social networking, and countless other activities, especially buying goods and services. Because of this, households using smartphones were especially likely to use their mobile device when seeking out products, facilitating the process and shrinking the household product demand gap.

In line with seeking out products and shrinking the demand gap, low-income households' income mostly uses consumer credit from entrepreneurs' marketing promotions and options on their loan payments, especially on high-priced products. Because of this, low household income is still driving an extremely high interest toward credit consumers, and this will continue to drive a certain level of sales transactions. Furthermore, these customers prefer consumption debt because they receive not only speedy goods and services when they are in need but also might be considered receiving discounts for their next sales transactions.

Another major factor determining the company's sales growth is price. Pricing influences consumers' purchasing behaviours. High price sensitivity indicates that customers can easily reject buying a product if its cost is unreasonable. The company needs to be mindful of maintaining its product quality and adding or modifying functions and utilities according to changing technology and the varying utilities and preferences of the consumers. Consumers' perceived price and willingness to pay for products increase when they feel that the price is reasonable and gives them the highest utility and satisfaction.

The next empirical conclusion is that factors affecting household consumption are interesting. Technological development of both entrepreneurs and households, including promotion options by credit payment, was confirmed as an effective marketing strategy and has become mandatory for modern businesses. Modern marketing strategies can determine customer needs, demands, preferences, and consumptions, as well as provide them with convenience. This is especially true when the customer goes on the processing websites for transactions and chooses payment options on e-commerce. Household debt plays an important role in driving higher consumption and supporting economic growth. Households also play a role as consumers of goods and services that are produced by

firms. Debt or credit options allow households to increase spending in an alternative way for consumption smoothing, responding to household demand, and more satisfaction.

Following on from the above-mentioned point about price sensitivity, price is a measurement of how much the price of goods and services determines customers' willingness to buy them. According to both the sales and household consumption models, households' consumption and buying increase when they perceive that the price is reasonable and the product gives them the highest utilities and satisfaction. It also depends on the kinds of goods and services. Furthermore, the difference between income (all quantile levels) is used to determine household consumption. As the household's income increases, consumption expenditures also increase. So, technological development of both entrepreneurs and households, including entrepreneurs' marketing promotion and options (such as household debt), household income, and price, were obviously considered to determine the buying and consuming of goods and services at different levels of sales and household consumption.

7. Implication

Technological development (digital marketing operation) focuses on using technology to improve sales performance and increase consumption, which means creating various new customers or reimagining current consumers. It specifies the direction the company or entrepreneur will take to create new competitive advantages with technology, as well as the tactics it will use to achieve these rapid changes. The most important factor of a digital marketing strategy is that it needs mastery of the product details, clear communication about marketing options, and reasonable prices to compete across the main digital platforms that consumers use to find and select products. Various and new customers are able to more easily and effectively consume their goods and services at any time and at any location with convenience by using a smartphone for shopping on platforms that offer product reviews and information (Alalwan, 2020; Singh et al., 2017). Lastly, make sure that marketers have immediately responded to the conversation to capture the true needs of that customer and keep explaining how the business can offer them ways to solve their points and reach their goals. This is the big picture which businesses need to consider when they create a marketing strategy in order to increase their sales, gain new customers, and influence consumption behaviours.

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