THE PRODUCTION PERFORMANCE OF MALAYSIA’S FOOD PROCESSING INDUSTRY

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UNIVERSITI SAINS MALAYSIA

2024

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by

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Thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

December 2024

ACKNOWLEDGEMENT

I wish to express my sincere gratitude to Dr. Lim Ghee Thean, my supervisor, for his tireless dedication, priceless input, guidance, recommendations, corrections, patience, and encouragement during my Ph.D. studies and associated research. Having access to his vast knowledge has been an incredible honor and privilege. I also much appreciate the staffs in the School of Social Sciences and Institute of Postgraduate Studies (IPS) at Universiti Sains Malaysia (USM) for their prompt and amiable support throughout my studies. Last but not least, I would like to express my deepest gratitude to my family for supporting me with unwavering encouragement and inspiration to smoothly achieve my objectives. Thank you.

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LIST OF ABBREVIATIONS

ARDL	Autoregressive Distributed Lag model
CPI	Consumer Price Index
CPS	Credit to Private Sectors
DEA	Data Envelopment Analysis
DMU	Decision Making Unit
ER	Exchange Rate
FDI	Foreign Direct Investment
FPI	Food Processing Industry
FPI 01	Processing Meat, Fish, Fruit, Vegetables, Oils, and Fats Industry
FPI 02	Manufacturing Dairy Products Industry
FPI 03	Producing Grain mill items, Starch derivatives, and Formulated Animal Feeds
FPI 04	Processing Other Food Products Industry
FPI 05	Manufacturing Beverage Industry
GCE	Government Consumption Expenditure
GDP	Gross Domestic Product
IMP	Industrial Master Plan
IR	Interest Rate
IT	Information and Technology
IMP2	Second Industrial Master Plan
LSEs	Large-scale Enterprises
LSE01	Processing Meat, Fish, Fruit, Vegetables, Oils, and Fats Industry of Large-scale Enterprises
LSE02	Manufacturing Dairy Products Industry of Large-scale Enterprises
LSE03	Producing Grain mill items, Starch derivatives, and Formulated Animal Feeds of Large-scale Enterprises
LSE04	Processing Other Food Products Industry of Large-scale Enterprises
LSE05	Manufacturing Beverage Industry of Large-scale Enterprises
MARDI	Malaysian Agricultural Research and Development Institute

MFPI	Malaysia's Food Processing Industry
MSIC	Malaysia Standard Industrial Classification
RD	Research and Development
SMEs	Small and Medium Enterprises
SME01	Processing Meat, Fish, Fruit, Vegetables, Oils, and Fats Industry of Small and Medium Enterprises
SME02	Manufacturing Dairy Products Industry of Small and Medium Enterprises
SME03	Producing Grain mill items, Starch derivatives, and Formulated Animal Feeds of Small and Medium Enterprises
SME04	Processing Other Food Products Industry of Small and Medium Enterprises
SME05	Manufacturing Beverage Industry of Small and Medium Enterprises
TE	Technical Efficiency
TFP	Total Factor Productivity

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PRESTASI PENGELUARAN INDUSTRI PEMPROSESAN MAKANAN DI MALAYSIA

ABSTRAK

Industri pemprosesan makanan (FPI) memainkan peranan yang signifikan dalam ekonomi Malaysia, tetapi ia menghadapi cabaran berterusan dengan produktiviti yang rendah dan pertumbuhan pengeluaran negatif, yang menunjukkan kebimbangan mengenai potensi ketidakcekapan, terutamanya dalam lima sub-sektornya. Isu-isu ini mungkin sebahagiannya disebabkan oleh kejutan ekonomi seperti krisis kewangan 2009, yang memberi kesan kepada akses kepada pembiayaan, kestabilan rantaian bekalan, dan pelaburan dalam teknologi yang meningkatkan produktiviti. Oleh itu, objektif utama adalah untuk menganalisis prestasi pengeluaran FPI Malaysia. Objektif pertama adalah untuk menentukan tahap kecekapan dan produktiviti perusahaan kecil dan sederhana (PKS) serta perusahaan berskala besar (LSE) dalam FPI Malaysia. Kedua, ia bertujuan untuk mengkaji faktor-faktor yang mempengaruhi produktiviti dan ketidakcekapan. Akhirnya, ia bertujuan untuk menilai kesan produktiviti dan faktor makroekonomi lain terhadap pertumbuhan pengeluaran dalam FPI Malaysia. Untuk mencapai ini, kajian ini menggunakan produktiviti faktor keseluruhan (TFP) dan bukannya ukuran produktiviti separa seperti produktiviti buruh atau modal, kerana TFP menawarkan penilaian yang lebih komprehensif dengan merangkumi semua input pengeluaran dan mencerminkan tahap produktiviti keseluruhan. Selain itu, kajian ini menggunakan Analisis Pembangunan Data (DEA) untuk menilai kecekapan teknikal, dengan mempertimbangkan semua faktor pengeluaran merentasi firma dalam FPI. Selepas itu, kajian ini menyiasat faktor-faktor yang mempengaruhi TFP dan ketidakcekapan teknikal dengan menerapkan analisis data panel sepanjang tempoh dari 2000 hingga 2017, merangkumi dua unit silang (LSE dan PKS). Selain itu, kajian ini mengguna pakai analisis data panel untuk menilai impak produktiviti dan faktor makroekonomi dengan lima unit silang (lima sub-sektor) sepanjang tempoh dari 2006 hingga 2017. Kajian ini mendedahkan penemuan TFP dan kecekapan teknikal untuk kedua-dua LSE dan PKS. Penemuan menunjukkan bahawa LSE menunjukkan TFP yang lebih tinggi berbanding PKS; pemerhatian ini mencadangkan bahawa LSE menghasilkan 1.1613 unit output bagi setiap input agregat, manakala PKS menghasilkan 0.9354 unit output bagi setiap input agregat. Menariknya, kecekapan teknikal purata PKS sedikit melebihi LSE, pada 0.978 dan 0.95, masing-masing. Faktor-faktor seperti kos latihan, infrastruktur awam, dan keterbukaan perdagangan menunjukkan kesan positif terhadap TFP. Kehadiran pekerja dengan pendidikan SPM dan pelaburan dalam infrastruktur awam menyumbang kepada peningkatan kecekapan teknikal. Walau bagaimanapun, peningkatan perbelanjaan untuk penyelidikan dan pembangunan serta fluktuasi dalam harga minyak dunia memberi kesan negatif terhadap kecekapan teknikal. Selain itu, kredit sektor swasta memberi kesan negatif terhadap pertumbuhan pengeluaran, manakala pembentukan modal tetap kasar memberi kesan positif terhadapnya. Cadangan dasar mencadangkan bahawa campur tangan kerajaan boleh memperkuatkan produktiviti dan daya tahan industri. Kerajaan disarankan untuk meningkatkan akses PKS kepada kredit yang berpatutan, menyokong latihan tenaga kerja yang berterusan, dan memprioritaskan projek infrastruktur awam. Selain itu, memudahkan pengambilan teknologi dan menggalakkan kerjasama perdagangan antarabangsa adalah penting untuk menstabilkan tahap produktiviti dan melindungi industri daripada kejutan ekonomi di masa depan. Kajian berkala terhadap dasar perdagangan dan monetari disyorkan untuk meningkatkan daya saing sektor dan pertumbuhan yang mampan.

THE PRODUCTION PERFORMANCE OF MALAYSIA’S FOOD PROCESSING INDUSTRY

ABSTRACT

The food processing industry (FPI) plays a significant role in Malaysia's economy, but it faces ongoing challenges with low productivity and negative production growth, which indicates potential inefficiency concerns, particularly within its five sub-sectors. These issues may be partly attributed to economic shocks like the 2009 financial crisis, which impacted access to financing, supply chain stability, and investment in productivity-enhancing technologies. Hence, the main objectives are to analyze the production performance of Malaysia’s FPI. The first objective is to determine the level of efficiency and productivity of the small and medium-sized enterprises (SMEs) and large-scale enterprises (LSEs) in Malaysia’s FPI. Secondly, it aims to examine the factors affecting productivity and inefficiency. Lastly, it aims to assess the impact of productivity and other macroeconomic factors on the production growth in Malaysia’s FPI. To achieve this, the study utilizes total factor productivity (TFP) instead of partial productivity measures like labour or capital productivity, as TFP offers a more comprehensive assessment by encompassing all production inputs and reflecting overall productivity levels. Additionally, the study employs Data Envelopment Analysis (DEA) to evaluate technical efficiency, considering all production factors across firms in the FPI. After that, the study investigates the factors affecting TFP and technical inefficiency by applying panel data analysis over the period from 2000 to 2017, covering two cross-sectional units (LSEs and SMEs). Besides that, the study adopts panel data analysis to evaluate the impacts of productivity and macroeconomic factors with five cross-sectional units (five sub-sectors) over the period from 2006 to 2017. The study unveils TFP and technical efficiency findings for both LSEs and SMEs. The findings reveal that LSEs exhibit a higher TFP compared to SMEs, this observation suggests that LSEs generate 1.1613 units of output per aggregate input, while SMEs produce 0.9354 units of output per aggregate input. Interestingly, the mean technical efficiency of SMEs slightly exceeds that of LSEs, at 0.978 and 0.95, respectively. Factors such as training costs, public infrastructure, and trade openness demonstrate a positive impact on TFP. The presence of employees with SPM education and investments in public infrastructure contribute to enhanced technical efficiency. However, increased spending on research and development and fluctuations in world oil prices negatively affect technical efficiency. Moreover, private sector credit negatively influences production growth, while gross fixed capital formation positively impacts it. The policy recommendations suggest that government interventions could strengthen the industry's productivity and resilience. The government is advised to improve SMEs' access to affordable credit, supporting ongoing workforce training, and prioritizing public infrastructure projects. Additionally, facilitating technology adoption and fostering international trade partnerships are essential for stabilizing productivity levels and insulating the industry from future economic shocks. Regular review of trade and monetary policies is recommended to enhance the sector's competitiveness and sustainable growth.

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Malaysia's economy is diverse and its growth is contributed to by several industries. The main contributors are the manufacturing, services, and agriculture sectors. The largest contributor to Malaysia's economy is the services industry, which accounted for over 58.6 percent of the total Gross Domestic Product (GDP) in 2022, it increased by 8.9 percent in the last quarter of 2022 (Department of Statistics Malaysia, 2023). The services industry encompasses finance, healthcare, insurance, tourism, transportation, telecommunications, and other professional services. According to the 11th Malaysia Plan, productivity plays a crucial role in fostering economic development because economic growth is motivated by both public and private investments in industry and infrastructure (Economic Planning Unit, 2016). Therefore, this plan prioritizes increasing productivity to promote the economy to become more viable, all-encompassing, and rapid growth (Economic Planning Unit, 2016). Besides that, the low productivity issue is a concern of the government in the 12th Malaysia Plan (Economic Planning Unit, 2021). Hence the performance of the industry is important and it is often assessed through the measure of productivity (Coelli *et al.*, 2005).

The manufacturing industry is also well-developed in Malaysia and it is the second-largest contributor to economic development, approximately 24 percent of the GDP (Department of Statistics Malaysia, 2023). This industry primarily consists the production of automobiles, chemicals, textiles, electronics, equipment, and machinery.

Additionally, the outputs of the manufacturing industry are usually exported goods, and this industry provides a significant number of job opportunities (Lee, 2019).

As a country rich in natural resources, agriculture is a significant contributor to Malaysia's economic development, accounting for 6.3 percent of the GDP (Department of Statistics Malaysia, 2023). Agricultural products include rubber, palm oils, cocoa, wood products, tropical fruit, and rice. In 2020, Malaysia ranked as the second-largest supplier and exporter of palm oil, elucidating 34 percent of palm oil exports and 26 percent of palm oil production globally (International Trade Administration, 2024).

The food processing industry (FPI) is classified as a branch of the manufacturing industry and it is also related to the agriculture industry. This is because the FPI involves transforming raw materials from agriculture into food products or finished goods through manufacturing activities. Raw agricultural products include fruits, grains, vegetables, livestock, fish, palm oil, and cocoa. These primary goods are then processed in manufacturing plants to generate higher value-added food products such as fruit jam, juice, meat, canned fish, bread, flour, milk, and chocolate.

The FPI is a vital player closely associated with the agriculture industry. It acts as a buyer, purchasing agriculture-related products from farmers, and as a food manufacturer, producing processed food or agro-based products for consumers (Alsco Uniforms, 2021). This generates a win-win situation where farmers save time and costs in transforming raw ingredients into valuable processed food, and raw material buyers have lower demands on the quality of goods. Furthermore, consumers receive extended shelf life and high-quality food that is not limited by seasonality.

The growth of the FPI not only enhances primary products and increases the workforce but also positions Malaysia as a leading processed food exporter. The Bank Negara Malaysia announced that Malaysia gross exported processed food worth over RM 28 billion in 2022, representing a 15.5 percent increase compared to 2021 (Bank Negara Malaysia, 2023).

Malaysia's FPI has evolved rapidly since it was supported by the industrialization policy in the 1960s and has continued to grow significantly to this day. After Malaysia's independence, the first industrialization policy was introduced in the late 1950s to 1960s, largely dominated by the import-substitution industrialization strategy. This policy attracted foreign capital-intensive industries, particularly from Britain, encouraging them to relocate behind the tariff barriers established by the newly independent government (Jomo, 1993).

During this period, the industrial policy focused on protecting local industries while simultaneously offering incentives to attract foreign firms (Kinuthia, 2009). For example, Dutch Lady Milk Industries Berhad, a subsidiary of FrieslandCampina, was established in 1963, and Fraser and Neave Holdings Berhad was launched in Kuala Lumpur in 1962. Additionally, the strategy focused on the domestic market and emphasized substantial import substitution for foodstuff, beverages, tobacco goods, petroleum products, cement, rubber and plastic products, fertilizers and textiles. This implied capturing the local market from international manufacturers, sheltered behind protective tariffs, and formed the early foundation of industrialization (Hasan, 1987).

During the 1960s, the industries that generated the highest value-added included food processing, rubber, wood, and chemical products, which utilized the outputs of the nation's key primary sectors, specifically agriculture, fishing, forestry, and mining (Hasan, 1987). By the end of the 1960s, the initial momentum for industrial growth quickly dwindled as the domestic market reached it limits, and efforts to penetrate export markets failed. Thus, the government promoted Investment Incentives Act of 1968 to encourage the expansion of manufactured exports. Following this, Malaysia introduced the New Economic Policy, which aligned with a shift in industrial policy from import substitution industrialization to an export-oriented industrialization strategy (Jomo, 1993).

In the beginning stage, the FPI employed traditional and simple techniques to process food, concentrating on producing basic processed foods like sugar, rice, and flour. However, the government introduced several policies such as First Industrial Master Plan (IMP) (1986-1995) and Second Industrial Master Plan (IMP2) (1996-2005) to encourage new technology, advanced equipment, and investments in the FPI, leading to its expansion (Ahmed, 2012; Kanapathy, 2019). As a result, there is now a comprehensive variety of food processing products, including canned food, processed meats, sauces, snacks, beverages, dairy products, frozen food, and condiments.

Malaysia's FPI is divided into several sub-sectors based on the type of processed food. This study pertains the Malaysia Standard Industrial Classification (MSIC) 2000 (Department of Statistics Malaysia, 2000) which classifies the FPI into five groups which are for the reference years 2000 to 2008. The latest version of industry categorization, MSIC 2008 (Department of Statistics Malaysia, 2008) has been published, segregating the FPI into nine sectors from 2009 to the present. The period of this study spans across these two reference years, hence it is more reliable and reasonable to aggregate the data from nine sectors into five sectors rather than dividing it from five to nine sectors.

The first sub-sector (FPI01) in the FPI covers an ample range of economic activities relevant to the production, processing, and preservation of several types of food products. This includes meat products and poultry products (involving slaughtering, dressing, freezing or packing, and canning meat and poultry), fish products (consisting of salting, drying, pickling, and freezing seafood), fruit and vegetable products (including packing of dried, bottled, canned, sweetened, salted fruits and vegetable), oils and fats products (including processing coconut oil, crude palm oil, refined palm oil, kernel oil, as well as various vegetable and animal oils).

The second sector (FPI02) of FPI covers the production of dairy products manufactured in Malaysia, such as milk (evaporated, condensed, powdered milk, baby infant food and beverages with milk base), ice cream, and other dairy products (yogurt, cheese, butter, and ghee). Next, the third sector of the FPI (FPI03) refers to the manufacturing of grain mill products, starches, starch derivatives, and formulated animal feeds. This category comprises the manufacture of rice, flour, breakfast foods, starch and glucose products, and grain-based animal feed for birds, fishes, dogs, cats, and other pet or farm animals.

Moreover, the fourth sector of FPI (FPI04) is other food products which covers the business nature related to the production, processing, and manufacturing of various food products that are excluded from other MSIC categories. Some examples of the products comprised under this sector include bakery products (manufacture of bread, cakes, biscuits, and cookies), sugar, confectionery products (manufacture of sugar, chocolate products, and cocoa paste), noodles (such as instant mee, meehoon, kuay-teow, pasta, and vermicelli) and other processed foods (manufacture of sauce, ice, coffee, tea, spices, curry powder, nut-based products, and snack foods).

The last category of FPI (FPI05) covers the production of a wide variety of beverages, including alcoholic beverages (production of sparkling wine, flavored wines, fortified wine, and distilled alcoholic drinks), and non-alcoholic drinks (manufacture of mineral waters, soft drinks, fruit juices, and other flavored drinks). Furthermore, the FPI includes both small and medium enterprises (SMEs) and large-scale enterprises (LSEs), as shown in Table 1.1.

Table 1.1 Example of Products, Small and Medium Enterprises, and Large-scale Enterprises in Malaysia's Food Processing Industry

Sector	Example of products	Small and medium enterprise	Large-scale enterprises
FPI01	Meat products - fresh or frozen meat, sausages, and other meat-based products. Fish products - fresh or frozen fish, fish fillets, fish balls, and fish-based products. Fruit and vegetable products – pineapple juice and jam, other food jams and jellies, sauces and pickles, and raw frozen potato chips. Oils and fats – coconut oil, coconut cakes, coconut copra, crude groundnut oil, crude palm oil, refined coconut oil, refined palm oil, and extraction oil from marine animal.	EB Frozen Food Sdn Bhd – halal, meat and seafood-based frozen food products LKT Food Industries Sdn. Bhd – halal and frozen foods Pondok Abang Sdn Bhd – halal frozen food	FELCRA Berhd – owned by Ministry of Finance, including palm oil-based products and animal feed. Sime Darby Plantation Berhad - oil and fats products Cargill Malaysia - a subsidiary of Cargill, produces oil and fat, cocoa and chocolate, animal feeds Bangi Agro Malaysia - meats and poultry
FPI02	Dairy products - milk, yogurt, cheese, and ice cream	Malaysia Yoghurt Company - yogurt Holy Cow Ice Cream - produces a range of gourmet ice cream flavours using locally sourced ingredients.	Dutch Lady Milk Industries Berhad - milk, yogurt, and cheese Nestle (Malaysia) - a multinational company that including milk,

			yogurt, and ice cream, for both the domestic and export markets. Fraser & Neave Holdings Bhd - including condensed milk, evaporated milk, and sweetened creamer.
FPI03	Grain mill products - rice, and rice flour Breakfast or foods cereals – wheat and corn flake, rolled oats, blended flour for biscuits, pancakes, cake, and bread. Starch and starch products - glucose, glucose syrup, maltose, dextrin, tapioca flour, corn oil and wet corn. Grain-based animal feed and pet food.	Lee Gaik Khuan Coffee Powder & Flour Mill Sdn Bhd – Coffee powder and flour Gemini Flour Mills Sdn Bhd – flour, spices powder Rajas Flour Mill Sdn. Bhd. - flour Milling, spice and Extract Manufacturing	Malayan Flour Mills Berhad - flour products, including wheat flour and premixes FFM Berhad - wheat flour and animal feed milling Bio Starch Industries Worldwide Sdn. Bhd. - full bio tapioca starch for local and export requirement.
FPI04	Bakery products - bread, cakes, Chinese cakes, pies cones, wafers, and doughnuts. Sugar product – gula melaka. Confectionery products – cocoa, chocolates, candies, toffees, marshmallow, fudge, pastilles and fondants, sugar covered nuts, chewing gum. Snack foods - potato chips, popcorn, fish crackers, prawn crackers, banana chips, and other savoury snacks. Sauces, dressings, and condiments -	Lee Koe Noodle Manufacture – noodle Sang Yoon Food Industry Sdn Bhd – koey toew, noodle Khor Brother Mee Manufacturer – noodle, chili sauces Bidor Kwong Heng Sdn Bhd - soy sauce, oyster Sauce, black pepper sauce, plum Sauce, hoisin Sauce	Nestle Malaysia - instant noodles, chocolate bars, and confectionery products. Mondelez Malaysia - subsidiary of Mondelez International, snacks and confectionery products under brands such as Oreo, Cadbury, and Toblerone. Juta Food Industries SDN BHD – crackers, chips, confectionery

	ketchup, mayonnaise, salad dressings, and other sauces and condiments. Other food products - pasta, noodles, tea, ice, coffee powder, roasted coffee beans, curry powder, vinegar, yeast, baking powder, salted eggs, and extract of meat, other seafood and infant foods.		
FPI05	Carbonated soft drinks - Coca-Cola, Pepsi, and F&N. Fruit juices and drinks - Sunquick, Marigold, and Vitagen. Bottled water - Spritzer, Cactus, and Nestle Pure Life. Coffee and tea - OldTown White Coffee, Nescafe, and Boh. Alcoholic beverages - Carlsberg, Tiger Beer, and Johnnie Walker.	Deluxe Rich Sdn Bhd - ready-to-drink cans and premixes SYZ Food & Beverage Industries Sdn Bhd - produced beverages, coffee, tea, and chocolate Zaliza Food Industries (Z&Z) – soy drinks, cincau drinks, flavors of carbonated water	Coca-Cola Bottlers (Malaysia) Sdn Bhd - produces a range of carbonated soft drinks. Carlsberg Brewery Malaysia Berhad - a subsidiary of Carlsberg, which produces a range of beer products. Nestle Products Sdn Bhd - a subsidiary of Nestle, which produces a range of coffee and bottled water products.

Source: Department of Statistic Malaysia (2000)

As mentioned above, the FPI plays a vital role in Malaysia's economy. Under the 12th Malaysia Plan, the manufacturing industry is anticipated to boost by 5.1 percent per year, and it is primarily supported by domestic-oriented sectors (food and beverage, plant and equipment, tobacco, and manufactured metal products) with proposed 4.4 percent enhancement (Economic Planning Unit, 2021; Ministry of Economy of Malaysia, 2023). Moreover, both the agriculture industry and the FPI are being equally promoted to become net processed food exporters by heavily investing in research and development (RD) and accelerating modernization programs. In 2019, the output of the FPI accounted for around 10 percent of the manufacturing output in

Malaysia, afterward the contribution of this industry has been increased as processed food and agro-based products contributed 12.9 percent of the manufacturing production in 2021 (Malaysian Investment Development Authority, 2020; Ministry of International Trade and Industry, 2022). The FPI also contributed to GDP, increasing by 5.5 percent from RM21 million in 2015 to RM 30.5 billion in 2022 (Minister of Investment Trade and Industry, 2023b). Malaysia’s FPI is defined by a sizable foreign market, primarily palm oil-related products that are extreme demand from overseas countries, thereby Malaysia is well-known as a major exporter of palm oil globally. The products of FPI were exported to more than 200 countries and territories, generating about RM 21.76 billion, while the imported processed food accounted for RM 20.27 billion in 2019, according to the Malaysian Investment Development Authority (2020). Regarding the Minister of International Trade and Industry (2023), the international export of processed food rose from RM 2653.7 million to RM 2817.9 million between December 2022 and December 2023, accounting for 6.2 percent growth. Other than palm oil products, the exports of processed food were principally contributed by edible products and preparation, cocoa preparations and processed fruits and vegetables, confectionery, cereals, and flour preparations (Flanders Investment and Trade Malaysia Office, 2020). Additionally, Malaysia's FPI contributed RM 2,621.256 million to the export of processed food in January 2024, while the highest value of exported processed food, RM 2,933.477 million, was achieved in November 2023 during the period from November 2015 to January 2024 (CEIC, 2024).

Moreover, the FPI was the fourth largest investment contributor to the manufacturing industry in 2022, with a total investment (domestic and foreign investment) amount of approximately RM8.5 billion (Malaysian Investment

Development Authority, 2022b). According to the Economic Outlook 2024 (Ministry of Finance Malaysia, 2023), the processed food in the domestic-oriented sector increased by 9.8% in 2022 and 4.1% in 2023, while the growth of exported processed food surged from -4.5% in 2022 to 5.5% in 2023, indicating high foreign demand. On the other hand, the beverage manufacturing industry had a negative growth rate in 2020 but recovered to 9.4% in 2021; it substantially rose to 19% in 2022 and slightly decreased in 2023 (Ministry of Finance Malaysia, 2021, 2023).

Besides that, the desire for halal foods persists in growing as the profit of Malaysia's halal food industry achieves USD 31 billion in 2021 and it is expected to expand to USD 47.6 billion by 2025 (Malaysian Investment Development Authority, 2022a).

However, Malaysia Productivity Blueprint (Economic Planning Unit, 2017) highlights concerns about the low productivity and neglect of high value-added in the agro-food industry. The report identifies several reasons for low productivity, including inadequate linkages between the local raw material suppliers and food manufacturers, as various large manufacturers rely on imported raw materials rather than local resources (Economic Planning Unit, 2017). Other factors include poor supply chain management and low levels of automation and mechanization, especially among SMEs in the industry (Economic Planning Unit, 2017). Hence, it is necessary to address the productivity and efficiency of the FPI to foster its development.

1.2 Definition of Small and Medium Enterprises (SMEs) and Large-Scale Enterprises (LSEs)

The manufacturing sector comprises small and medium enterprises (SMEs) as well as large-scale enterprises (LSEs), which are classified according to their sales turnover or employee count (SME Corp. Malaysia, 2024b). In the detailed classification of SMEs within the manufacturing sector, a business falls into the micro-enterprise category if its sales turnover is below RM 300,000 or if it employs fewer than 5 individuals. A small enterprise is defined by a sales turnover ranging from above RM 300,000 to less than RM 15 million, or by a workforce numbering from 5 to 75 employees. Moreover, a company qualifies as a medium enterprise if its sales turnover lies between RM 15 million and RM 50 million, or if its employee count surpasses 75 but does not exceed 200. Conversely, an enterprise with a sales turnover exceeding RM 50 million or employing more than 200 individuals is classified as a large-scale enterprise.

In most countries, SMEs have been identified as a significant contributor to economic growth, and Malaysia, being a developing country, is no exception. According to SME Corp. Malaysia (2024a), SMEs contributed 38.4 percent to the overall GDP in 2022, up from 37.4 percent in 2021, and the value of exported goods increased from RM124.3 billion to RM144.5 billion in 2022. Additionally, SMEs in the manufacturing industry provided over 1.19 million employment opportunities in 2020 that comprised 46.5 percent of the total employment in manufacturing industry (Department of Statistics Malaysia, 2021). Meanwhile, Malaysia had 1,173,601 SMEs in 2022 representing over 97 percent of the total organizations, this number of SMEs has increased by 87,068 compared to 2016 (SME Corp. Malaysia, 2023). Furthermore, the majority of SMEs in the FPI are owned by local citizens, constituting over 80 percent of the total establishments in the industry in 2018 (Aniza *et al.*, 2019). Moreover, Malaysia’s FPI is dominated by SMEs (Flanders Investment and Trade Malaysia Office, 2020) as this sector is dictated by the highest concentration of SMEs within the manufacturing industry (Human Resources Development Fund, 2019).

1.3 Performance of the Food Processing Industry

Since the post-independence period, the government has implemented several policies, including the Import-Substitution Industrialization strategy, the New Economic Policy, and the First Industrial Master Plan (IMP), aimed at transitioning Malaysia from an agrarian economy to an industrialized economy. As a result of these efforts, the FPI has experienced significant growth, primarily attributed to the establishment of economic structural change.

From Figure 1.1, it can be observed that the total sales value of the FPI in Malaysia exhibited a continuous increase, rising from RM 16,820,828 thousand in 2005 to RM 134,058,369.4 thousand in 2023. This upward trend indicates an increasing role of the FPI in bolstering the nation's economy. However, there was a slight decline in total sales value from 2008 to 2009, this could be attributed to the effects of the global financial crisis. Notably, during the COVID-19 period, the sales value experienced a sharp boost from RM 56,513,288 thousand to RM 134,058,369.4 thousand in 2023. The twice enhancement of sales value reflects the importance of the FPI during times of crisis. Besides that, the increased sale value may be link to the greater inflation rate in the food and non-alcoholic beverages sectors, driven by increased supply and demand. Specifically, the food inflation rate augmented from 1.7 percent in 2021 to 5.8 percent in 2022 (Bank Negara Malaysia, 2022).

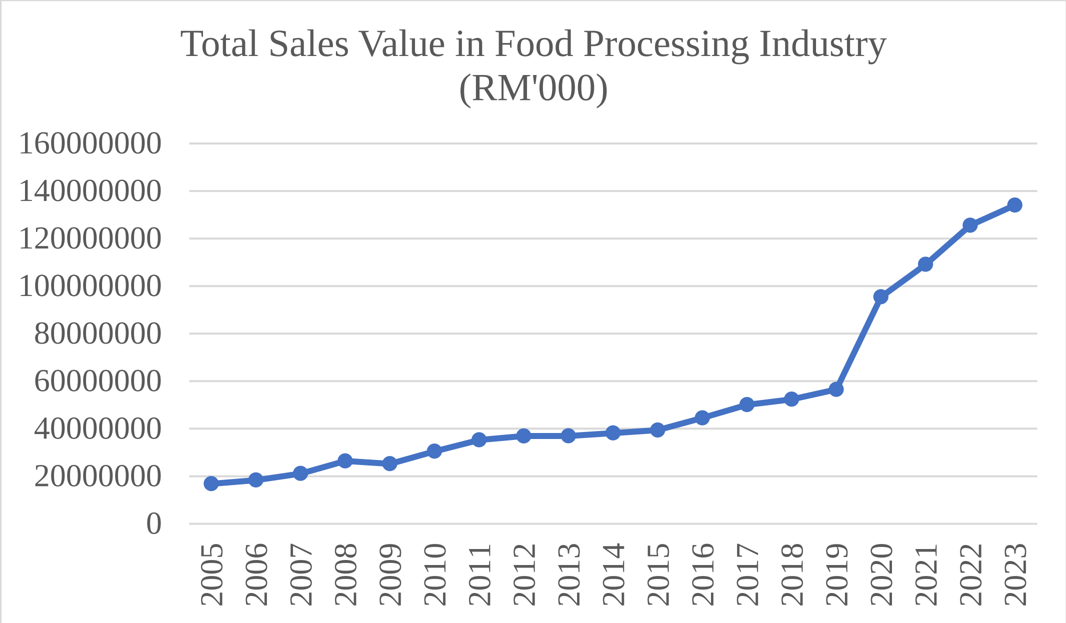

Figure 1.1 Total Sales Value of the Food Processing Industry
Source: Department of Statistics Malaysia (2024)

Industrialization brings about the enlargement of job opportunities in the FPI thereby improving the purchasing power and standard of living for citizens and stimulating economic growth in Malaysia. Figure 1.2 illustrates a consistent growth in the workforce employed within the FPI, indicating increased hiring and a reduction in the rate of unemployment. Despite the economic downturn and downsizing resulting from the COVID-19 pandemic, there is a high demand for processed food which led to the swift rise in the employment rate within the FPI from 2019.

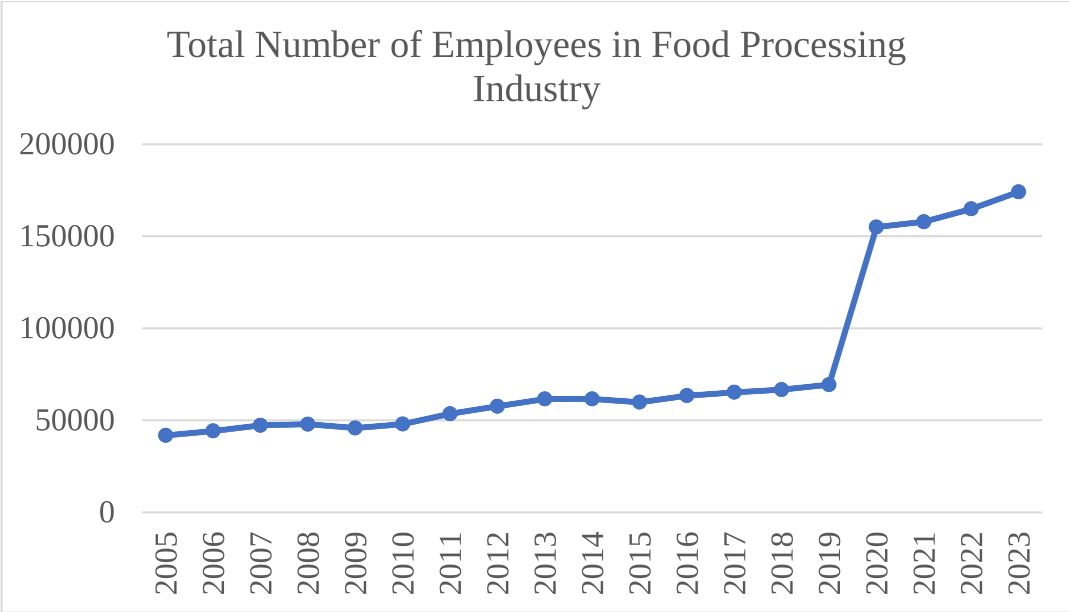

Figure 1.2 Total Number of Employees in the Food Processing Industry Malaysia
Source: Department of Statistics Malaysia (2024)

Productivity is usually used to gauge the performance of the firm (Coelli *et al.*, 2005). It is regarded as a vital driver of economic development and competitiveness, serving as fundamental statistical information for evaluating a country's performance such as the productivity employed to figure out the effect of labour and product market regulations on economic performance (Paul Krugman, 1994). Furthermore, Malaysia's expansion has been principally input driven by the infusion of capital and labour into the economy as Malaysia heavily relied on primary goods like rubber and it has varied to emerge as an international supplier of palm oil, natural gas, and electrical and electronic products (Economic Planning Unit, 2017). The input-oriented enhancement is increasingly expensive to maintain, as every unit of input implanted into the economy brings in less GDP growth compared to the previous years. Therefore, to attain sustainable growth of economic, it is pivotal for Malaysia transit to productivity-driven from input-driven (Economic Planning Unit, 2017). Additionally, Collatto et al. (2018) asserted that productivity is the sole relevant indicator of competitiveness, implying that greater productivity corresponds to higher competitiveness. High productivity within a sector reveals the industry's capability to achieve the maximum output with the same level of input. Labor productivity has been widely used in previous research due to its simplicity (Economic Planning Unit, 2017). It represents the firm's overall output divided by its total workforce, providing insight into the average output per employee and the overall output quantity.

The following figures represent the labour productivity of the FPI. Figure 1.3 presents the labour productivity for the total FPI, while Figure 1.4 shows labour productivity in the meat, fish, fruit, vegetables, oils, and fats industry (FPI 01). Figure 1.5 illustrates labour productivity in dairy product manufacturing (FPI 02), and Figure 1.6 displays labour productivity in the grain milling, starch, and animal feed sector (FPI 03). Figure 1.7 provides the labour productivity data for other food product manufacturing (FPI 04), and Figure 1.8 shows the labour productivity in beverage manufacturing (FPI 05).

The labour productivity of entire FPI demonstrated a steady increase throughout the period (Figure 1.3). However, the FPI experienced a decline in labor productivity in 2019, likely attributable to the adverse effects of the COVID-19 pandemic. Afterward, its recovery since 2020 might be attributed to the FPI being an essential activity, which fulfilled the demand of the market even during the Movement Control Order (MCO). The industry continued to operate despite limited labour hours and activities mandated by the standard operating procedures (SOPs) (Bank Negara Malaysia, 2021). The manufacturing of grain mill products, starch derivatives, formulated animal feeds, and other food products industry have similar labour productivity with the overall FPI (Figure 1.6 and Figure 1.7), while both sub-sectors showed an increasing trend but diminished since 2019. Besides that, these two sectors might have been negatively influenced by the global financial crisis, as they experienced a slight reduction afterward.

In the meat, fish, fruit, vegetables, oils, and fats processing sector, labour productivity witnessed a decline from 2011 to 2014 (Figure 1.4). This could be attributed to high inflation in the food and non-alcohol industry primarily driven by the higher price enhancements in vegetables and fruits, meat, and seafood, which typically leads to reduced labour productivity (Bank Negara Malaysia, 2011). Furthermore, the labour productivity of the manufacturing of dairy products displayed instability and a continued decrease from 2014 to 2023 (Figure 1.5). It reflects the poor performance of the dairy products industry since 2014 and even worse during the crisis (Covid-19). The manufacturing of the beverages industry showed fluctuating labour productivity from 2005 to 2023 (Figure 1.8). The labour productivity of this sub-sector has been declining since 2017, reaching its lowest level in 2020.

In brief, the labour productivity of the whole FPI, including various sub-sectors, suggests instability in the performance of FPI, particularly within specific sectors of food processing. Besides that, the decreasing labour productivity indicates that there may be inefficiency and low total factor productivity in the FPI.

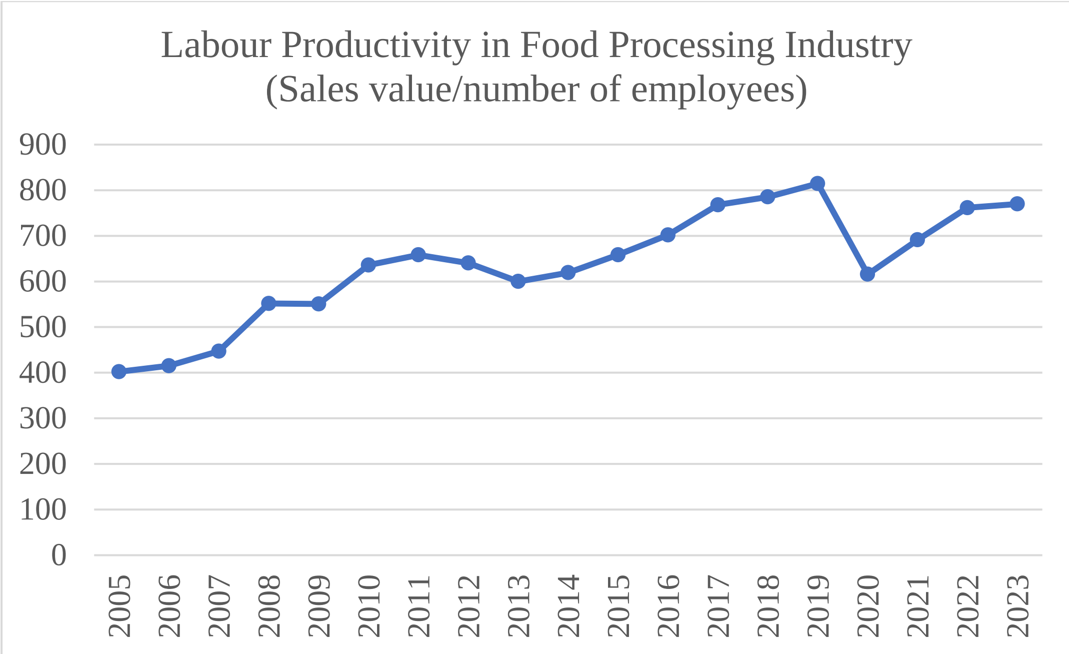

Figure 1.3 Labour Productivity of Food Processing Industry
Source: Author generated

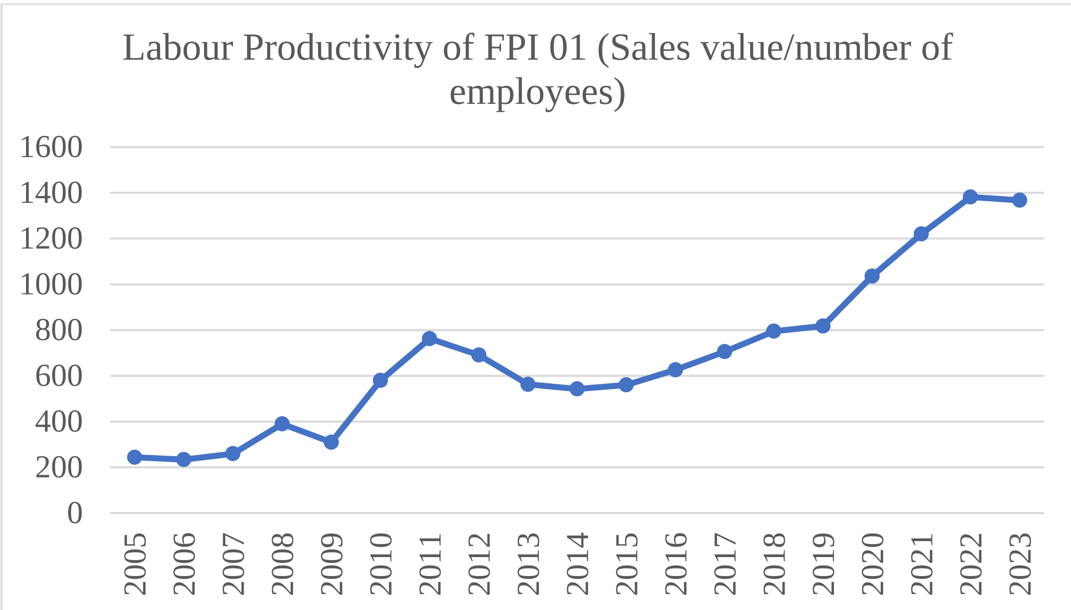

Figure 1.4 Labour Productivity of Processing Meat, Fish, Fruit, Vegetables, Oils, and Fats industry (FPI 01)
Source: Author generated

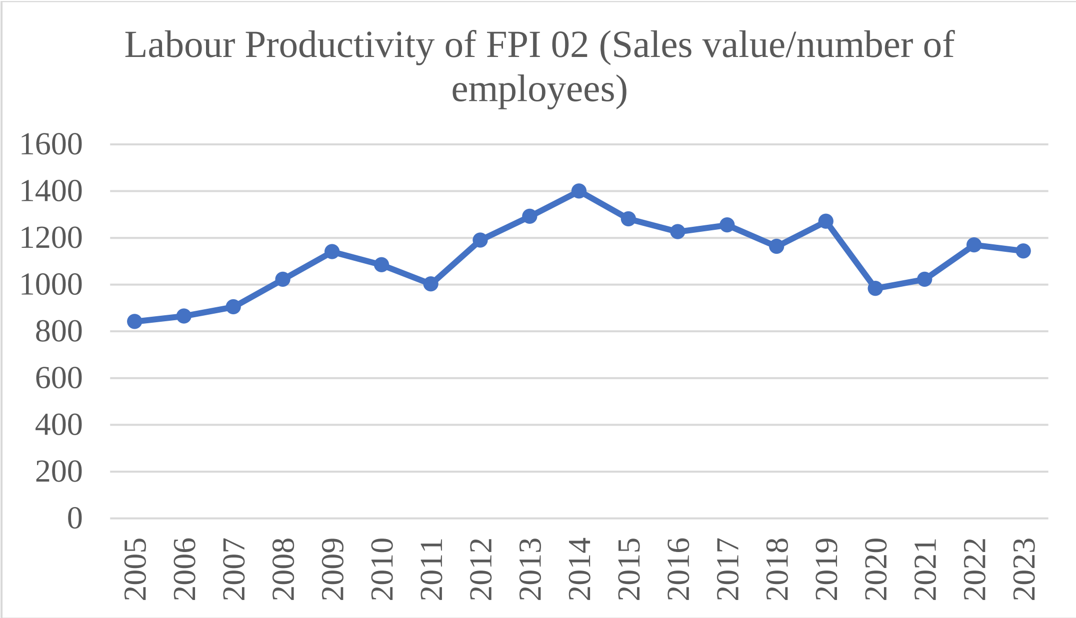

Figure 1.5 Labour Productivity of Manufacturing Dairy Products Industry (FPI 02)
Source: Author generated

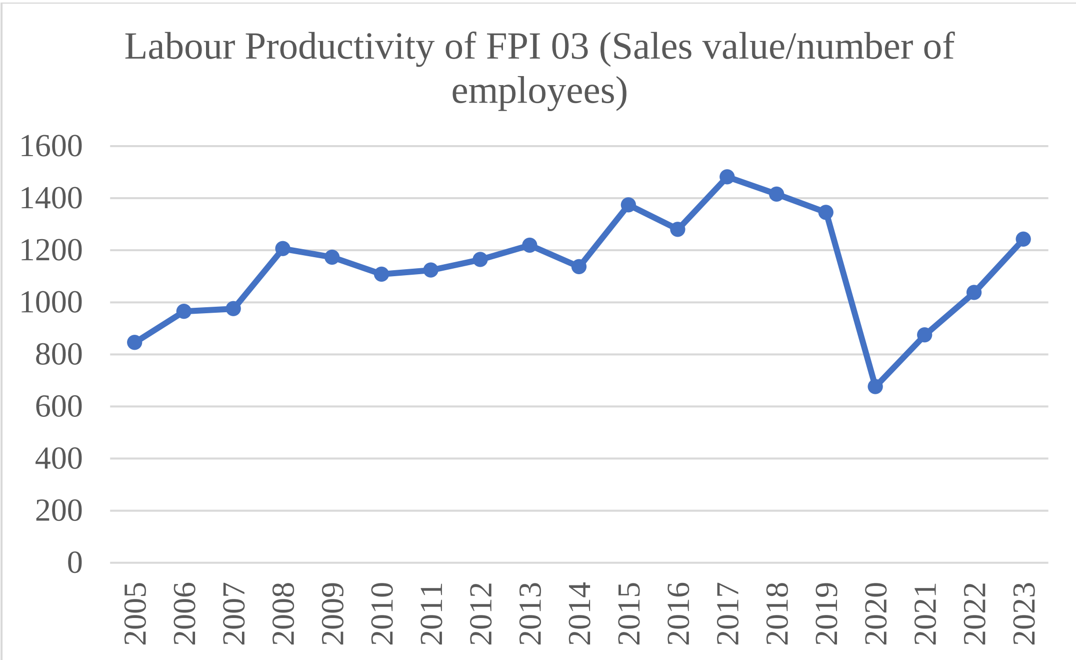

Figure 1.6 Labour Productivity of Manufacturing Grain Mill Products, Starch Products and Prepared Animal Feeds Industry (FPI 03)
Source: Author generated

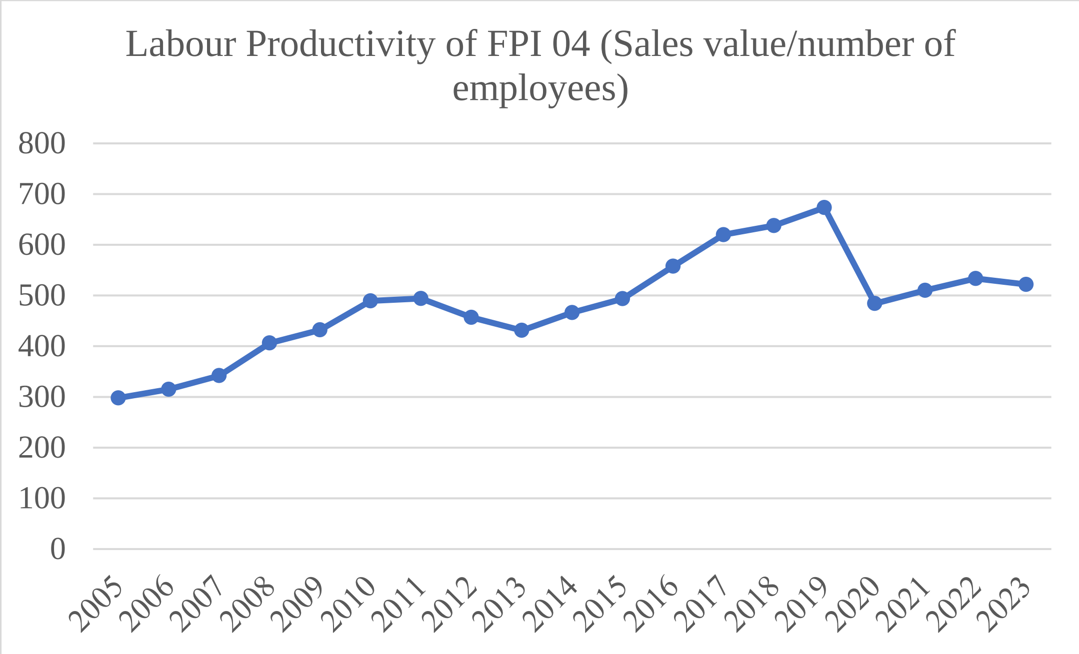

Figure 1.7 Labour Productivity of Other Food Products Industry (FPI 04)
Source: Author generated

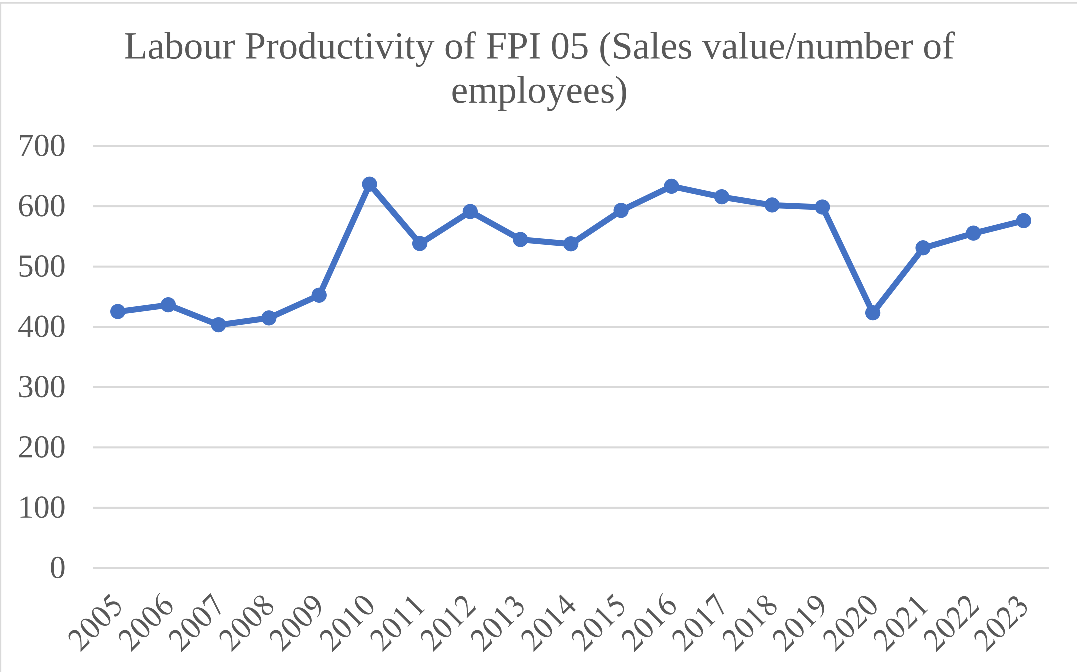

Figure 1.8 Labour Productivity of Manufacturing Beverage Industry (FPI 05)
Source: Author generated

Production growth has always been a concern due to it is a critical contribution to the GDP and overall economic growth. In this study, sales value growth is an alternative proxy for production growth (Majumdar, 2014). The production growth of the whole FPI had negative growth in 2009 and a downward trend from 2010 to 2013 and 2020 to 2023, potentially due to the global financial crisis and COVID-19 (Figure 1.9). The negative growth in the FPI reflects that the industry may be facing an inefficient problem. The production growth of the processing meat, fish, fruit, vegetables, oils, and fats industry (FPI 01) followed a similar pattern to the whole FPI which was negatively growing in 2009 and 2013 (Figure 1.10). The production growth of this sub-sector dramatically reduced from 2010 to 2013 and 2020 to 2023 reflects it is more uncertain compared to the whole FPI. In Figure 1.11, the production growth of dairy food products (FPI 02), apart from the adverse growth in 2009, also presented unfavourable growth in 2015, 2017, 2018, and 2023. This suggests poor management and a lack of capability within this sub-sector compared to the previous sub-sector. The production growth in the manufacturing of grain mill products, starch derivatives, and formulated animal feeds (FPI 03) grew negatively in 2010 and 2014, it also has had a downward slope since 2011 and 2020 (Figure 1.12). In the other proceed food sector (FPI 04), the tendency of production growth is unsteady (Figure 1.13), with diminishing production growth in 2010, 2016, and 2020. The beverage industry (FPI 05) experienced unfriendly development in 2006 and 2014 (Figure 1.14). The production growth declined from 2012 to 2014, 2015 to 2018, and 2020 to 2023.

In short, the production growth of the FPI exhibits fluctuations over the years, including instances of negative growth. Consequently, this study suggests that Malaysia's FPI may face challenges associated with inefficiency and reduced total factor productivity.

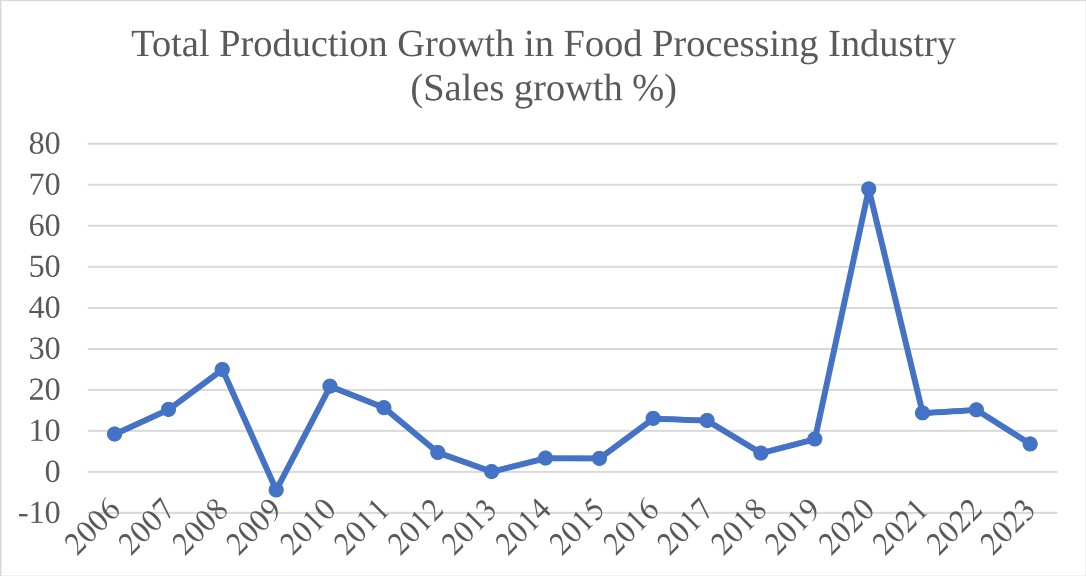

Figure 1.9 Total Production Growth of Food Processing Industry
Source: Author generated

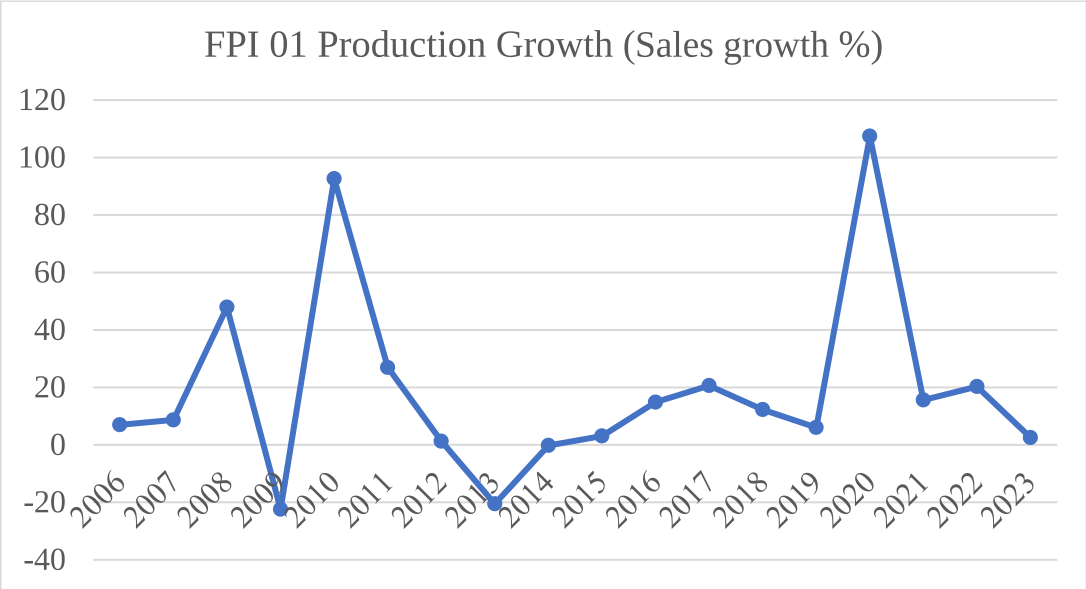

Figure 1.10 Production Growth of Processing Meat, Fish, Fruit, Vegetables, Oils, and Fats Industry (FPI 01)
Source: Author generated

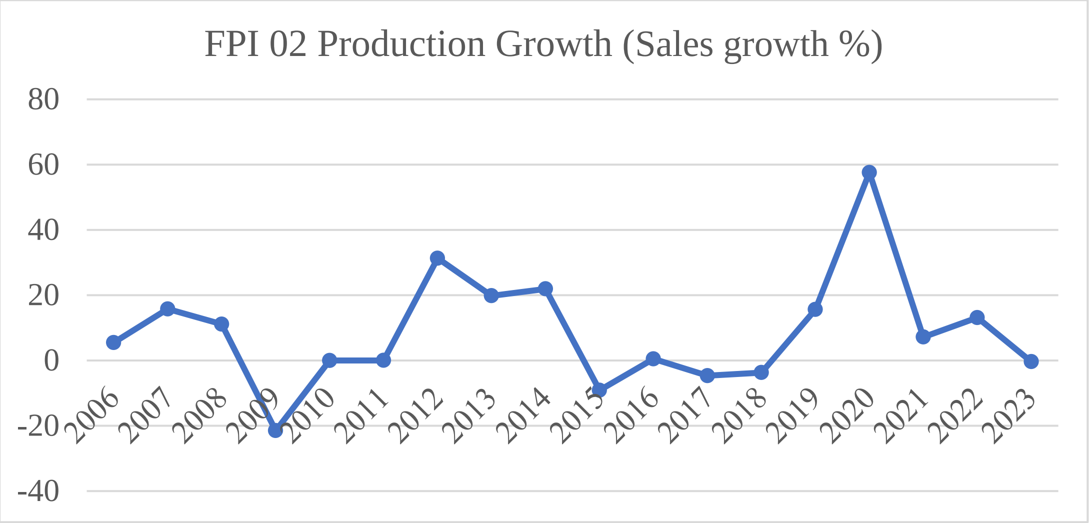

Figure 1.11 Production Growth of Manufacturing Dairy Products Industry (FPI 02)
Source: Author generated

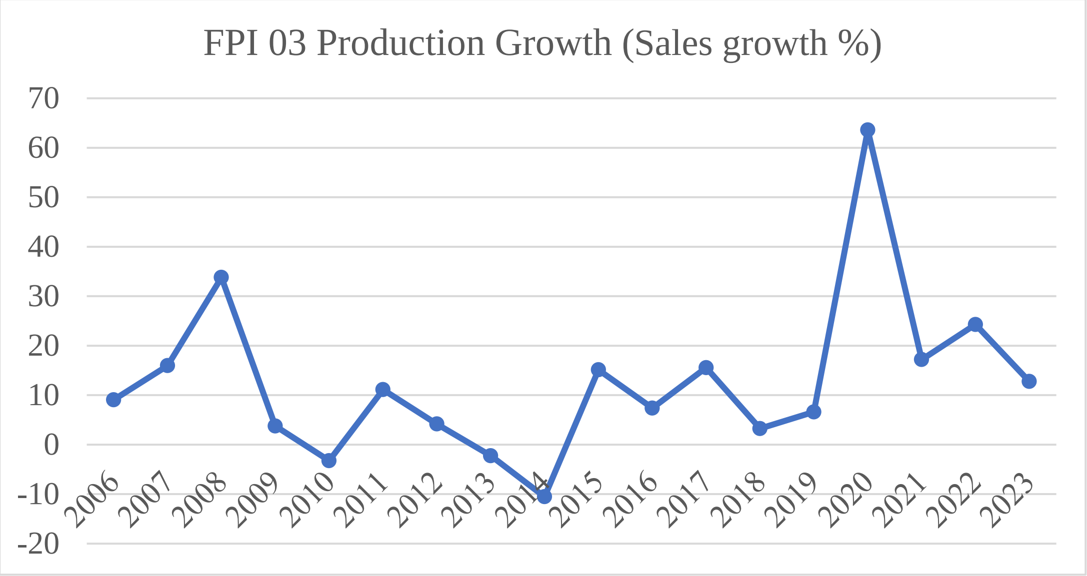

Figure 1.12 Production Growth of Manufacturing Grain Mill Products, Starch Products and Prepared Animal Feeds Industry (FPI 03)
Source: Author generated

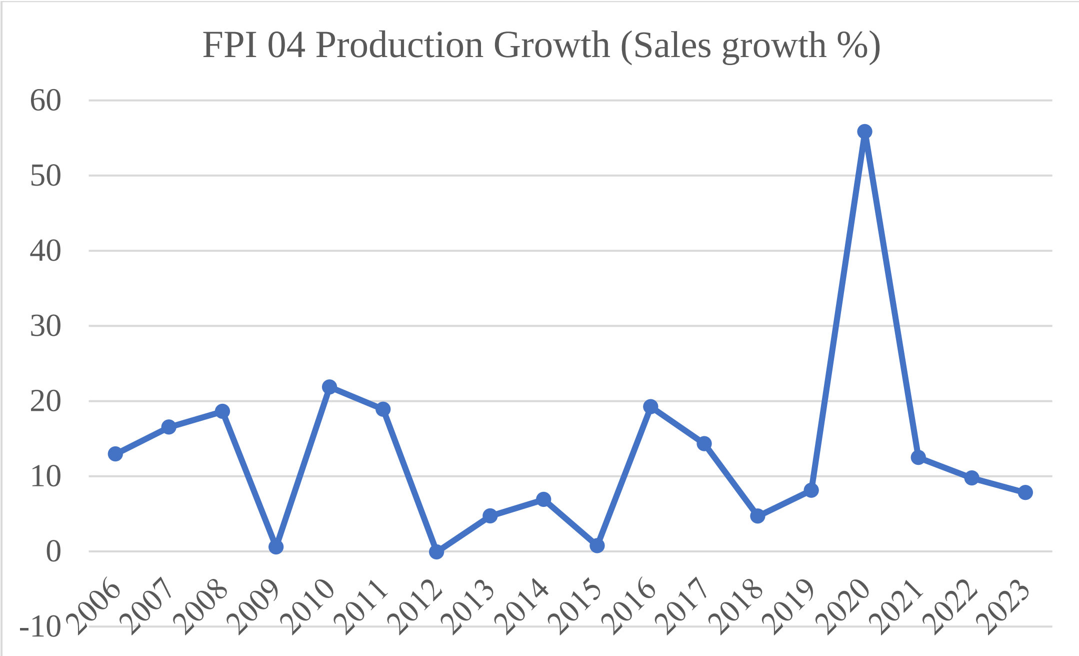

Figure 1.13 Production Growth of Other Food Products Industry (FPI 04)
Source: Author generated

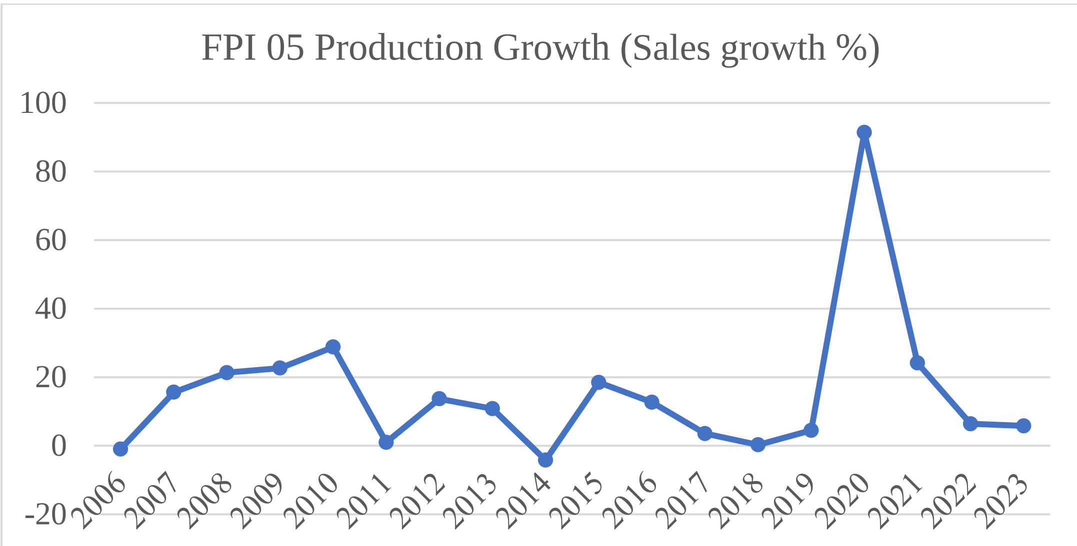

Figure 1.14 Production Growth of Manufacturing Beverage Industry (FPI 05)
Source: Author generated

1.4 Total Factor Productivity and Inefficiency

The performance of the firms could be evaluated by the productivity of the firms, which is defined by the ratio of outputs to inputs. A higher value of the productivity ratio indicates the firm has exceptional performance. Two traditional productivity measurements are commonly used, called partial productivity and total factor productivity (TFP). Partial productivity analysis involves assessing labour productivity and capital productivity. The approach is commonly utilized because the method is simple and it shows the productivity of a particular single input and output. However, relying solely on a partial productivity approach may lead to an ambiguous understanding of a firm's overall performance as it is focused on a single input. To overcome this limitation, TFP is employed to gauge productivity by considering the cumulative inputs and outputs. Low TFP indicates the firm fails to achieve maximum output at the given combination of inputs level.

Inefficiency refers to the suboptimal utilization of resources to produce output. In economic theory, the concept of inefficiency could be explained in several circumferences. Pareto inefficiency arises when the economy is not operating on the production possibility frontier which indicates that the economy is not fully employing the scarce resource to produce at the maximum output. Besides that, productive inefficiency arises when a firm is unable to produce output at the lowest unit cost or average cost. This suggests that the firm is not operating at its most efficient production level. Moreover, allocative inefficiency happens when the firm does not minimize the production cost and maximize the revenue. In other words, resources are not allocated in most efficiently, resulting in a suboptimal outcome. In addition, technical inefficiency occurs when a firm fails to create the maximum possible output at the given level of input. This implies that the firm is not utilizing its resources optimally to produce output.

Generally, the efficiency score ranges from zero to one. A score of one indicates that the economy or firm operates at 100% efficiency, whereas a score of