

Investigating the Factors Influencing Private Sector Marketing Strategies to Boost Food and Beverage Manufacturing Sales and Overall Manufacturing in Thailand: An Empirical Examination Amid Rapid Structural Changes in Economies

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Abstract

Big data offers a powerful statistical tool that helps address business issues and provides companies and organizations with a deeper understanding of their operations, enabling them to make more informed decisions. Businesses may forecast future trends and customer demands using data analysis. This study aims to investigate the factors that influence private sector marketing strategies to boost food and beverage manufacturing sales and overall manufacturing in Thailand. The researcher employed secondary annual statistics over 16 years for each variable covering 2006 to 2021. The study applied ordinary least square (OLS) logarithm regression to examine the determinants affecting manufacturing sales, quantile regression approach (QR) to re-examine the relationship between dependent variables and to get rid of outliers, and Pareto analysis (PA) for final decision-making to determine the accumulative impact. The results showed that the use of smartphones and people's average income appear to be distinctively and positively important factors affecting food and beverage manufacturing sales. At the same time, personal credit has a negatively significant correlation with food and beverage manufacturing sales. In total manufacturing sales, investment in ICT in the private sector and people using smartphones are the highest positive determinants of total (holistic) manufacturing sales.

Keywords: Marketing strategy, Manufacturing, Pareto analysis, Thailand

Introduction

The major component of a nation's economic system that individuals and businesses drive is the private sector, where a company's principal goal is to increase sales and profit. The economy is primarily driven by the private sector, with private consumption, such as household manufacturing consumption, contributing around 52.30 percent of GDP in 2021¹ (Office of the National Economics and Social Development Council, 2021). The manufacturing of business and distribution channels on creative and

innovative approaches to integrate with different types of dynamic clients. Considerable investments in the manufacturing industry have brought about rapid structural changes in economies. The manufacturing industry is broad and generally includes businesses that transform materials or components into their products. Manufacturers have increased their digital investment with higher digital maturity over the past few years and accelerated the adoption of emerging technologies to accelerate manufacturing distribution. Distributed

¹Author's own study, GDP = 16,166,598 million Baht and private consumption = 8,455,173 million Baht.

manufacturing (DM) can be seen as a challenge and opportunity regarding products to sell, and it involves technology development and investment, as well as marketing strategies that change the economics, including the manufacturing distribution of organizations (Durach et al., 2017).

To progress the business strategy of the changing and competitive business environment of today, one of the most competitive manufacturing industries in Thailand is the food and beverage (F & B) industry. This industry is also one of the largest manufacturing sectors. Modern businesses are becoming digitally transformed and now provide different distribution channels that provide significant customer advantages (Chatterjee & Vrontis, 2022). As the present business landscape is entirely competitive and consumer behavior has dramatically changed since the COVID-19 pandemic, companies must provide tailored services to customers for convenience and satisfaction, effectively impacting their sales performance related to a digitally responsive system. These trends encouraged food and beverage manufacturers to be innovative to ensure that various offerings respond to customer demands.

In terms of rapidly changing economics and competitiveness, search marketing strategies, diversification of distribution, and even survival means that companies may seek different distribution channels, such as marketing campaigns on social media, in order to reach new customers, meet consumer demands, consolidate their position in the market and thrive in business (Santos & Alliprandini, 2020). Researchers have analyzed consumer behavior, especially in the context of the COVID-19 pandemic's economic impact, through various consumption preferences, such as flexible income, consumer credit, and remote buying via smartphones due to infection fears and convenience (Aduhene & Osei-Assibey, 2023). This altered the level of marketing strategy from the consumption of dairy products or manufacturing, which are distributed by both selling and delivering products and services from manufacturer to customer with the highest satisfaction. In order to achieve these benefits, private sector investments in technology as digital transformation have significant implications for firm performance (FP) regarding sales. Digital transformation has become an important factor in business. Transforming business is relevant, with opportunities for both companies,

creating new business models, responding to customer experiences (Maedche & Hevner, 2017), and reducing costs. Digital transformation and media have importantly changed how customers communicate with manufacturers. Modern customers drive purchase decisions based on manufacturing demand via social media channels such as Facebook, Twitter, or YouTube (Klein et al., 2020). Companies should invest a fundamental role in directly stimulating digital solutions selling (DSS) by focusing on customer networking ability in social media channels and, ultimately value-based selling behavior (Guenzi & Nijssen, 2023). The key challenges of private investments in technology are establishing how to amplify a potentially attractive opportunity for customers and increase sales to demonstrate the digital solution's value and gain a competitive advantage (Singh et al., 2019).

The manufacturing and distribution planning system is an integral part of enterprise resources to manage overseeing the movement of goods from supplier or manufacturer to point of sale. Manufacturing firms should modernize activities along the value chain to integrate distribution in extended product channel offerings for various customers. Modern activity can enhance market power and overcome entry barriers beyond manufacturing superiority (Schmenner, 2009). Moreover, modern distributed management via the Internet, media, and customer credit can create customer relations with long-term value in use and gain a competitive advantage (Brax & Jonsson, 2009; Baines et al., 2009). Customers demand personalized products and responsive distribution systems in the ever-changing and highly competitive business landscape. Businesses profit margins of businesses depend on how quickly they can sell manufactured products. The more they sell, the more they earn, which means a better future for the business. A successful distribution management system is truly important for businesses to remain competitive and maintain customer satisfaction. At the same time, manufacturing companies are seeing their sales models changing. Hence, principal advances in digitization in manufacturing are an important part of the business cycle for distributors and wholesalers. Sung (2018) emphasized that companies should consider principal advances in digitization in manufacturing by moving increased distributed flexibility and product customization to progress a business strategy that is

termed alternatively in typically different manufacturing business models.

Thailand has been developing as a country, and its economy has made remarkable progress, driven by the private sector. The private sector manufacturing industry is one of the main drivers of the Thai economy. The manufacturing sector’s contribution to Thailand’s gross domestic product (GDP) contributed approximately 4.175 trillion Thai baht (approximately 0.115 trillion USD) in 2021, and this has continued to grow (see Figure 1). The manufacturing industry delivers investment plans, policies, and activities to improve the economic well-being of the communities. These plans and activities have encouraged economic growth by supporting the manufacturing industry to increase both internal and international sales (Hemtanon & Gan, 2021). Clearly, the private sector has played a huge role in Thailand’s development in translating new business models and strategies to boost innovation in the country, acting as chief of the manufacturing providers.

Following this introduction, this paper aims to empirically examine the effects of holistic manufacturing sales and food and beverage sales amid the rapid structural changes in economies. This study finds that manufacturing sales in the food and beverage industry and overall manufacturing are boosted. The National Statistical Office, the Office of the National Economics and Social Development Council, the Ministry of Commerce, and the Bank of Thailand provided data for this study. Organizations build data-driven marketing on strategies derived from the analysis of big data. This analysis will offer insights into manufacturer preferences and broader trends that once identified can impact the success of a marketing strategy and campaign. In order to apply this to sales, the Pareto Principle states that 80 percent of household products manufactured will be generated from only 20 percent of the analytical distribution. If a company wants to increase sales, the greatest impact will be felt from focusing on the top 20 percent of this distribution.

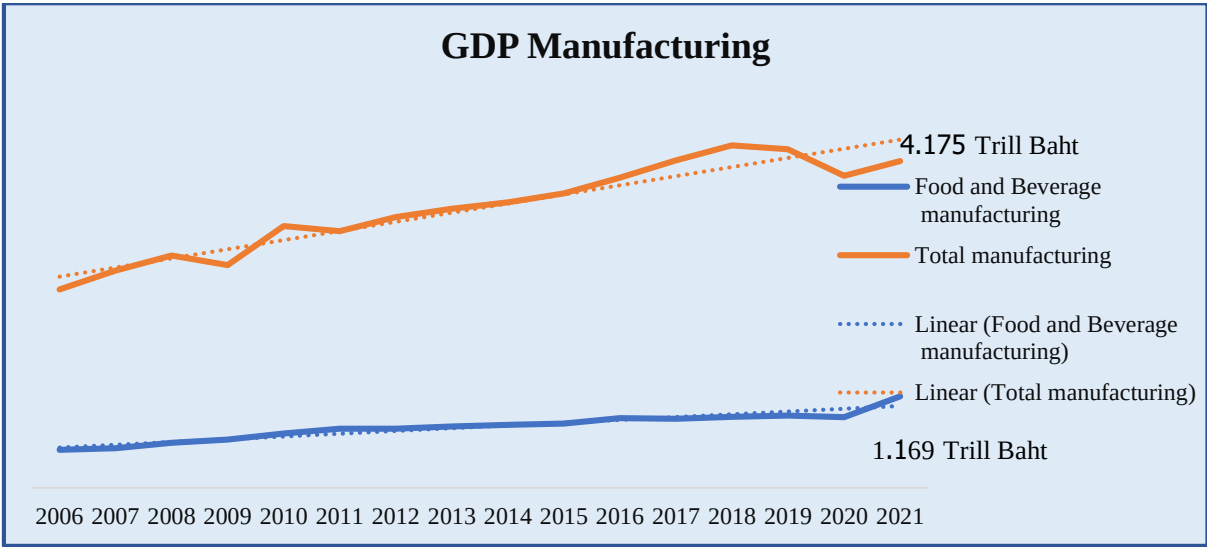


Figure 1 Shows total GDP manufacturing and food and beverage manufacturing
Source: Office of the National Economics and Social Development Council (2023)

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Literature reviews

Numerous theories look at the variables that affect a business's marketing strategies to develop its sales in the contemporary business environment and how customer behavior changes. The most significant ideas aim to define contemporary consumer behavior, including customers using smartphones to make online purchases, customers using credit, personal income (per capita income), and private sector investment through social media or the internet. These elements include the present business strategy, which identifies prospective sales targets and creates an investment plan to reach these targets. The use of secondary data refers to the effective use of data to support decision-making and other related tasks in real time for businesses undergoing significant cultural and economic change.

The role of the internet via smartphones

Due to the rapid economic transformation of digital technology and innovative influences on manufacturing, Ramadan and Aita (2018) confirmed that the internet and social media play a vital role developing in consumer purchasing behavior in modern business markets in developed and countries. An

important new aspect of modern business markets is that the different distribution channels and marketing strategies become challenged, and customers can search for information online and buy both offline and online via mobile applications (apps) via their smartphones, from the same manufacturer (Mukherjee & Chatterjee, 2021). With customers having convenient to online buying access to online buying, mobile applications have been widely utilized by various services, mobile applications have been widely utilized by various services. Smartphones can be used to order products and deliver them to an office or home. Smartphones are one of the possible channels that not only purchase intention customers by convenience in shopping online but also develop marketing strategies and more effective services for the businesses, especially the food and beverage industry and retailers (Yang et al., 2017). Grewal et al. (2018) also examine consumers' shopping behavior by using their mobile phones. The results revealed that using mobile phones can increase purchasing products overall. Smartphones have the potential to increase consumers' intention to buy manufactured goods. Consumers can select their preferred channel for every situation at their convenience because they can search and shop anywhere anytime. This may indicate that using smartphones may cause consumers to act impulsively, and it can activate their urgent demand (Rodríguez-Torrico et al., 2017). These consumers prefer to shop online because it allows them to obtain more detailed information, and customer communication and measure manufacturing effectiveness before purchasing with a better internet connection. Furthermore, by using their smartphones these customers can instantly satisfy their impulses and check product reviews, opinions, ingredients, components, and anything else they need to make the best choice. Companies can use many online tracking strategies to increase their customer base. Meanwhile, companies should develop applications and security systems to protect customers' personal information to be confident in developing a trust system. This is because trust systems positively affect online purchasing intentions and enhance customer loyalty towards ordering further products via application or smartphone.

Private sector investment

We can measure private sector investment in terms of net consumer surplus, service availability, expansion ability, higher product quality, and the rate of innovation. Consumers surplus often most satisfied with involves businesses investing in improving their ability to connect with customers easily and quickly, leading to increasing sales and profits. One of the most important positive impacts of sales expansion is that businesses thrive to reaches this point to achieve business growth, and they seek out additional options to generate more profit on these investments on the internet. The internet makes the marketplace broader and more accessible via immediate connections with customers as they purchase products and services. It can increase a business' s market share and customer base as they receive product information more quickly. Various business modes and applications have also addressed e- business- driven competitive advantages mainly generated from investing in information and communications technology (ICT) (Shehata & Montash, 2020). Based on the above statements, private sector investment in the Internet to provide a variety of distributed options is an unavoidable business strategy that can offer an advantage for businesses in terms of access to extended markets, manufacturing information, customer relation management (CRM) , and improved customer and finally increased sales, etc. (Kim et al., 2021). In other words, investing in innovations such as the internet by moving business online, known as e-business, allows companies to utilize their strengths and meet customer demand instantly, change their business model, and rebrand the company' s image (Kim et al., 2021; Jha et al., 2022).

Investing in ICT becoming a key contributor to continuously improving the bottom line in e-business (Demestichas & Daskalakis, 2020) . It has massive potential in business today, especially in achieving improved profitability, customer connection results, and keeping up with the competition. The adoption and implementation of e-business by various organizations in emerging markets has become important to reach higher sales volumes and profit, and remain competitive. The environment of for conducting e-business and competition has changed since the COVID-19 pandemic. Many e-business operations are conducted frequently with the customer via electronic

networks such as the internet. Modern firms are investing in the internet as one of the most revolutionary technologies. It can create a major paradigm shift to identify responding customer needs to produce products and services demanded by those customers (Shehata & Montash, 2020) . In other words, internet-based companies can generate higher company profits through online sales. With the final target of increasing company sales and profits, e- commerce expected online competition to one sector an investment- driven modern marketing strategy for any given product (Jorge et al., 2020).

More specifically, e- commerce has grown exponentially and refers to the process of buying and selling products or services using electronic data transmission via the internet. The internet (e-business) has become an important tool for online options for both customers and companies as a massive marketplace and, online channels increase customer and company profitability. Hence, companies should consider investing in ICT to make major gains in the necessary strategic element of an established market share, including customer base (Szolnoki et al., 2016; Corvello et al., 2021).

These are the reasons for new business models that are further investments in the internet and communication technology. This is because information and communication technology are important for e-business development, increasingly receiving many utilities, particularly in terms of strong growth for the private sector (Giotopoulos et al., 2022) . Under this context, this article aims to investigate private sector investment as a proxy of further company' s investment on the internet that helps a large volume of sales and makes through this distribution channel (e-business).

Personal credit

Credit theories of money, also called debt theories of money, are monetary economic theories concerning the relationship between credit and money. The credit theory also combines that a sale and purchase is the exchange of a commodity (goods and services) for credit (Von Mises, 2013). Personal credit, or consumer credit, is personal debt taken to currently purchase goods and services. The personal credit account reflects the portion of a family or individual' s spending to purchase commodities or services for personal consumption.

Based on the traditional economic theory, consumers refer to individuals and households. If their income is insufficient or unstable, a credit account is one where someone needs to obtain goods or services now with the promise to repay them later. A credit account represents an agreement to buy and receive goods and services now and pay for them in the future. With developments in internet-based technologies and e-commerce, consumer credit (credit accounts) as a facility for entrepreneurs has diversified and become a convenient means of obtaining flexible income, changing consumer behavior. Credit accounts have become popularized, with many entrepreneurs offering consumer credit at the point of sale. Hao et al. (2019) confirmed that an increase in credit accounts corresponds to a transfer of funds from customer preferences to meet their current customer needs.

Researchers have also investigated the effects of e-business on credit consumption. Zhu et al. (2021) identified that credit consumption has significantly influenced e-business. Most business organizations nowadays offer customers credit facilities, which is a compelling way to increase sales. Credit accounts represent the total amount a customer owes to the business due to increasingly purchasing manufacturing on a credit basis. Credit accounts drive results that not only increase the total sales and income of the organization but also determine customer satisfaction. Meanwhile,—researchers found that credit utilization positively impacts various household characteristics by smoothing income and consumption. Countries classified as emerging market economies develop the credit market by providing helpful information and insights for business practitioners to offer credit markets and serve credit client accounts for clients with various income levels (Xiao et al., 2021).

Based on emerging economies and customer satisfaction, Xiao and Tao (2021) show that many consumers have an expected level of consumption satisfaction. One major satisfaction goal is to smooth consumption. When income levels are insufficient and unstable, a credit account can help smooth consumption, to indicate satisfaction and well-being. This is especially true of agricultural manufacturing (food and beverage), as shown by Maia et al. (2020) analysis of how rural credit has impacted agricultural manufacturing. The

results revealed that rural credit does matter to small manufacturing agribusinesses.

Manufacturers can help achieve household consumption smoothing by offering customer credit. Credit availability can employ customers to increase current consumption in various manufacturing. Idi et al. (2019) examined credit utilization and its impact on food manufacturing. The results found that credit positively impacts food manufacturing in Nigeria. Other evidence points to households achieving smoothing consumption to take credit access to food manufacturing in rural Ethiopia (Bocher et al., 2017).

Per capita income

Per capita income is a macroeconomic theory of total spending in the economy and its effects on purchasing power. The income effect is the resultant change in demand for goods or services caused by an increase or decrease in a consumer's purchasing power of real income. Per capita income, also called average income, measures the average income earned per person in a given area (city, region, country, etc.). A high consumer income provides more opportunities for increased consumption and accumulated wealth. Furthermore, a high income can not only afford alternatives to consumption but also reach a greater variety of special products associated with higher satisfaction. Per capita income is often used to measure a sector's average income and compare the wealth of a country's standard living population. Pham et al. (2024) pointed out that the per capita income of a rural household is a highly statistically significant and positive predictor of consumption expenditure in Vietnam. Further, regarding the relationship between consumption characteristics and personal income, changes in per capita income determine the impact of changes in consumption demand. Wong and Abdul (2023) investigated the role of geographical area and income, and the result showed that personal income is positively related to aggregate consumption. In addition, Mohanti and Banerjee (2022) emphasized that an increase undoubtedly follows high aggregate consumption in the permanent growth of personal income.

A marketing strategy that involves consumer income toward food and beverage manufacturing has become a thriving company's value positioning as a key

element of a company's brand. A creative marketing strategy requires the most appropriate venue for a particular customer demographic. Effective positioning strategies consider the customer needs, personal income, and competitive advantage. Mehroli et al. (2021) indicated that the youth population with a higher disposable income significantly drives consumption in the country's food and beverage manufacturing, and this was particularly true during the COVID-19 pandemic in India.

With the outbreak of COVID-19, several changes occurred, such as income loss and changes in consumer behavior regarding the purchase of food and beverages. Consumers typically changed their purchasing process, mainly regarding online purchases, the amount of food on sale, and average monthly food expenditure (Vasquez, 2022). Hence, consumers expect food and beverage manufacturers to proactively approach quality and affordability in the long run. This means that the food and beverage industry is facing new challenges regarding growing consumer demands and the most important role of economic growth and development. The food and beverage industry needs to contribute to economic growth, with expanded sales in the diversified market, and overcome the middle-income trap, including meeting demand for convenience or additional processes (Qi & Chu, 2022). It is a significant and stable contributing role to the economy's growth and it plays a leading role in responding to changes in various consumer demands.

Objective of research

This study aims to investigate the factors that influence the private sector's marketing strategy (variables) to boost manufacturing sales in the food and beverage industry as well as overall manufacturing. There are four marketing strategies: per capita income serves as a stand-in for people's average income, private sector investment is reflected in metrics such as capital expenditures, infrastructure projects, and market expansion investment, personal credit is represented by individual borrowing capacity, credit scores, and loan accessibility, and the role of the internet via smartphones is evident in how people use their devices to purchase goods and services. The National Statistical Office, the National Economics and Social

Development Council Office, the Ministry of Commerce, and the Bank of Thailand provided the data.

Methodology and data

We divided the methodology into two stages: The first aimed to identify the determinants, such as distribution channels that affect food and beverage manufacturing and total manufacturing in Thailand, using the ordinary least square (OLS) logarithm regression. Researchers used the Durbin-Watson (DW) statistic to detect autocorrelation in a regression model's result.

The second stage intended to examine the determinants affecting food and beverage manufacturing and total manufacturing in Thailand using an econometric model, quantile regression. In this stage, Pareto analysis was also used to identify each determinant (impacted factor) on both food and beverage manufacturing, and total manufacturing, by giving a coefficient score on both quantiles based on the level of impact on the two manufacturing groups. The higher the coefficient score, the greater its impact.

For each factor, the study used secondary yearly statistics spanning 16 years, from 2006 to 2021. This reason period data for using period data considers availability, which is an important aspect in any empirical study, particularly when examining the factors influencing individuals use of cellphones to make purchases. There was enough power in the sample size to identify connections in the quantile or OLS regression.

The OLS regression approach requires homoscedasticity assumptions and the error term's normal distribution. The quantile regression approach (QR) distinctively 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 determinant variable, allowing for a more complete investigation of the influence of specific covariates. Researchers used the quantile regression technique to compute a set of regression functions, with each variable affecting a different quantile of the distribution of conditional volatility. Quantile regression produces results similar to those of OLS regression. However, 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 square 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 food and beverage manufacturing and total manufacturing as a holistic model as follows:

Model 1:

$$\log(\text{FOOD})_t = \beta_0 + \beta_1 \log(\text{SMART_P})_t + \beta_2 \log(\text{PRIVATE})_t + \beta_3 \log(\text{CREDIT})_t + \beta_4 \log(\text{INCOME})_t + \varepsilon_{it} \quad (1)$$

Model 2:

$$\log(\text{MANUF})_t = \beta_0 + \beta_1 \log(\text{SMART_P})_t + \beta_2 \log(\text{PRIVATE})_t + \beta_3 \log(\text{CREDIT})_t + \beta_4 \log(\text{INCOME})_t + \varepsilon_{it} \quad (2)$$

When:

- FOOD = GDP of food and beverage manufacturing as a proxy for food and beverage manufacturing sales.
Source: Office of the National Economics and Social Development Council
- MANUF = GDP of total manufacturing as a proxy for total manufacturing sales.
Source: Office of the National Economics and Social Development Council
- SMART_P = People using smartphones
Source: National Statistical Office
- PRIVATE = Private sector investment as a proxy for investment in ICT
Source: Office of the National Economics and Social Development Council
- CREDIT = Amount of credit accounts as a proxy for personal credit
Source: Bank of Thailand
- INCOME = GDP per capita as a proxy for people's average income
Source: Office of the National Economics and Social Development Council

Models 1 and 2 are estimated to examine the determinants of parameters on food and beverage manufacturing and total manufacturing. The quantile regression approach was employed in this study, and an attempt was made to compare it with simple OLS estimates. The determinants of food and beverage manufacturing, total manufacturing and independent variables chosen in this study were to use the logarithm of the annual data to measure this performance. The researchers made this decision to leverage statistical tools to enhance features that are typically distributed when obtaining data.

Data

The National Statistical Office, the Office of the National Economics and Social Development Council, the Ministry of Commerce, and the Bank of Thailand provided data for this study. The number of

manufacturers using the internet, the per capita income, the number of credit accounts, and the number of smartphone users made up the information data. Fundamental data shows that in Thailand, 1,151,331 manufacturers are utilizing the internet, 18,644,349 credit accounts, 328,224 Thai Baht of income per capita, and 60,600,000 smartphone users in 2021.

Pareto analysis

Pareto analysis (PA) is a valuable technique for making final business decisions in various domains, including quality control and economics utility. With a primary focus on historical data, PA can significantly assist in determining the cumulative impact arising from effects created over an extended period. The researchers make the best decision by comparing and weighing the so-called consistent factors of determinants. In order to make final decisions about the best private sector

strategies, PA is used in this study to rank the overall coefficient weights obtained from the quantile regression model after quantile regression analysis estimation. This allows for a better understanding of the impact of the various determinants of both food and beverage manufacturing and total (holistic) manufacturing. The diagram helps identify the level of impacted attributes based in their severity on the econometric model (Grosfeld-Nir et al., 2007).

Empirical results

The study applied stepwise ordinary least square (OLS) logarithm regression to identify the determinants of parameters on food and beverage manufacturing and total (holistic) manufacturing in Thailand (shown in Table 1).

Ordinary least square and quantile regression analyses

The study further applied stepwise multiple logarithm regression to examine the association between food and beverage manufacturing (FOOD), and total manufacturing (MANUF), dependent variables, and four determinants of marketing strategy of the private sector, independent variables (IV) (shown in table 1). Table 1 shows the results, consisting of two models; of stepwise multiple logarithm regression of food and beverage manufacturing (FOOD) and total manufacturing (MANUF).

Researchers used a multicollinearity test with variance inflation factor (VIF) to detect the severity of multicollinearity in the OLS regression analysis. The VIFs are 4.009 and 5.327 for the food and beverage and total manufacturing models respectively. These values indicate that multicollinearity is not a concern in our regressions because they are lower than 10 (Hair et al., 2010). The Durbin Watson (DW) statistic was tested and used to detect the presence of autocorrelation in a regression model's output. The Durbin-Watson statistic will always assume a value between 1.5 and 2.5. A value of $DW = 2$ indicates no autocorrelation (Chithra et al., 2016). Therefore, these two models are statistically significant the values of the Durbin Watson statistic were found to be 2.036 and 2.100 for Model 1 and Model 2, respectively. The value of Durbin Watson is preferred to be between 1.5 and 2.5 and is favourable and appropriate for time series data to obtain models.

Model 1 examines the association between the four IVs of the study to food and beverage manufacturing. In this model, the results show that people's average income (INCOME) has a significantly positive association with food and beverage manufacturing sales (FOOD), as the coefficient is 1.211 and is significant at 1 percent. It reveals that a 1 percent increase in the people's average income will increase the food and beverage manufacturing by about 1.21 percent. This result shows the importance of income to increase and expand the food and beverage manufacturing sales of a company. This indicates that people's income is pushed and positively motivates the sales performance of the food and beverage manufacturing of a company, and it is clear that income is a significant determinant of food and beverage manufacturing sales in the private sector. The result is consistent with the literature of Kim et al. (2021).

The first model also shows that personal credit (CREDIT) has a negative association with food and beverage manufacturing sales, with a coefficient of -0.453, and is significant at 1 percent. The result reveals that the credit leads to decreased sales in the company's food and beverage manufacturing sales. This may mean that credit appears to be negatively linked to buy food and beverage manufacturing.

In the second model, private sector investment in ICT (PRIVATE) points significant relationships with total manufacturing sales (MANUF) with a coefficient of 0.305 at 5 percent significance levels. This result reveals that private sector investment in ICT plays a significant role in increasing holistic manufacturing sales. The coefficient is 0.305, which shows how this determinant is important for holistic manufacturing sales. The reason could be consumers' purchase intention and willingness to pay higher prices for both products and information when able to connect quickly and easily, resulting from expanding investment by the private sector. In sum, private sector investment provides various advantages for businesses such as accessing extended markets, responding to manufacturing information for customers, and enhancing product ability and sale opportunities. These are important for customers who need quick and convenient ways to find different manufacturing information that may influence their final decision.

Table 1 Multiple logarithm regression results of food and beverage manufacturing (FOOD) and total manufacturing (MANUF)

variables	Model 1: Dependent variable, food and beverage manufacturing log(FOOD)		Model 2: Dependent variable, total manufacturing log(MANUF)	
	Coefficient	p-value	Coefficient	p-value
Intercept	2.675	0.000	2.866	0.000
log(INCOME)	1.211	0.000***		
log(CREDIT)	-0.453	0.000***		
log(PRIVATE)			0.305	0.022**
R ²	0.977		0.942	
Adjusted R ²	0.974		0.933	
F-statistic	282.356		105.145	
Prob. (F-statistic)	0.000		0.000	
DW	2.036		2.100	
Main VIF	4.009		5.327	
Nb. of observations	16		16	

Note: Significant level; *** $p < 0.01$, ** $p < 0.05$

Source: Authors' computations

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 re-examine the relationship between dependent variables, food and beverage manufacturing sales (FOOD), and total manufacturing sales (MANUF), and four independent variables consisting of people using a smartphone (SMART_P), private sector investment in ICT (PRIVATE), personal credit (CREDIT), and people's average income (INCOME).

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 the relationship between IV₇ and the varied components of the analyzing manufacturing determination (DV) is examined. Tables 2 and 3 exhibit the quantile regression results of food and beverage manufacturing sales (FOOD) and total manufacturing sales (MANUF).

Researchers used the quantile regression method to analyze the proposed model, describing the conditional distribution of the dependent variables food and beverage manufacturing sales (FOOD), and total manufacturing sales (MANUF).

The analysis considered three quantile interval ranges: $Q = 0.25$, $Q = 0.50$, and $Q = 0.75$, presented in Tables 2 and 3. 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 food and beverage manufacturing sales and total manufacturing sales (holistic manufacturing estimation) quantile regression models.

Starting with the main determinant variable of this study from model 1 in Table 2, at first, the people using a smartphone (SMART_P) appears to be the distinctively important factor affecting food and beverage manufacturing sales. The result indicates that people using a smartphone tend to have a powerful positive impact on food and beverage manufacturing sales with both the lowest ($Q = 0.25$) and highest ($Q = 0.75$) quantiles of sales in food and beverage manufacturing at $p < 0.05$ level. This confirms that smartphones have become more powerful devices, and it has also become the new consumer behavior, especially among young people, as they can send and receive a full menu of information. However, they also prefer different channels for various situations with their convenience.

Table 2 Quantile regression results of food and beverage manufacturing (FOOD)

Variables	Model 1. Dependent variable, food and beverage manufacturing log(FOOD)					
	Q = 0.25		Q = 0.50		Q = 0.75	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Intercept	2.409	0.000	2.591	0.003	1.962	0.000
log(SMART_P)	0.107	0.023**	0.680	0.480	0.107	0.012**
log(PRIVATE)	0.124	0.201	-0.138	0.522	0.120	0.163
log(CREDIT)	-0.365	0.000***	-0.370	0.023**	-0.435	0.000***
log(INCOME)	0.829	0.000***	1.196	0.001***	1.016	0.000***
Pseudo R Square	0.893		0.866		0.867	
Nb. of observations	16		16		16	

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

Source: Authors' computations

Table 3 Quantile regression results of total manufacturing (MANUF)

Variables	Model 2. Dependent variable, total manufacturing log(MANUF)					
	Q = 0.25		Q = 0.50		Q = 0.75	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Intercept			2.075	0.00	1.745	0.000
log(SMART_P)			0.283	0.001***	0.282	0.000***
log(PRIVATE)			0.520	0.005***	0.724	0.000***
log(CREDIT)			-0.020	0.848	-0.122	0.057*
log(INCOME)			-0.201	0.285	-0.259	0.028**
Pseudo R Square	0.820		0.840		0.847	
Nb. of observations	16		16		16	

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

Source: Authors' computations

Another variable that is more intriguing and significant is that all three quantiles of food and beverage manufacturing sales at $p < 0.01$, $p < 0.05$, and $p < 0.01$ level respectively, are personal credit (CREDIT). Personal credit is an important economic phenomenon, and researchers have various theories to explain firms' decisions regarding credit extension. However, this result shows that personal credit negatively affects food and beverage manufacturing sales. This implies that personal credit can hurt food and beverage manufacturing. This is because business managers do not manage good business practices, such as high investment costs in accounts receivable, and cash flow problems (Martínez-Victoria & Maté-Sánchez-Val, 2022). The main issue with running a food

and beverage business is that fresh material stock is highly perishable. Because of the perishable material of goods, the right cash flow management and control are vital to the prosperity of the food and beverage manufacturing business. Hence, a credit account is a straightforward way to cure business cash flow and to keep the wheels running in the food and beverage business. Based on the research finding above, personal credit negatively impacts food and beverage manufacturing sales as food security and risk management. This business should be more in part of its marketing strategies (Salima et al., 2023).

The model 1 result also confirms that people's average income (INCOME) positively determines food and beverage manufacturing sales at $p < 0.01$ level of all

three quantiles. What could be happening? Quantile estimations let us obtain the marginal effects of food and beverage manufacturing sales, which change relative to people's average income and spending by focusing more on holistic health and wellness food (Eberle et al., 2023).

Model 2 (Table 3) shows that quantile estimations allow us to obtain all four factors comprised of people using their smartphone (SMART_P), private sector investment in ICT (PRIVATE), people's average income (INCOME), and personal credit (CREDIT) are most important and determine total manufacturing sales (MANUF) at the highest levels ($Q = 0.75$) at $p < 0.01$, $p < 0.01$, $p < 0.05$, and $p < 0.1$ level respectively. Moreover, we can see that people using smartphones (SMART_P) and private sector investment in ICT

Interestingly, firms generally view personal credit (CREDIT) as an effective tool for building long-term. However, our empirical finding is that personal credit negatively impacts total manufacturing sales at the highest quantile ($Q = 0.75$) at $p < 0.1$. This suggests that total manufacturing sales may not rely on something other than personal credit as a pillar of the company's long-term marketing strategies. Personal credit expansion is a concession on credit risk management principles for tackling uncertain situations depending upon the available customer information. This research finding is consistent with the survey results on dangerous trade credit regarding competitive edge (Osiichuk & Wnuczak, 2022). They strongly suggest that cost and credit management significantly impact company growth resulting in short- and long-term operational business performance.

Moreover, the income effect is the general key change in demand for goods or services in a consumer's purchasing power. However, our empirical finding is that people's average income (INCOME) has a negative influence on total manufacturing sales at the highest quantile ($Q = 0.75$, highest sale volume) at $p < 0.05$ level. This implies that total manufacturing sales will decrease when people's average income increases. This finding offers empirical support to Soon (2022) exploring quantile analysis in Malaysia's spending behavior. He suggested that an income increase does not affect product expenditure statistically significantly.

(PRIVATE) also have a significant level ($p < 0.01$ level) of total manufacturing sales at the $Q = 0.50$ quantiles. This shows that mobile devices have become essential in everyday life, especially for young people who constantly use their smartphones in multitasking activities, including convenient online buying access. Meanwhile, private sector investment in ICT has led to improvements across customers and society, such as fast communication and content transmission facilities, to connect with customers quickly and easily (La Marra et al., 2020). The findings show that smartphone usage and private sector investment in ICT align to increase consumer purchasing intentions for manufactured products, thereby expanding sales opportunities for businesses.

Namely, when income increases, they do not spend an increase in the aggregate demand. However, they increase their percentage savings instead.

Pareto analysis (PA) graphically depicts the occurrence of each tracked variable to show the relative importance of different impacts or causes of problems. The advantage of Pareto analysis is that it helps to identify and determine the root causes of defects or problems. It also helps to save time by focusing on the root causes of the problem occurring in business. Figures 2 and 3 use Pareto analysis diagrams to depict the importance of four variables related food and beverage manufacturing sales.

Its left vertical axis is the estimation by the overall coefficient weights obtained from the quantile regression model, while the right vertical axis represents the cumulative percentages over the significant variables that determined the root impact of food and beverage manufacturing sales; and total (holistic) manufacturing sales.

Following the comparison of the four variables, in terms of food and beverage manufacturing sales, people's average income and personal credit are the most impacted variables compared to the other variables, followed by people using smartphones. At the same time, private sector investment in ICT is the highest effect to the total (holistic) manufacturing sales, followed by people using smartphones, people's average income, and personal credit respectively.

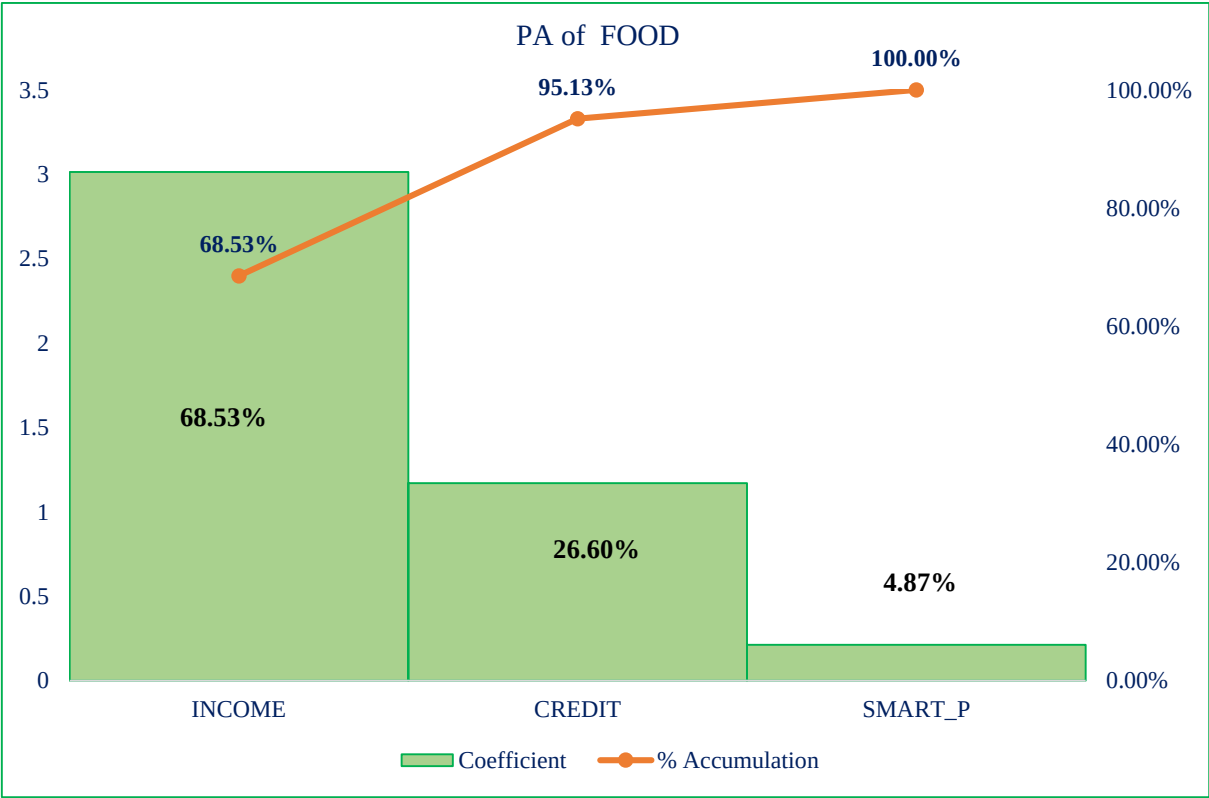


Figure 2 Pareto analysis diagram (PA) of food and beverage manufacturing
Source: Author’s computations

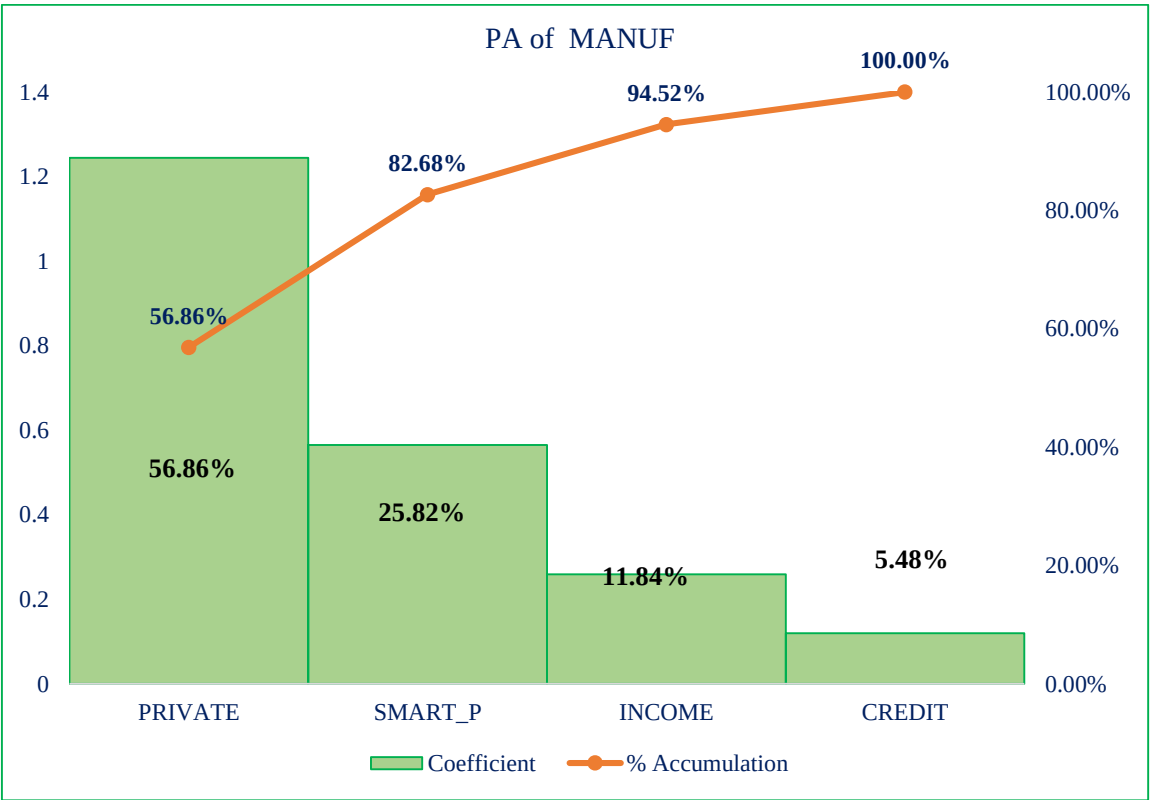


Figure 3 Pareto analysis diagram (PA) of total (holistic) manufacturing
Source: Author’s computations

Conclusion

In this study, we explored the impact of marketing strategy in the private sector on increasing manufacturing sales in both food and beverage, as well as total manufacturing, by using data from 2006 to 2021, a period of 16 years, for each variable. The results found that food and beverage manufacturing significantly and positively impacts people's average income and smartphones. Average personal income is a positive relationship between price awareness and higher purchase intention, especially on healthy food, due to consumers making more appropriate food choices and protecting the environment (Eberle et al., 2023). Consumers on higher incomes consistently focus more on holistic health and wellness food. In contrast, those on lower personal income may lack the financial resources to implement change, resulting in poorer diet quality personally.

Another of the most apparent findings of this research relates to the smartphone. It serves as an integral part of the larger economy. It is the reason so many customers utilize and facilitate it not only in the food and beverage delivery industry to send and receive a full menu of information, but also as the preferred channel for various situations with their convenience such as customers having access to multiple deals (offers, discounts, and specific promotions) via a platform or application.

In terms of personal credit, it has a significant impact but has a negative relationship on food and beverage manufacturing. This may be due to cash flow problems and credit (risk) management in practices, because of this, food and beverage industries should not be offering personal credit to customers because of cash flow effects and perishable material of food. Therefore, food and beverage businesses can receive credit card payments within a day or two days, which is a helpful solution to maintain customers, sales, and cash flow, manage risk, and sell perishable goods.

In general, when looking at our findings for total (holistic) manufacturing sales, they suggest that the private sector must emphasize investment in ICT to provide various benefits for business strategies such as accessing extended markets, quickly responding to customers with information, and finally increasing sales opportunities. Gavrilă and De Lucas (2022) confirmed

that ICT investment such as digitization and digital transformation encouraged future business opportunities in terms of both consumers' intention and interaction, and increasing sales. Romero et al. (2023) supported this finding that technological capabilities positively affect small- and medium-sized enterprises (SMEs) by stimulating more competitiveness in diversifying their distribution channels.

Furthermore, this finding suggests that investment in ICT is parallel with people using smartphones to ensure fast communication and content transmission facilities and create new market opportunities (Gavrilă & De Lucas, 2022). Modern marketing revolves around customer preferences, which leads to more successful businesses and growth.

Implication

The research indicates that credit consumption and income both have robust sales growth rates. Therefore, income is one of the most significant economic factors influencing a consumer's capacity, desire, and, need for loan access. According to this perspective, the ease of using credit for consumption is a significant economic component, particularly regarding various credit categories like personal and agricultural loans. Additionally, increasing credit promotion causes consumption to grow, boosting present sales. Bahadır et al. (2020) pointed out that income inequality would increase households' consumption by using credit.

Because of how consumers currently make purchases, businesses cannot overlook the existence of smartphone users in their marketing campaigns. Many different marketing services have made extensive use of mobile applications. Products may be ordered and delivered to homes or offices using smartphones. In contemporary commercial marketplaces, social media and the significantly impact customer purchasing behavior in developed and developing nations, as demonstrated by Ramadan and Aita's (2018).

The model also has practical implications for people's average income and personal credit. Credit (risk) management and classification may benefit consumer income segmentation for businesses offering positional manufacturing. Businesses can thus estimate and classify not only positional manufacturing of consumers but also cutting down on any further risk

Kovács (2021). There are several reasons, such as income level, risk management, and interest, why businesses may properly offer credit accounts as classified customer segmentation.

The model's finding contributes to the awareness of business risk in terms of personal credit and customers' average income. Credit can help increase manufacturing sales, but it may only suit some customer segments. Therefore, it is important to carefully assess the financial status of lower-income customers in this context. This indicates the importance of transparent and careful assessment when offering credit to effectively handle future risks such as cash flow, risk management, and credit interest (Duong & Antriandarti, 2021).

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