
**Independent Study on Packaging Products Market
in Southeast Asia**

November 2019

F R O S T  S U L L I V A N

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Disclaimer

The market research process for this study has been undertaken through secondary or desktop research, as well as detailed primary research, which involves discussing the status of the industry with leading industry participants and industry experts.

This market research was completed on November 19, 2019.

This report is prepared for inclusion in the preliminary and final versions of the English language offering circular and Thai language prospectus prepared by SCG Packaging Public Company Limited relating to its initial public offering and submission to the Securities and Exchange Commission of Thailand and other relevant parties.

Frost & Sullivan takes no responsibility for any incorrect information supplied to us by parties contacted within the consulting engagement.

We hereby certify that the views expressed in this consulting service accurately reflect our views based on primary and secondary research with industry participants, industry experts, end users, regulatory organizations, financial and investment community, and other related sources. In addition to the above, our robust in-house forecast & benchmarking models along with the Frost & Sullivan Decision Support Databases have been instrumental in the completion of this report. We also certify that no part of our compensation was, is or will be, directly or indirectly, related to the specific recommendations or views expressed in this service.

For and on behalf of Frost & Sullivan

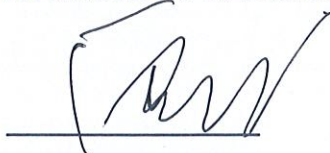


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1. TERMS AND ABBREVIATIONS

CAGR	Compound Annual Growth Rate
GDP	Gross Domestic Production
IMF	International Monetary Fund
SEA	Southeast Asia
ASEAN	Association of Southeast Asian Nations
FDA	Food & Drug Administration
PVC	Polyvinyl Chloride
PS	Polystyrene
PET	Polyethylene Terephthalate
VN	Vietnam
INA	Indonesia
PH	Philippines
TH	Thailand
DOH	Department of Health
MNRE	Ministry of Natural Resources & Environment
F&B	Food & Beverages
FMCG	Fast Moving Consumer Goods
FSL	Legislation of Food Safety
SKU	Stock Keeping Units
MNC	Multinational Companies
RCP	Recovered Paper
P&W	Printing & Writing
CIP	Consumer & Industrial Packaging
PoC	Point of Contact
RTD	Ready to Drink
OTG	On The Go
USD	United States Dollar
THB	Thai Baht
IDR	Indonesian Rupiah
VND	Vietnamese Dong
Peso	National Currency of Philippines
RECOFTC	Centre for People & Forests
PPP	Performance and polymer packaging
VKPC	Vina Kraft Paper Company, Ltd (subsidiary of SCG Packaging)
UPPC	United Pulp and Paper Company, Incorporated (subsidiary of SCG Packaging)
DENR	Department of Environment and Natural Resources of the Philippines

2. RESEARCH SCOPE

Research Period:

Base year: 2018

Historical: 2014 to 2018

Forecasting: 2019E to 2024E

Service Market Scope:

Overview of Southeast Asia Packaging Economy (for each country in scope)

Drivers & Restraints for Packaging – by material & country (Plastic, Paper and others)

Market size & forecasts for packaging, 2018 to 2024, by volume and value, by country and by type of packaging

Regulations for packaging in each country

Macro-economic indicators for each country

Geographical Scope:

Southeast Asia – Split by Thailand, Indonesia, Vietnam and Philippines

3. ASSUMPTIONS AND METHODOLOGY

Assumptions:

The forecasts were made by Frost & Sullivan based on the following assumptions:

GDP Growth rates for each of the countries in scope was used as one of the reference points to map factors such as disposable incomes, demand for F&B, FMCG and other products

Future growth rates for packaging materials is based on a combination of demand growth for various packaged products, growth of E-commerce industry, packaging alternatives, availability of raw materials for packaging, reliance on imports for raw materials for packaging manufacturing

Growth rates for packaging materials also takes into account the various drivers, trends and challenges in each country coupled with the regulations for various packaging materials in the country

Historical data & growth rates have also been factored in, as a basis for future forecasts

Supply side forecasts have been done using details provided by specific companies in terms of capacity expansion as well as importers bringing packaging solutions into each country

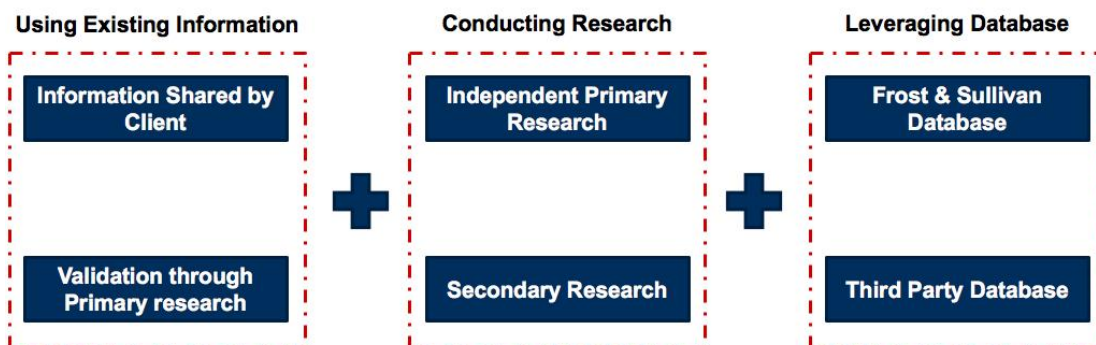
Volume forecasts have been used as the basis for each country. Value forecasts have been derived using average pricing in each country

Methodology:

In preparing the report, Frost & Sullivan has relied on the statistics and information obtained through primary and secondary research.

Primary research includes interviewing industry insiders, competitors, downstream customers and recognized third-party industry associations.

Secondary research includes reviewing corporate annual reports, databases of relevant official authorities, independent research reports and publications, as well as the exclusive database established by Frost & Sullivan over the past decades.



Frost & Sullivan has also validated all these pieces of information using an in-house market model for data generation.

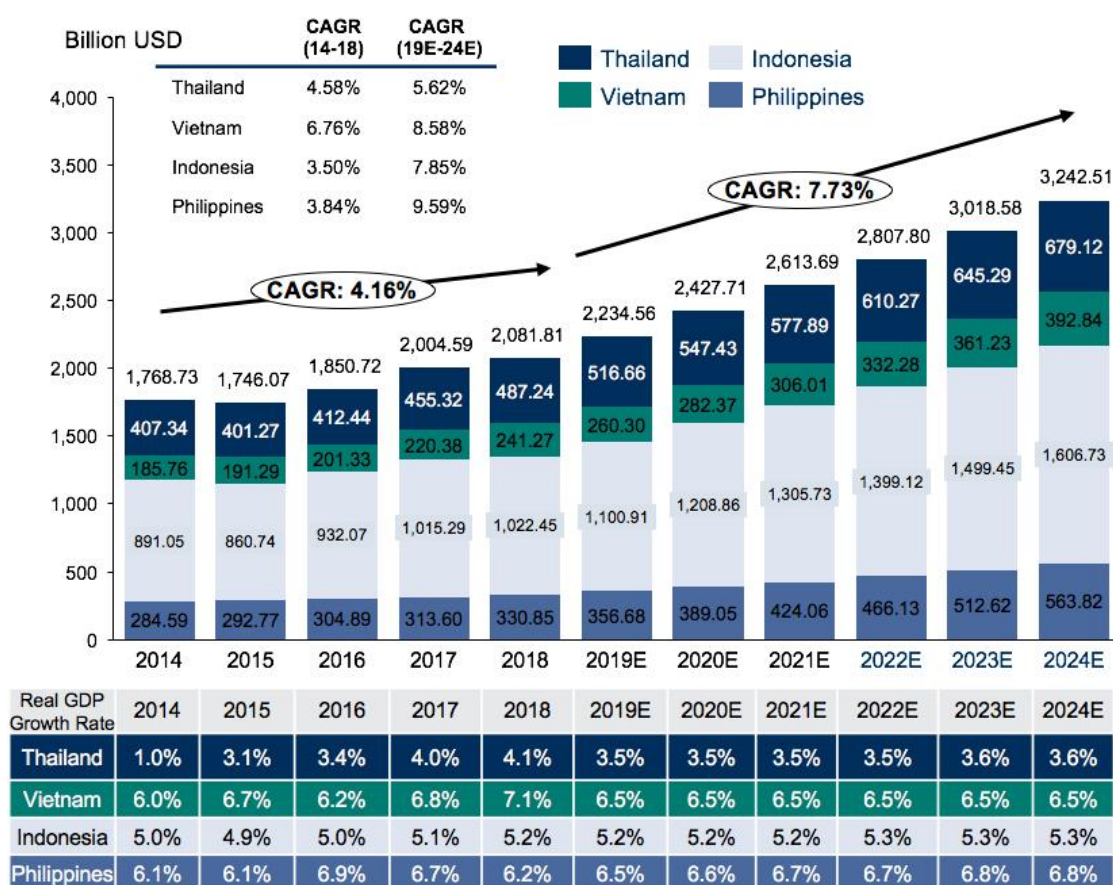
4. OVERVIEW OF SOUTHEAST ASIA'S MACRO-ECONOMY

4.1 NOMINAL GDP AND REAL GROWTH RATE IN ASEAN

Southeast Asia has been experiencing relatively strong economic growth during recent years. The total nominal GDP of the focused countries reached USD 2,081.81 billion in 2018 and is expected to amount to USD 3,242.51 billion in 2024 at a CAGR of 7.73% in the period 2019 to 2024.

Southeast Asia's economy has been aided by the increased domestic consumption, growth of exports of goods and services as well as other factors such as tourism, growing disposable incomes, a growing middle income population, a large young population coupled with strong labour market. The region's large labour force also makes it an ideal destination for manufacturing activities. At the same time, government initiatives across the region to boost infrastructure as well as commercial and residential construction has also been critical to the region's economic growth.

Chart 4-1: Nominal GDP and Real Growth Rate, Thailand, Vietnam, Indonesia, and the Philippines, 2014-2024E



Source: IMF, Frost & Sullivan

Benefited by the growth of export and prosperity in its tourism industry, Thailand achieved its nominal GDP at USD 487.24 billion in 2018.

The nominal GDP of Vietnam reached USD 241.27 billion in 2018 benefited by the development of its labour intensive industry as the factories invested by foreign companies boosted the manufacturing industry in Vietnam.

As the largest economy in ASEAN, the nominal GDP of Indonesia amounted to USD 1,022.45 billion in 2018 driven by the increase in individual consumption and its sufficient labour force with its future growth still hinging on the growth of investment.

The nominal GDP of Philippines reached USD 330.85 billion in 2018. The ambitious infrastructure construction plan proposed by Philippines government is expected to contribute to its economic growth in the future.

Real growth rate of ASEAN were vibrated over the past five years. With the gradual maturity of economic development, the real GDP growth of ASEAN is expected to be stable in the future.

In comparison to global GDP growth rate, which is expected to grow at 2.8% over the course of the next three to four years, Southeast Asia's economic outlook is significantly stronger and robust. Developed or advanced economies such as the United States (GDP growth forecast of 1.6% between 2019 and 2022), the Euro Area (GDP growth forecast of 1.3% between 2019 and 2022) and Japan (GDP growth forecast of 0.6% between 2019 and 2022), all have weaker economic outlooks in comparison to Southeast Asia, owing to a broad range of challenges such as the US-China trade war, general slowdown in the EU and a lack of economic stimulus.

4.2 INFLATION INDEX IN ASEAN

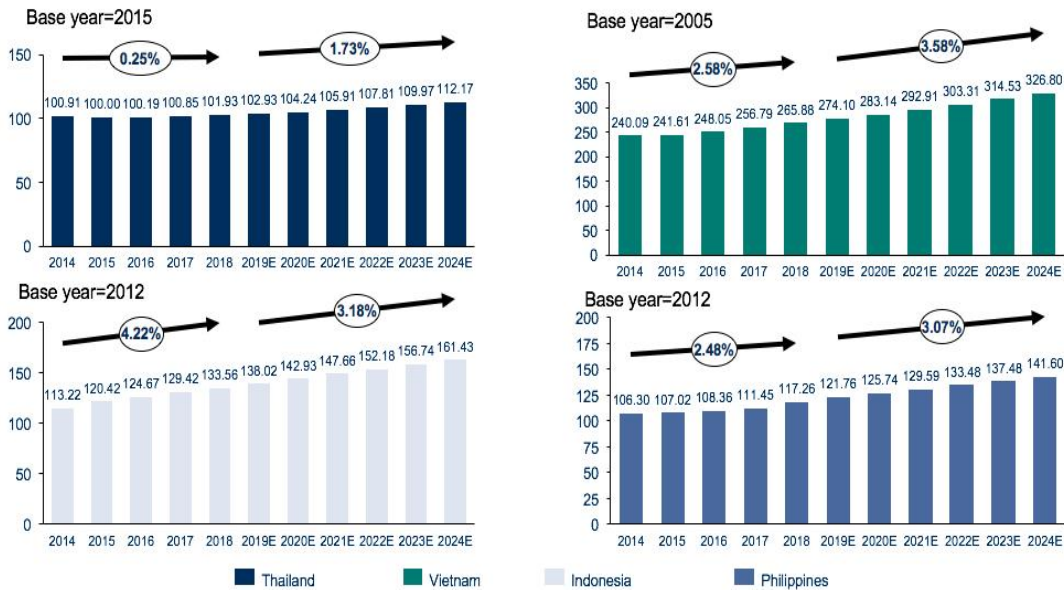
The inflation in Thailand, measured by Average Consumer Prices, increased from 100.91 in 2014 to 101.93 in 2018, with a CAGR of 0.25%. It is expected to rise to 112.17 in 2024, with a CAGR of 1.73% between 2019 to 2024.

In Indonesia, inflation will rise from 133.56 in 2018 to 161.43 in 2024, with a CAGR of 3.18% between 2019 and 2024.

The inflation in Vietnam increased from 240.09 in 2014 to 265.88 in 2018, with a CAGR of 2.58%. Between 2019 and 2024, it is expected to rise to 326.80 with a CAGR of 3.58%.

The inflation in Philippines increased from 106.30 in 2014 to 117.26 in 2018, with a CAGR of 2.48%. Between 2019 and 2024, it is expected to rise to 141.60 with a CAGR of 3.07%.

Chart 4-2: Inflation (Average Consumer Prices Index), Thailand, Vietnam, Indonesia, and the Philippines, 2014-2024E



Source: IMF, Frost & Sullivan

4.3 NOMINAL GDP PER CAPITA IN ASEAN

The growth in the Nominal GDP per Capita across the region is testament to the positive economic conditions across the region. A key factor in the region’s growth story is the inclusion of a larger percentage of the population into the work force as well as into sectors such as manufacturing, services and agriculture. Southeast Asia’s focus as an ideal export economy has also aided the growth of countries such as Vietnam and Indonesia.

Among the focused countries, Thailand achieved the highest nominal GDP per Capita of USD 7,018 in 2018 with the CAGR of 4.20% in the period 2014 to 2018. It is expected to reach USD 9,664 in 2024 given constant economy transformation and upgrading. Thailand 4.0 Strategy aims to promote the growth of high value-added industry.

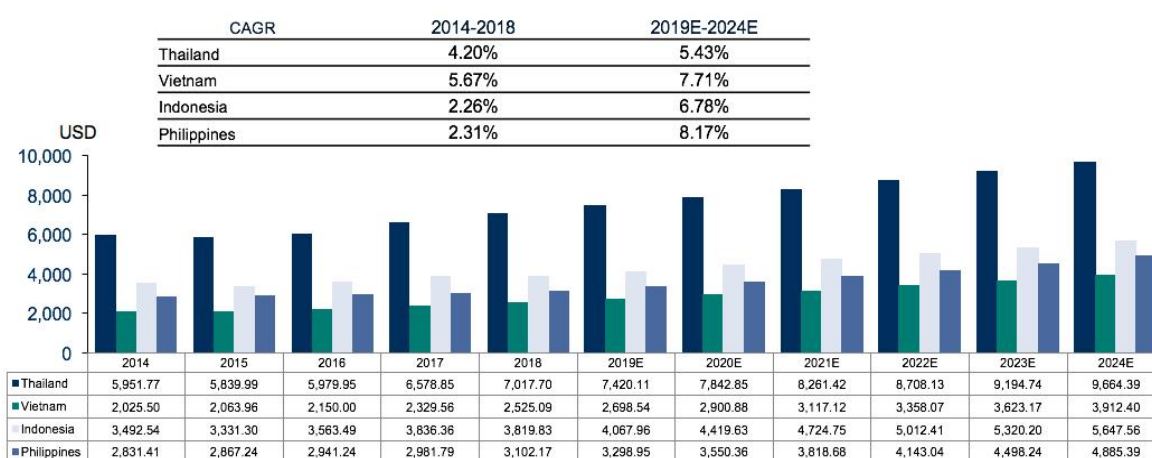
As the economic reform in Vietnam attracted enormous foreign investment due to its low labour cost, GDP per Capita of Vietnam reached USD 2,525 in 2018 and it is expected to reach USD 3,912 in 2024, with the CAGR of 5.67% in the period 2014 to 2018.

Indonesia achieved GDP per Capita of USD 3,820 in 2018 and it is anticipated to reach USD 5,648 in 2024 with a CAGR of 6.78% in the period 2019 to 2024. Despite its high total nominal GDP, Indonesia has a backward industry structure and underdeveloped industrial system.

Philippines achieved GDP per Capita of USD 3,102 in 2018 and it is expected to reach USD 4,885 in 2024 at a high CAGR of 8.17% in the period 2019 to 2024. Government investment may be a major driving force of the strong growth.

The growth in the nominal GDP per capita across the region is testament to the positive economic conditions across the region. A key factor in the region’s growth story is the inclusion of a larger percentage of the population into the work force as well as into sectors such as manufacturing, services and agriculture. Southeast Asia’s focus as an ideal export economy has also aided the growth of countries such as Vietnam and Indonesia.

Chart 4-3: Nominal GDP per Capita, Thailand, Vietnam, Indonesia, and the Philippines, 2014-2024E



Source: IMF, Frost & Sullivan

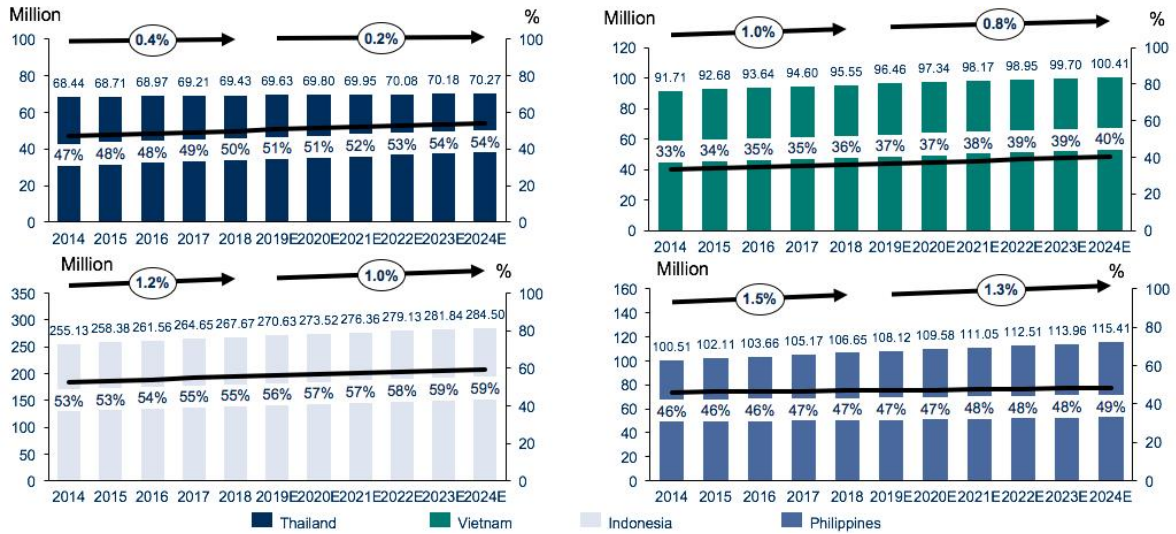
4.4 POPULATION GROWTH AND URBANIZATION RATE IN ASEAN

The focused countries have relatively stable population. The CAGR of population of Thailand, Vietnam, Indonesia and Philippines are 0.4%,1.0%,1.2% and 1.5% respectively in the period 2014 to 2018.

Thailand achieved population of 69.4 million in 2018. It is expected to remain relatively stable and reach 70.3 million in 2024. Thailand has a fast aging population compared with other countries. Its urbanization rate reached about 50% in 2018 and is expected to reach 54% in 2024. Vietnam has a population of 95.6 million with growing proportion of labour population. It has a relatively low urbanization rate of 36% in 2018 and is expected to reach 40% in 2024.

Indonesia has a population of 267.7 million and urbanization rate of 55% in 2018 and is expected to reach 59% in 2024. Philippines has a population of 106.7 million and urbanization rate of 47% in 2018 and is expected to reach 49% in 2024. Both of the two countries focused on the development of urban regions, which led to the migration to the urban area.

Chart 4-4: Total Population and Urbanization Rate, Thailand, Vietnam, Indonesia, and the Philippines, 2014-2024E



Source: IMF, Frost & Sullivan

4.5 YOUNG POPULATION AND MEDIAN AGE IN ASEAN

While the urbanization rate is increasing, the population is becoming younger. The percentage of population aged between 15-64 years old in Thailand, Indonesia and Vietnam is higher than the global average, standing at 71.0%, 67.6%, and 69.6% respectively. Although Philippines' adult population is slightly lower, at 63.9%, the proportion has been trending upwards in the past decade and the Philippines has a large younger cohort aged between 0 and 14 years old fueling the future economy.

In 2018, the median age of Thailand, Vietnam, Indonesia and the Philippines stood at 39 years, 32 years, 29 years, and 25 years, respectively, compared with 42 years, 38 years, and 48 years, respectively, in the European Union, the United States and Japan.

The young and sizable population in focused countries of ASEAN, especially in Indonesia and Philippines, is expected to spur greater consumption, production and investment through the accumulation of more disposable income of the working-age population.

Chart 4-5: Percentage of Population, by Age, in Thailand, Vietnam, Indonesia, and the Philippines, 2018

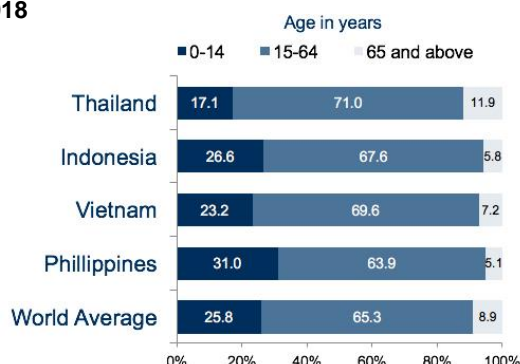
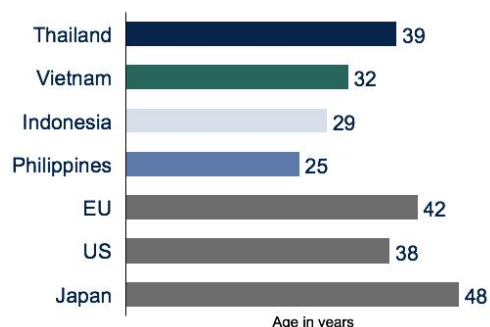


Chart 4-6: Median Age in Thailand, Vietnam, Indonesia, Philippines and Other Developed Countries, 2018



Source: Frost & Sullivan

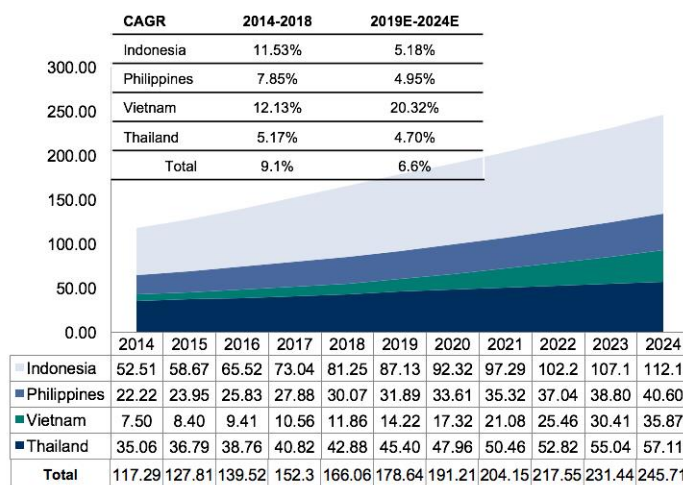
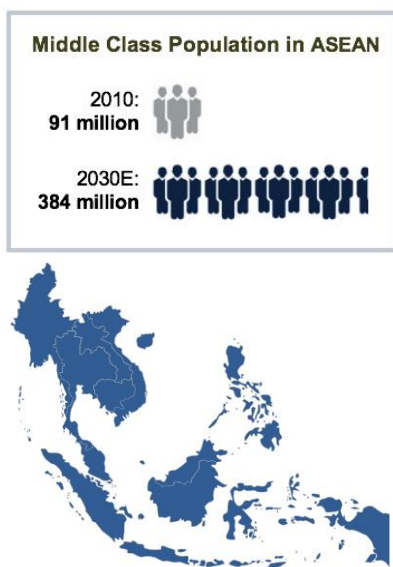
Moreover, it is expected that Thailand, Indonesia, Vietnam and the Philippines are either approaching or have surpassed the "tipping point" on the wealth to consumption per capita S-curve, which is commonly considered to be when GDP per capita exceeds USD 2,500-3,000 – the upper end of the World Bank definition of Lower Middle-Income level and is when consumption per capita begins to grow exponentially as what was experienced by China in the early 2000s. Based on data from the World Bank, GDP per capita in 2018 for Thailand stands at USD 7,017.7, which is beyond the Middle Income level, while the Philippines, Indonesia, and Vietnam are expected to benefit from one of the largest driving force for growth with GDP per capita at USD 3,102.2, USD 3,819.8, and USD 2,525.1.

4.6 MIDDLE CLASS POPULATION IN ASEAN

In focused countries (Thailand, Vietnam, the Philippines, and Indonesia), the number of middle class is anticipated to more than double in size from 117.29 million in 2014 to 166.06 million in 2018, which is expected to reach 245.71 million by 2024.

The growth of the middle class population will lead to higher disposable incomes, which in turn will spur demand in industries such as F&B, FMCG, E-commerce and others, all of which are key users of packaging solutions.

Chart 4-7: Estimated Middle Class Population (millions of people) in Thailand, Vietnam, the Philippines, and Indonesia, 2014-2024E



Note: Middle class is defined as those households with daily expenditures between USD10 and USD100 per person in purchasing power parity terms.

Source: Homi Kharas, "The Emerging Middle Class in Developing Countries,"

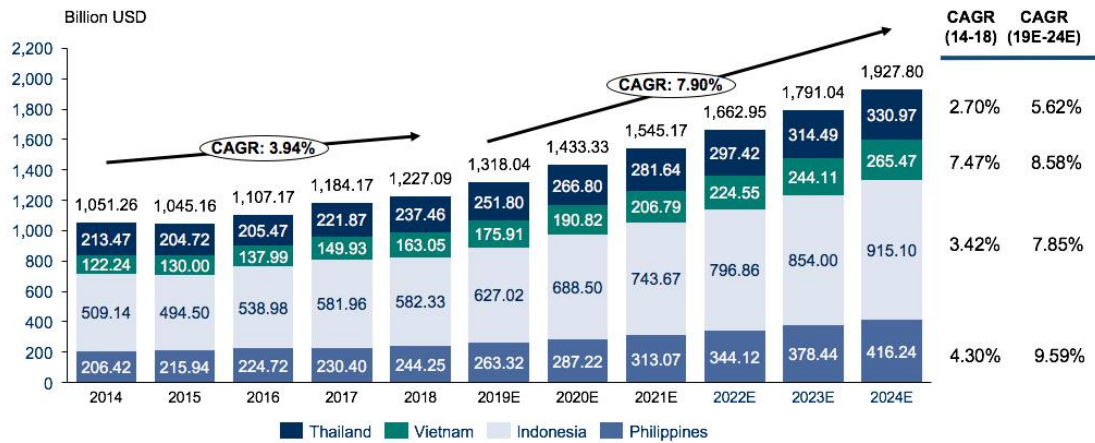
OECD Working Papers; Frost & Sullivan

4.7 TOTAL HOUSEHOLD CONSUMPTION IN ASEAN

Total household consumption in ASEAN has been witnessing a gradual growth. Total household consumption in the focused countries reached USD 1,227.09 billion in 2018 and is expected to achieve USD 1,927.80 billion in 2024 with a CAGR of 7.90% in the period 2019 to 2024. Growth of total household consumption for goods and services will also positively impact the growth of the packaging market in the region.

Thailand has a total household consumption of USD 237.46 billion in 2018 partly driven by increase in vehicle consumption and overseas travelling consumption. Total household consumption in Vietnam reached USD 163.05 billion in 2018 and is anticipated to reach USD 265.47 billion in 2024 with a CAGR of 8.58% in the period 2019 to 2024, which is consistent with the growth of individual income. Indonesia has achieved the household consumption of USD 582.33 billion in 2018. Total household consumption in Philippines reached USD 244.25 billion in 2018 benefited by its relatively young population structure who prefers consumption to saving.

Chart 4-8: Total Household Consumption, Thailand, Vietnam, Indonesia, and the Philippines, 2014-2024E

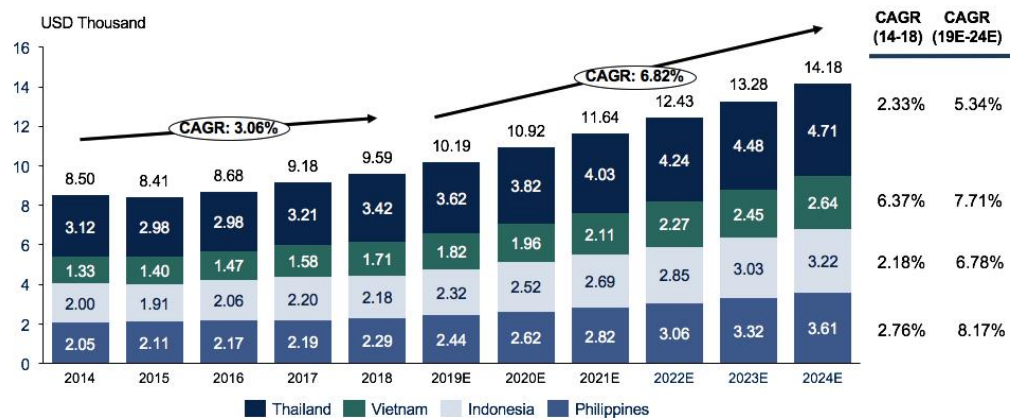


Source: IMF, Frost & Sullivan

Among the focused countries, total household consumption per capita increased from USD 8.50 thousand in 2014 to USD 9.59 thousand in 2018 with a CAGR of 3.06%, and is expected to increase further to USD 14.18 thousand in 2024, representing a CAGR of 6.82% in the period 2019 to 2024.

Total household consumption per capita in Thailand increased slightly from USD 3.12 thousand in 2014 to USD 3.42 thousand in 2018 with a CAGR of 2.33%, and is expected to further increase to USD 4.71 thousand in 2024 with a CAGR of 5.34%. Vietnam has achieved the household consumption per capita of USD 1.71 thousand in 2018 and is anticipated to increase to USD 2.64 thousand in 2024, representing a CAGR of 7.71%. Total household consumption per capita in Indonesia was USD 2.00 thousand in 2014 and slowly reached USD 2.18 thousand in 2018 with a CAGR of 2.18%. It is anticipated to increase to USD 3.22 thousand in 2024 with a CAGR 6.78% Philippines has a total household consumption per capita of USD 2.29 thousand in 2018, and the figure of Philippines is expected to reach USD 3.61 thousand in 2024 with a CAGR of 8.17%.

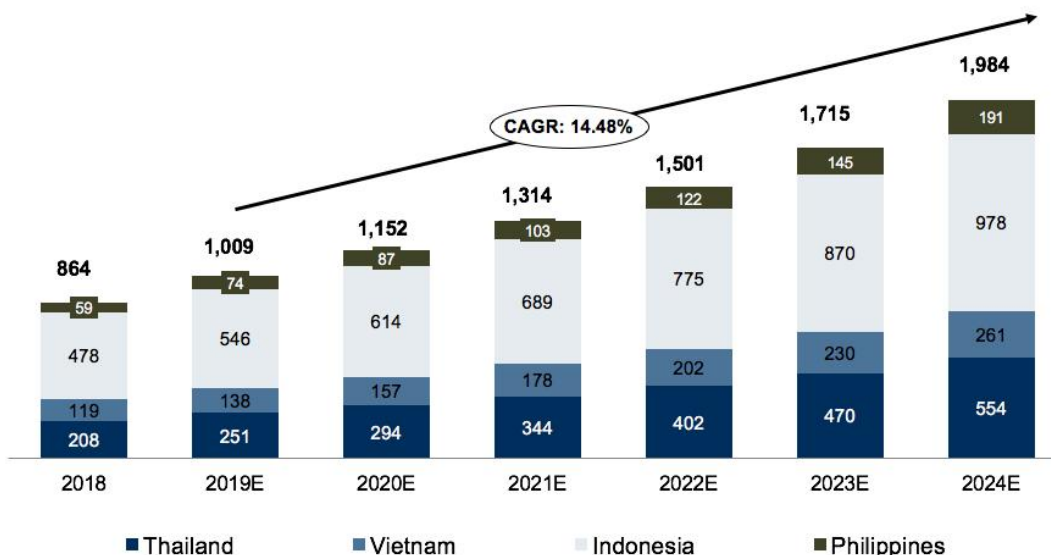
Chart 4-9: Total Household Consumption per Capita, Thailand, Vietnam, Indonesia, and the Philippines, 2014-2024E



Source: IMF, Frost & Sullivan

4.8 E-COMMERCE MARKET SIZE IN FOCUSED COUNTRIES AND ASEAN

Chart 4-10: E-commerce Packaging Market (million USD) in Thailand, Vietnam, Indonesia, and the Philippines, 2019E-2024E



Note: no information prior to 2018 for E-commerce packaging market

Source: Frost & Sullivan

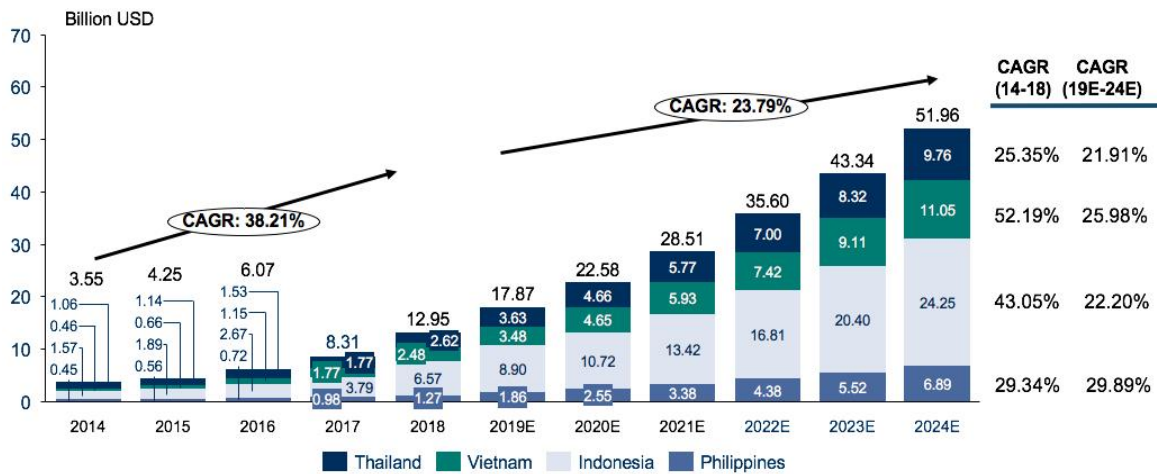
The rapid growth of the E-commerce market is expected to have a considerable impact on demand for E-commerce packaging. The overall market for E-commerce packaging in Thailand, Vietnam, Indonesia and the Philippines is anticipated to expand at a significant rate over the forecast period from 2019 to 2024, with a CAGR of 14.48% and reach a market value of USD 1,984 million by the end of 2024.

In Thailand, the market is estimated to grow from USD 251 million in 2019 to 554 million in 2024, with a CAGR of 17.16%. It is estimated that the market in Vietnam will rise from USD 138 million in 2019 to 261 million in 2024, with a CAGR of 13.59%. The market in Indonesia is projected to reach USD 978 million by 2024, from USD 546 million in 2019, with a CAGR of 12.36%. In the Philippines, the market is expected to increase from USD 74 million in 2019 to 191 million in 2024, with a CAGR of 20.88%.

The E-commerce market, measure by GMV (Gross Merchandise Volume) in ASEAN has been experiencing a significant growth during recent years. The E-commerce market size of the focused countries reached USD 12.95 billion in 2018 with a CAGR of 38.21% in the period 2014 to 2018. It is anticipated to amount to USD 51.96 billion in 2024 at the CAGR of 23.79% in the period 2019 to 2024. The penetration of smartphones coupled with greater internet connectivity across the region has been one of the most important factors for the growth of the E-commerce industry. Convenience and factors arising from lack of time due to higher rates of urbanization have also propelled the E-commerce industry.

The E-commerce market sizes of Thailand, Vietnam, Indonesia and Philippines are USD 2.62 billion, USD 2.48 billion, USD 6.57 billion and USD 1.27 billion respectively. In Thailand, the growth is partly boosted by high proportion of mobile payment users. The Vietnamese E-commerce shopping has high conversion rate and it attracted enormous investment from foreign E-commerce companies. Indonesia has high usage coverage of social media and large internet user base. E-commerce market in Philippines is relatively untapped, but it has great potential with the development of the internet infrastructure. The E-commerce industry will be one of the biggest drivers for the growth of packaging in the region.

Chart 4-11: E-commerce Market Size (by GMV), Thailand, Vietnam, Indonesia, and the Philippines, 2014-2024E



Source: IMF, Frost & Sullivan

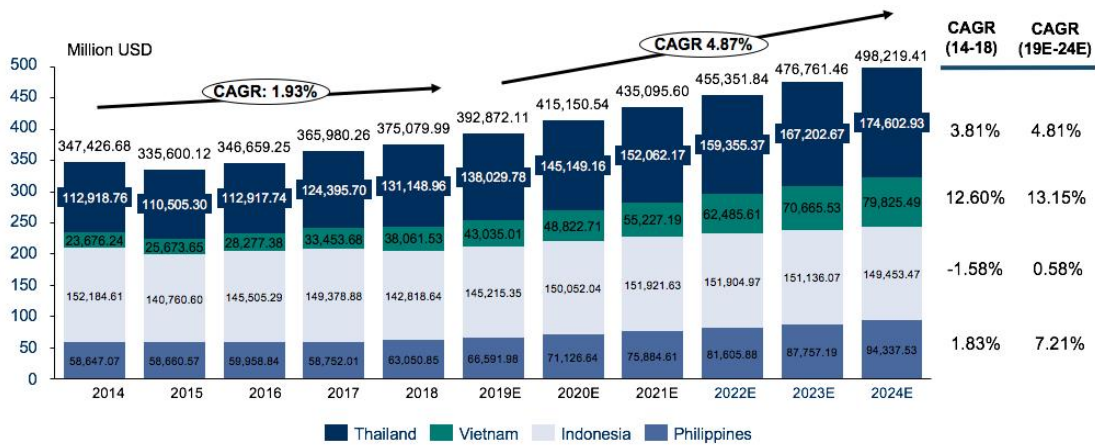
4.9 PRODUCTION OF MANUFACTURING GOODS IN ASEAN

The manufacturing industry in ASEAN has been growing during recent years. The total production of manufacturing goods of the focused countries reached USD 375.1 billion in 2018 and is expected to amount to USD 498.2 billion in 2024 at a CAGR of 4.87% in the period 2019 to 2024.

Thailand achieved production of manufacturing goods of USD 131.1 billion in 2018 at a CAGR of 3.81% in the period 2014 to 2018 due to growing demand for auto and export of electronic products, and is anticipated to achieve USD 174.6 billion in 2024 with a CAGR of 4.81%. In Vietnam, the production of manufacturing goods reached USD 38.1 billion in 2018 and is expected to achieve USD 79.8 billion in 2024 at a CAGR of 13.15%, which is attributed to foreign investment in labour intensive industry attracted by its low labour cost there. In Indonesia, the production of manufacturing goods reached USD 142.8 billion in 2018 and is expected to remain relatively stable and reach USD 149.5 billion in 2024. Manufacturing industry in Indonesia is limited by the production capacity of various downstream sectors

and their low added value. The production of manufacturing goods of Philippines reached USD 63.1 billion in 2018. Benefited by the investment of large-scale infrastructure construction plan of Philippines government, the production of manufacturing goods is expected to achieve USD 94.3 billion in 2024 with a CAGR of 7.21% in the period 2019 to 2024.

Chart 4-12: Production of Manufacturing Goods, Thailand, Vietnam, Indonesia, and the Philippines, 2014-2024E



Source: IMF, Frost & Sullivan

4.10 EXPORT OF MANUFACTURING GOODS IN ASEAN

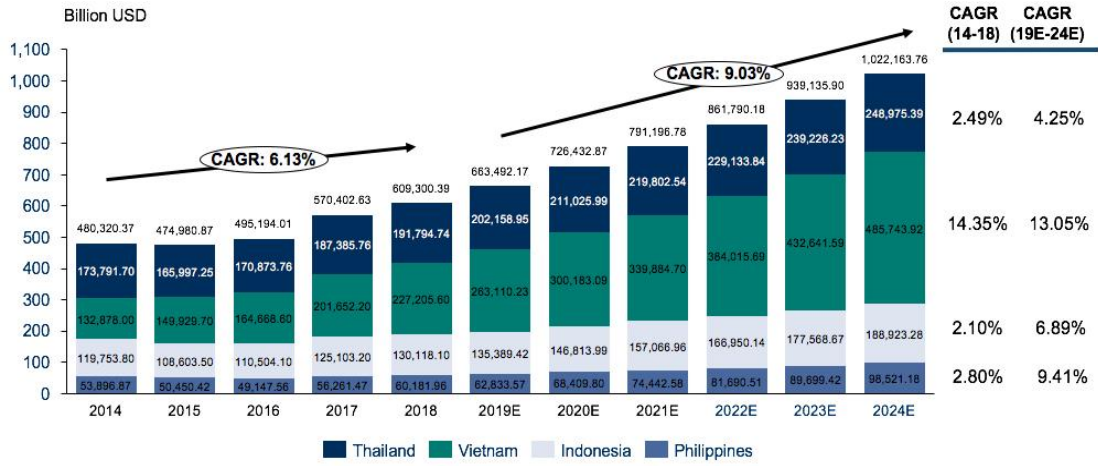
The export of manufacturing goods in ASEAN grew rapidly during last few years, which usually includes the re-export of the imported manufacturing goods. The total export of manufacturing goods of the focused countries amounted to USD 609.3 billion in 2018 and is expected to reach USD 1,022.2 billion in 2024 with a CAGR of 9.03% in the period 2019 to 2024.

That of Thailand reached USD 191.8 billion in 2018 and is expected to reach USD 249.0 billion in 2024 with a CAGR of 4.25% in the period 2019 to 2024. Thailand is faced with fiercer competition in the export market of China and Japan.

Vietnam is outstanding in the export of manufacturing goods which amounted to USD 227.2 billion in 2018 and is anticipated to achieve USD 485.7 billion with a CAGR of 13.05% in the period 2019 to 2024.

Indonesia and the Philippines are also expected to experience faster growth in export of manufacturing goods, in which it is anticipated to grow from USD 130.1 billion in 2018 to USD 188.9 billion in 2024 with a CAGR of 6.89% in Indonesia, and from USD 60.2 billion in 2018 to USD 98.5 billion in 2024 with a CAGR of 9.41% in the Philippines

Chart 4-13: Export of Manufacturing Goods, Thailand, Vietnam, Indonesia, and the Philippines, 2014-2024E



Source: IMF, Frost & Sullivan

5. OVERVIEW OF SOUTHEAST ASIA’S PACKAGING ECONOMY

5.1 INTRODUCTION OF THE PACKAGING INDUSTRY

Packaging industry is in general resilient to macro-economic variations

Packaging is an important part of the total product offering across almost all sectors. It serves several purposes from product protection, distribution, brand differentiation to facilitating usage of products and providing product information. Given the crucial role packaging plays in product offering, the demand for packaging products is relatively inelastic, which means it will remain stable to some extent, although some fluctuations within a narrow range also exists when the situation of economy fluctuates. The packaging industry is therefore generally less affected by macroeconomic contraction. Compared with industries that are vulnerable to economic impact, the packaging industry has stronger anti-risk capabilities, which has less dependence on the overall economic development.

Fiber and plastic are more common and economical choices of substrates in packaging

By function there are 3 types of packaging, namely, primary (in direct contact with the good itself, such as edible items), secondary (display and branding) and tertiary (protection and logistics) packaging. Key end markets of packaging include, fast-moving consumer goods (FMCG) such as food and beverage, cosmetics, clothing, electronics, pharmaceuticals, and other consumables, as well as industrial goods and logistics sectors. Depending on the end-markets and purposes, the packaging users have very distinct needs and requirements, thus leading to a wide range of packaging products and packaging materials.

There are 4 main types of packaging materials, namely, fiber, plastic, glass and metal. Fiber-based and plastic packaging are generally more commonly used due to its lightweight, flexibility, high recyclability and good cost to value ratios. For instance, although glass and metal are more durable and carry good barrier properties, but they are heavy and require significantly higher energy to produce, and hence more expensive production and larger environmental impact. The application of glass and metal packaging is much narrower than fiber- and plastic-based packaging. In terms of recyclability, paper and plastic packaging have high recyclability. However, due to the lack of infrastructure and promotional incentive in recycling plastic in Southeast Asia, the rate of plastic packaging recycling is lower than that of paper packaging.

Table 5-1: Comparison of Packaging Material Types Across Key Parameters

	<i>Plastic</i>	<i>Paper / Fiber</i>	<i>Glass</i>	<i>Metal</i>
Weight	<i>Lightweight</i>	<i>Lightweight</i>	<i>Heavy</i>	<i>Heavy</i>

Durability	High	Low	High	High
Processability	High	Low	Medium	Medium
Recyclability	High	High	High	Medium
Cost	Low	Medium	Medium	High
Energy Requirements	Low	Medium	High	High
Functional Properties (Barrier Properties)	Excellent	Poor	Average	Good
GHG Release	Low	Medium	Medium	Medium
Water Requirements	Low	High	Medium	High

Packaging market in ASEAN lags behind the developed economies and is highly fragmented

At a regional level, Southeast Asia as a whole is significantly behind developed economies such as Japan, Germany and the United States, which have a per capita consumption of paper in the packaging industry which is two to three times higher than Southeast Asia. The average per capita consumption of paper packaging in the four focused countries is 24.0 kg/capita/year in comparison to 80.3 kg/capita/year in developed countries. In the plastics packaging segment, the four countries had an average per capita consumption of 20.5 kg/capita/year in 2018 as compared to 99.5 kg/capita/year across developed countries. Southeast Asia as a region of a significant population of close to 650 million people and average GDP growth rate of 5.2% in 2018, has a high degree of potential in terms of growth of the packaging industry.

In addition, the packaging industry, either fiber-based or plastic-based, remains very fragmented in Southeast Asia with a large number of players. The top 5 paper packaging producers (SCG Packaging, Sinar Mas, ASA Group, Hieng Seng and Daya Cipta/Pelita) in Thailand, Indonesia, Vietnam and the Philippines accounted for around 40% of the aggregate market by capacity in 2018; while the top 5 plastic packaging producers (Amcor, Scientex, Daibochi, DNP and Huhtamaki) in Southeast Asia only accounted for less than 25% of the market, in 2018.

Packaging market in Southeast Asia will benefit from the macroeconomic megatrends and experience high growth in the next few years

The packaging industry in Thailand, Indonesia, Vietnam and the Philippines is expected to grow at a CAGR of 6.2% between 2019 and 2024, by sales revenue, which is higher than CAGR of 4.8% between 2014 and 2018.

The key underlying drivers include the rising urbanisation, growing middle class population and other demographic shifts, resulting in smaller households, rapid rise in food delivery applications, increasing demand for packaged food and beverage, shifts in consumer habits towards omni-channel shopping, rise in environmental and health consciousness amongst other trends.

Following trends are expected to drive the growth of overall packaging market over the next few years:

- Favourable shifts in demographics and associated changes in lifestyle brought about by rising urbanization rates in the region has resulted in a higher number of people moving into the middle class segment, leading to higher disposable incomes and in turn a higher degree of consumer spending.
- Growing consumer focus on more sustainable products is a key factor that could play a key role in the growth of paper packaging solutions and other alternatives such as cellulose. The awareness regarding the polluting nature of single-use plastics is on the rise in the region and several government initiatives and policies have been put in place to increase recyclability and tackle the issue surrounding unsustainable usage of plastics.
- The growth of E-commerce and the omni-channel sales model is one of the most important reasons for the growth of the packaging market in the region. Urbanisation has resulted in people spending more time commuting and at work, which leaves lesser time for shopping of daily goods as well as other products. Rising smartphone penetration and digital savviness have also contributed to increased usage of E-commerce platforms. The advantage of being able to order products through E-commerce platforms provides a high degree of convenience, which is the main factor, apart from discount pricing, that has led to the growth of the E-commerce market.
- Other factors that will spur the growth of packaging in the region include a greater requirement of imported F&B products, owing to higher disposable incomes and product awareness, stronger regulations for food safety which will have a positive impact on the quality of packaging solutions, the requirement of a higher number of SKUs in the same product and the increased usage of ready to eat or on the go F&B items.

On the other hand, environmental policies, resource scarcity and regional competitions are some of the major challenges faced by some of the players.

Revenues from all types of packaging solutions totalled approximately USD 51.0 billion in 2018 owing to strong demand from end use segments such as F&B packaging, consumer goods packaging, industrial packaging and others. The E-commerce industry which cuts across the above mentioned industries was also one of the most significant drivers of the packaging market. By 2024, the packaging market is

estimated to reach a total of USD 72.7 billion across the four countries, with the highest growth coming from the Philippines

5.2 SOUTHEAST ASIA-SUMMARY

5.2.1 Top Market Drivers of Packaging Market

5.2.1.1 Food & Beverage Packaging Market

Main Drivers	Influence (1-2 years)	Influence (3-5 years)
Increasing demand for packaged food and beverages	High	High
Rise in health conscious consumers	High	Medium
Urbanization and smaller households	High	Medium
Changes in eating habits	Medium	Low
Price Sensitive Middle Class	High	High
Growth of Local & Foreign Brands	High	Medium
Stronger Regulations for Food Safety	High	High
Rapid rise in food delivery applications	High	High
Sustainable Packaging options (for replacing plastics with paper)	High	High

5.2.1.2 Consumer Goods Packaging Market

Main Drivers	Influence (1-2 years)	Influence (3-5 years)
Growth of the middle and affluent classes	High	High
Demographic shift in primary purchaser	High	High
Changes in shopping habits including usage of E-commerce	High	High
Rapid urbanization	High	High
Price Sensitive Middle Class	High	High
Increasing number of SKUs	High	Medium
Sustainable Packaging options (for replacing plastics with paper)	High	High

5.2.1.3 Industrial Packaging Market

Main Drivers	Influence (1-2 years)	Influence (3-5 years)
Movement of production sites out of China	High	Medium
Growth of E-commerce	High	High
Rapid urbanization	High	High
Increasing number of SKUs	High	Medium

5.2.2 Top Market Restraints of Packaging Market

Main Restraints	Influence (1-2 years)	Influence (3-5 years)
Pressure to reduce environmental footprint (for plastics)	High	High
Scarcity of virgin fibers (for paper)	Medium	Medium
Environmental awareness among consumers (for plastics)	High	Medium
Forest preservation (lack of raw material for paper industry)	Medium	Low
Lack of Strong Policy for Paper Production & Recycling	Medium	Medium
Raw Material Competition with China for paper	High	High
Higher Raw Material Cost for paper	High	Medium

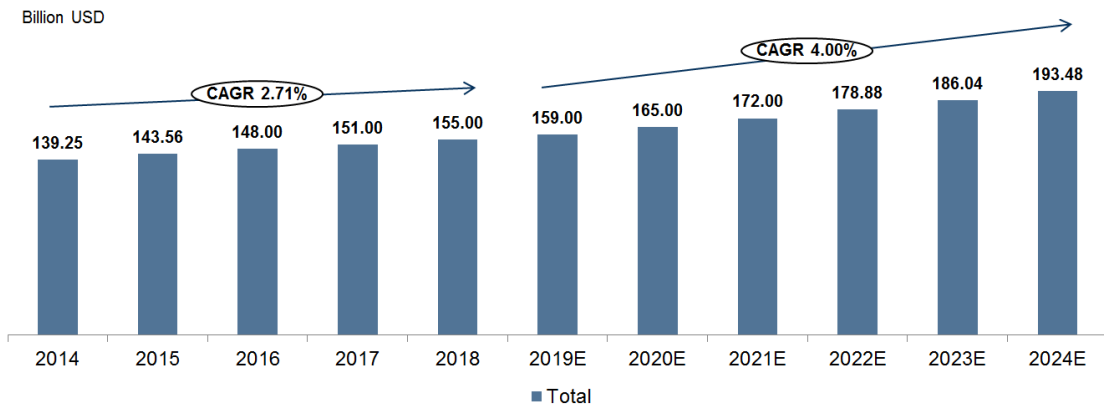
5.2.3 Total Market Size by Sales Revenue across Asia Pacific

5.2.3.1 Paper Packaging Products

The total market size for paper packaging across Asia Pacific was estimated to be approximately USD 155.0 billion in 2018 and is expected to grow at a CAGR of 4.0% between 2019 and 2024.

The main drivers for the growth of paper packaging in APAC include a move towards sustainable packaging, growing disposable incomes and a middle class, increasing penetration of E-commerce and growth of FMCG products.

Chart 5-1: Total Sales Revenue of Paper Packaging Products, APAC, 2014-2024E, Billion USD



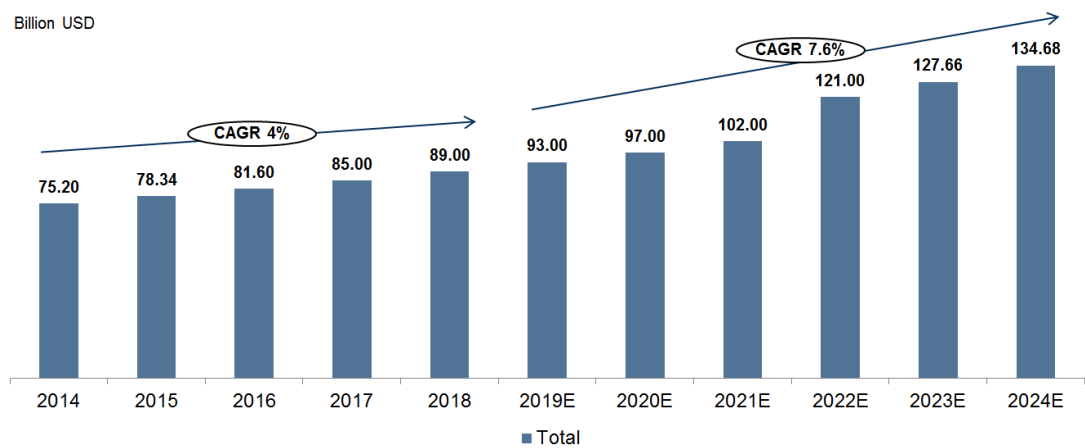
Source: Frost & Sullivan

5.2.3.2 Plastic Packaging Products

The total market size for plastic packaging across Asia Pacific was estimated to be approximately USD 89.0 billion in 2018 and is expected to grow at a CAGR of 7.6% between 2019 and 2024.

The main drivers for the growth of plastic packaging in APAC include the lower cost of plastic packaging, growing disposable incomes and a middle class, increasing penetration of E-commerce and growth of FMCG products.

Chart 5-2: Total Sales Revenue of Plastic Packaging Products, APAC, 2014-2024E, Billion USD



Source: Frost & Sullivan

5.2.4 Total Market Size in Southeast Asia

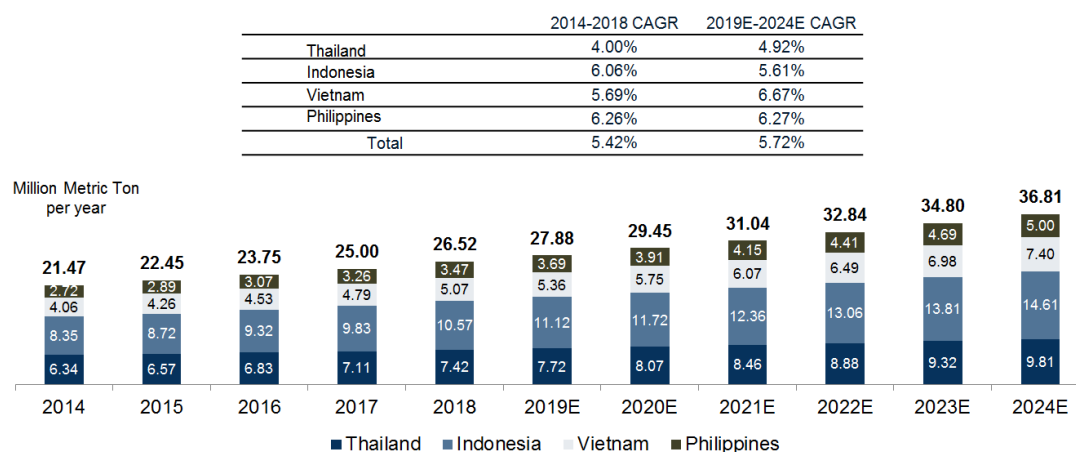
5.2.4.1 Total Market Size in Southeast Asia by country

Total market size by consumption in Southeast Asia by country

Out of the four countries in scope, Vietnam is expected to show the highest growth rate for packaging over the next five years followed by Philippines, Indonesia and Thailand.

Indonesia is the largest packaging market, followed by Thailand, Vietnam, and Philippines.

Chart 5-3: Total Consumption Volume of Packaging Products, Thailand, Indonesia, Vietnam, and Philippines, 2014-2024E, Million MT



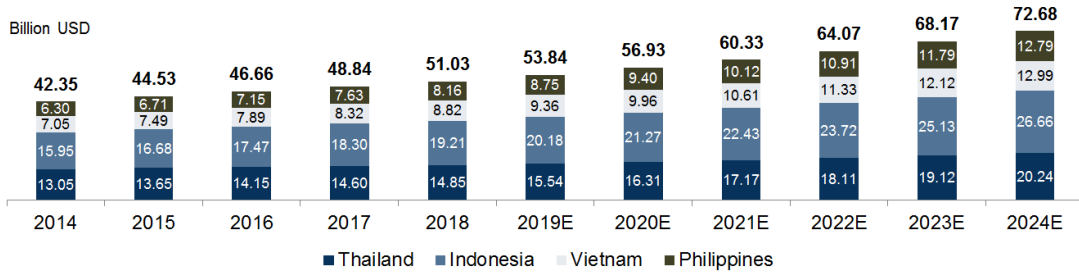
Source: Frost & Sullivan

Total Market Size by Sales Revenue in Southeast Asia by country

Of the four focused countries, Indonesia has the largest market size by sales revenue, and expected to maintain the lead with a steady growth projection of 5.73% over the forecast period. Thailand will see the fastest change in growth over the next 5 years with a CAGR of 5.43% from 2019-2024, as compared to the 3.29% CAGR from 2014-2018. Vietnam and Philippines will continue their healthy growth trajectory with a projected CAGR of 6.77% and 7.88% from 2019 to 2024, respectively.

Chart 5-4: Total Sales Revenue of Packaging Products, Thailand, Indonesia, Vietnam, and Philippines, 2014-2024E, Billion USD

	2014-2018 CAGR	2019E-2024E CAGR
Thailand	3.29%	5.43%
Indonesia	4.74%	5.73%
Vietnam	5.75%	6.77%
Philippines	6.67%	7.88%
Total	4.77%	6.19%

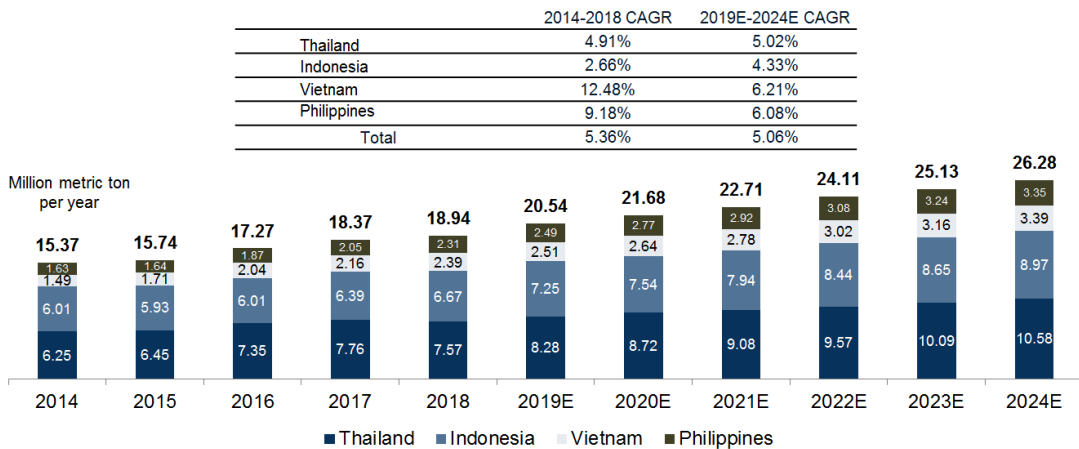


Source: Frost & Sullivan

Total Market Size by Production Volume in Southeast Asia by country

Manufacturing output in the four countries in scope is expected to increase in line with demand, registering a CAGR of 5.06% during the forecast period.

Chart 5-5: Total Production Volume of Packaging Products, Thailand, Indonesia, Vietnam, and Philippines, 2014-2024E, Million MT

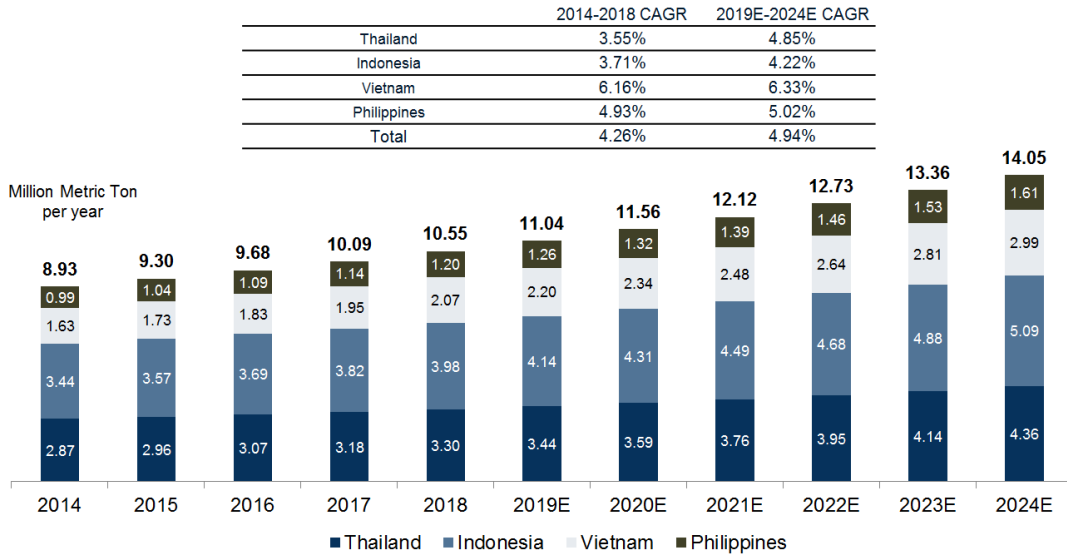


Source: Frost & Sullivan

5.2.4.2 Market Size in Southeast Asia – Paper

Market Size by Consumption in Southeast Asia – Paper

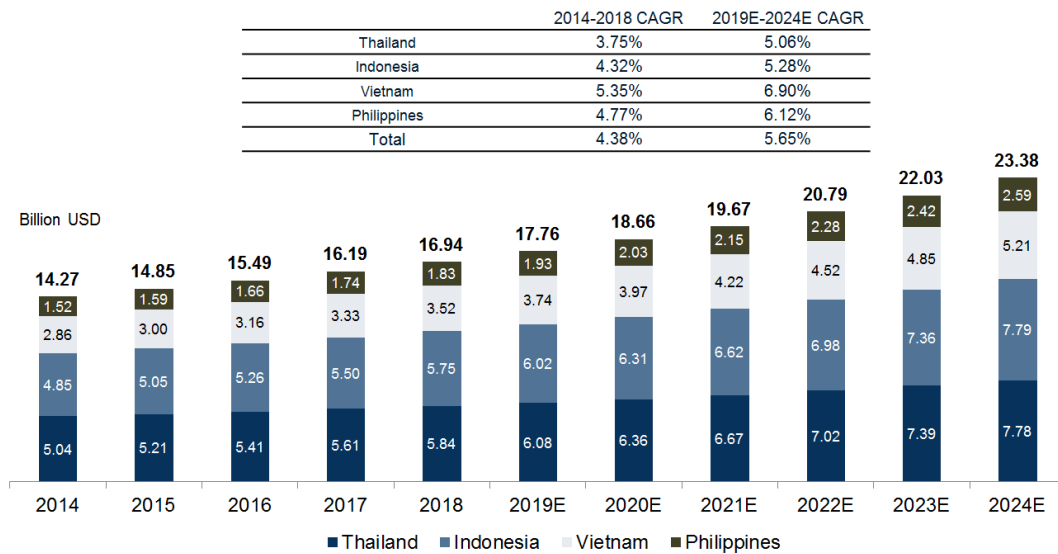
Chart 5-6: Total Consumption Volume of Paper Packaging Products, Thailand, Indonesia, Vietnam and Philippines, 2014-2024E, Million MT



Source: Frost & Sullivan

Market Size by Sales Revenue in Southeast Asia – Paper

Chart 5-7: Total Sales Revenue of Paper Packaging Products, Thailand, Indonesia, Vietnam and Philippines, 2014-2024E, Billion USD

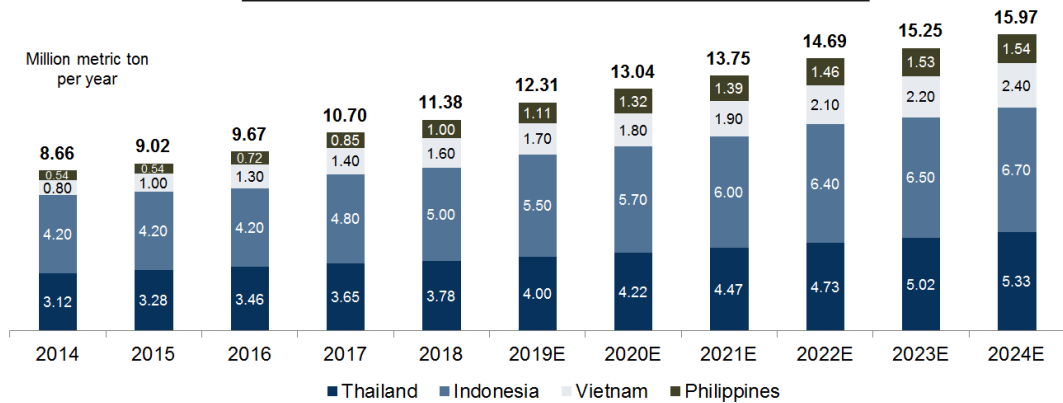


Source: Frost & Sullivan

Market Size by Production Volume in Southeast Asia – Paper

Chart 5-8: Total Production Volume of Paper Packaging Products, Thailand, Indonesia, Vietnam and Philippines, 2014-2024E, Million MT

	2014-2018 CAGR	2019E-2024E CAGR
Thailand	4.95%	5.90%
Indonesia	4.46%	4.03%
Vietnam	18.92%	7.14%
Philippines	16.65%	6.77%
Total	7.08%	5.34%



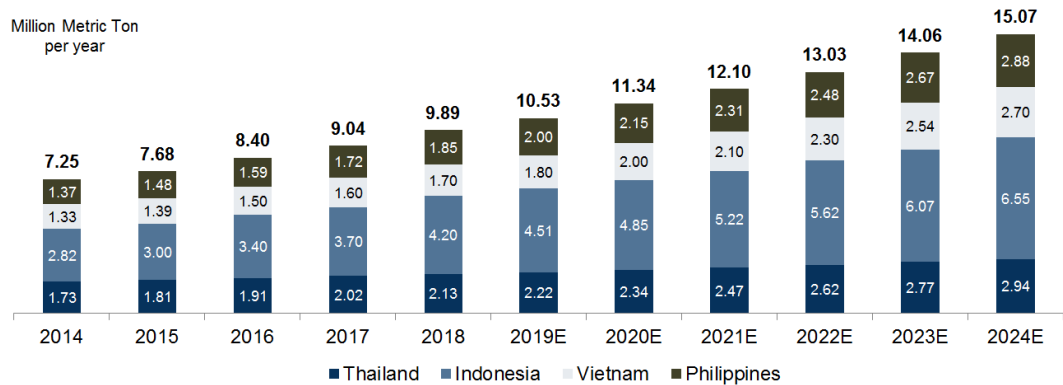
Source: Frost & Sullivan

5.2.4.3 Market Size in Southeast Asia – Plastics

Market Size by Consumption in Southeast Asia – Plastic

Chart 5-9: Total Consumption Volume of Plastic Packaging Products, Thailand, Indonesia, Vietnam and Philippines, 2014-2024E, Million MT

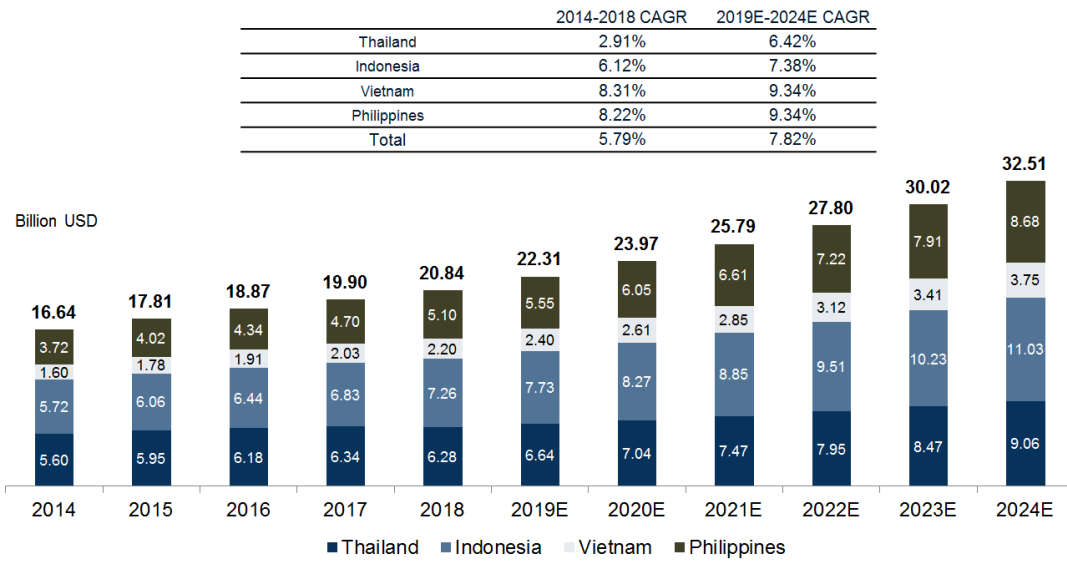
	2014-2018 CAGR	2019E-2024E CAGR
Thailand	5.40%	5.78%
Indonesia	10.47%	7.74%
Vietnam	6.33%	8.45%
Philippines	7.90%	7.56%
Total	8.08%	7.43%



Source: Frost & Sullivan

Market Size by Sales Revenue in Southeast Asia – Plastic

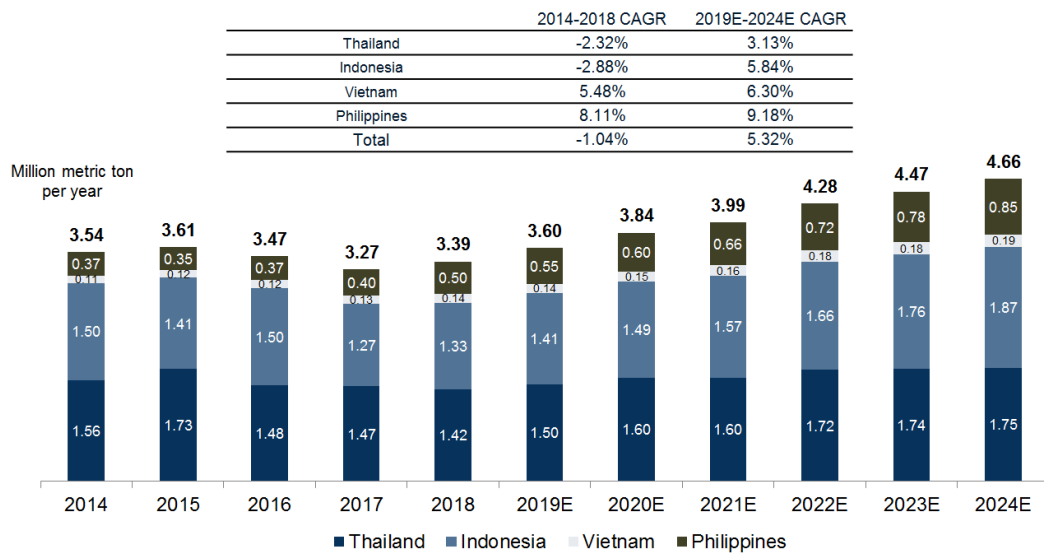
Chart 5-10: Total Sales Revenue of Plastic Packaging Products, Thailand, Indonesia, Vietnam and Philippines, 2014-2024E, Billion USD



Source: Frost & Sullivan

Market Size by Production Volume in Southeast Asia – Plastic

Chart 5-11: Total Production Volume of Plastic Packaging Products, Thailand, Indonesia, Vietnam and Philippines, 2014-2024E, Million MT



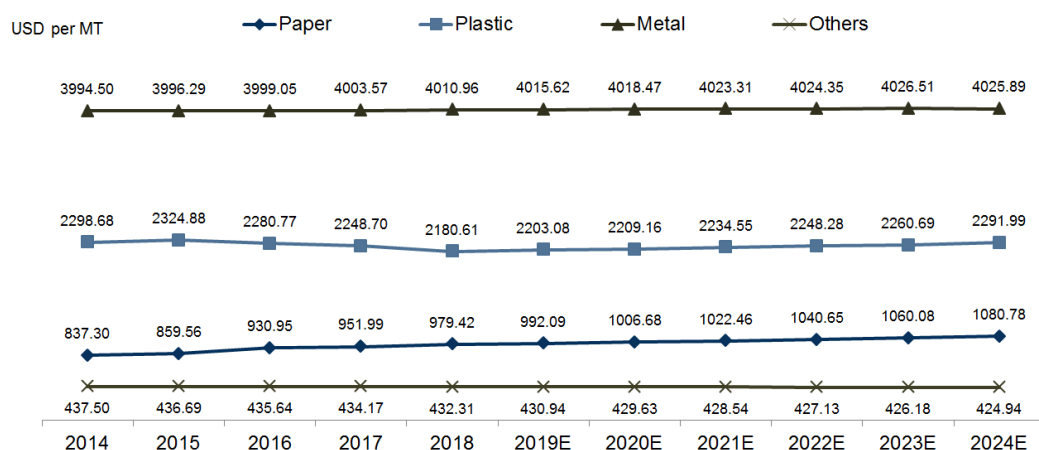
Source: Frost & Sullivan

5.2.4.4 Average Selling Price of Packaging Products in Focused Countries

In terms of average selling price of different types of packaging products, metal packaging commands the highest price, followed by plastic and paper packaging. Other packaging substrates, such as glass, have lower average selling price within the countries in scope. Based on trends and consumption

forecast, paper and plastic packaging are expected to increase in ASP as these lighter weight substrates increasingly replace the heavier, bulkier packaging particularly glass.

Chart 5-12: Average Selling Price of Packaging Products, Thailand, Indonesia, Philippines & Vietnam, 2014-2024E, USD per MT



Source: Frost & Sullivan

5.2.5 Per Capita Consumption in ASEAN vs Selected Mature Economies

5.2.5.1 Paper Packaging

When comparing the per capita packaging products consumption, countries in Southeast Asia such as the Philippines and Indonesia lag well behind countries such as Thailand in terms of per capital consumption of paper in the packaging industry.

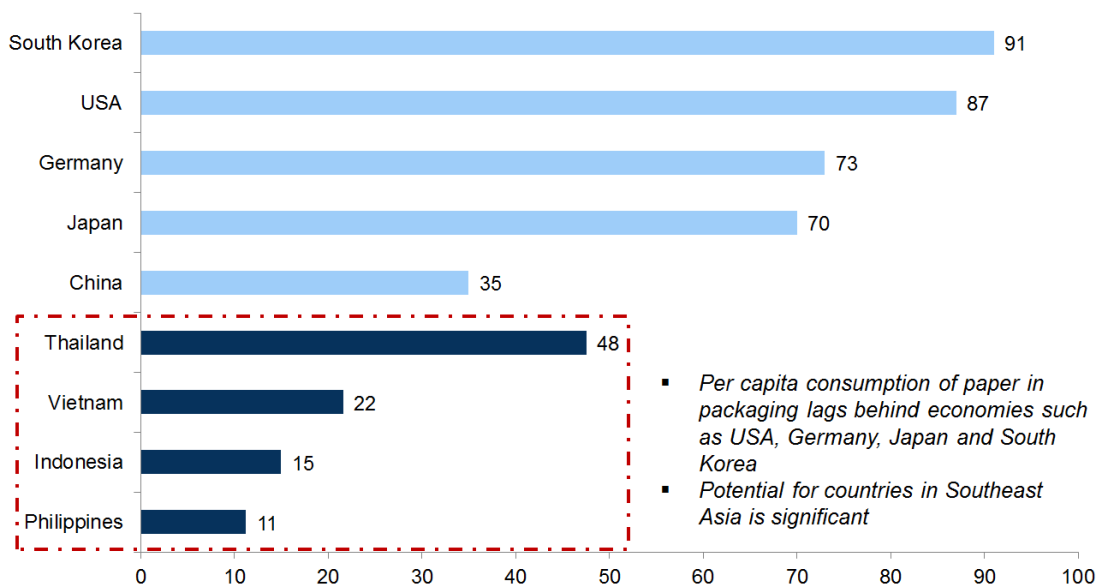
At a regional level, Southeast Asia as a whole is significantly behind developed economies such as Japan, Germany and the United States which have a per capita consumption of paper in the packaging industry which is two to three times higher than Southeast Asia.

Southeast Asia as a region has a significant population of close to 650 million people and has a high degree of potential in terms of growth of paper used in the packaging industry. The region also showcased an average GDP growth rate of 5.2% in 2018 which also showcases the strength of the economy in the region.

Disposable incomes are also on the rise across countries such as Philippines and Indonesia which add to the strength and potential for paper packaging to be used at much larger scales for F&B and FMCG products.

With the implementation of the right policies and a shift from plastic packaging to paper packaging could see the region's per capita consumption of paper in the packaging industry grow rapidly over the next five to ten years.

Chart 5-13: Per Capita Consumption of Paper Packaging, Kg/Annum/Per Person 2018

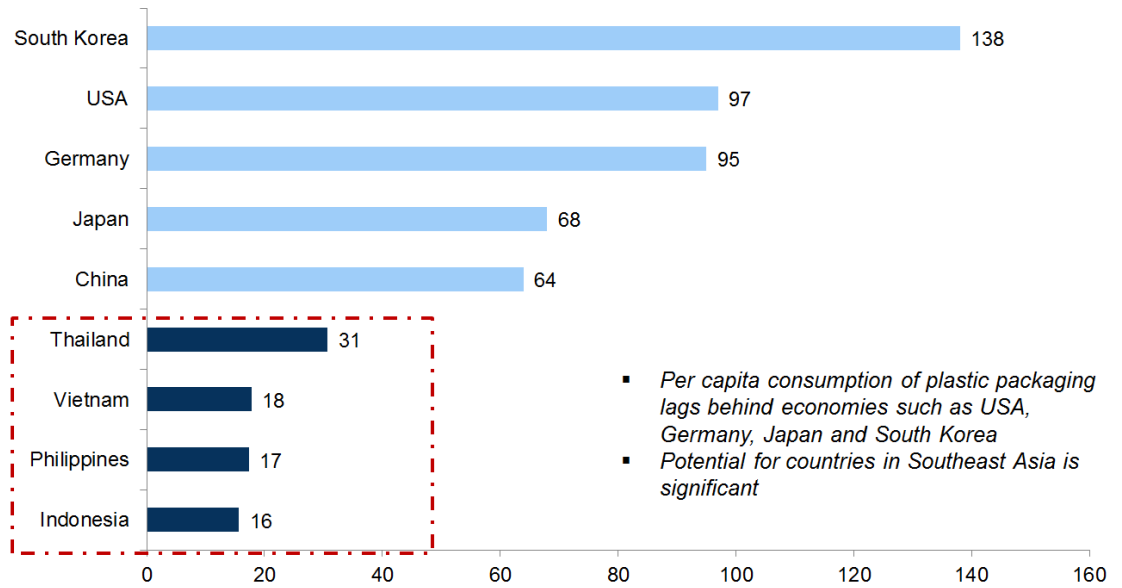


Source: Frost & Sullivan

5.2.5.2 Plastic Packaging

Like paper packaging, the region lags behind Japan, South Korea, USA, Germany and neighbouring China in terms of per capita consumption. The consumption of plastics packaging per capita in Indonesia and Philippines is approximately four times lower than that of China, whereas, Thailand's per capita consumption of plastic packaging is roughly 4 times lower than that of South Korea. Countries such as South Korea, Japan, USA, Germany are considered to be developed countries, and the economic growth of various countries in Southeast Asia over the next few years signifies the growth potential that plastics packaging has, assuming a strong growth in per capita consumption of plastics packaging.

Chart 5-14: Per Capita Consumption of Plastic, Kg/Annum/Per Person 2018



Source: Frost & Sullivan

5.3 SOUTHEAST ASIA-THAILAND

5.3.1 Policy and Regulation of Packaging Market in Thailand

Policies and Regulations: 《Plastic Waste Management Road Map 2018-2030》

Execution Year: 2018 – 2030

Issuing Department: Ministry of Natural Resources and Environment

Main Content and Emphasis:

- The Thai Cabinet has agreed for the roadmap to serve as the framework for plastic waste management policies.
- The roadmap aims to reduce plastic waste and replace them with environmentally friendly materials. The proposed policies will be implemented in several stages, as follows:
 - 2019: Banning of plastic cap seals in water bottles, OXO-degradable plastics, and plastic microbeads.
 - 2022: Banning of plastic bags with <36 microns in thickness, styrofoam food boxes, plastic straws, and single-use plastic cups
 - 2027: Ensure that 100% of plastic waste will be reusable

Policies and Regulations: 《International Standards for Packaging (ISO TC122)》

Execution Year: 2015

Issuing Department: Thailand Industrial Standards Institute

Main Content and Emphasis:

- Thailand follows the international packaging guidelines set by ISO.
- The ISO TC (Technical Committee) is responsible for developing and updating the international standards for packaging, covering aspects of food safety, dangerous goods, and waste regulations.
- Other relevant standards for packaging are covered by the following TCs:
 - TC 261 – Additive manufacturing
 - TC 6 – Paper, pulp and board
 - TC 52 – Light metal containers
 - TC 104 – Freight containers

5.3.2 Top Market Drivers of Packaging Market in Thailand

5.3.2.1 Paper Packaging Market-Food & Beverage

Rising demand for packaged food and beverages

- Food and beverage sector constitutes the largest share for paper-based packaging in Thailand, and expected to grow at a robust rate between 2019-2024.
- Growing urban population and busier lifestyles fuel the need for on-the-go consumption. At the same time, plastic packaging is falling out of favor due to environmental concerns, creating opportunities for paper packaging.

Shift away from single-use plastics

- Single use plastics (straw, carrier bags, cap seals) are used widely in F&B packaging, but the Thai government has moved to ban them to reduce plastic pollution in the marine ecosystem.
- Paper packaging is perceived as more eco-friendly than plastics, and there will be a large increase in demand as manufacturers seek to sustain the demand for packaged food from the growing population.

5.3.2.2 Paper Packaging Market-Consumer Goods

Growth of E-commerce

- Thailand's E-commerce market is forecasted to grow by 21.9% annually to reach USD 9.8 billion. Changes in the traditional retail distribution is also expected to contribute to the demand in paper packaging, particularly corrugated packaging.

Changes in distribution channel

- With traditional retail channels in decline, a product will need different formats of packaging as it moves through the supply chain, thereby increasing the ratio of corrugated volume per unit of consumer product.

Environmental consciousness

- Similar to packaged food & beverage, growth of consumer goods and spending will also stimulate paper packaging as it is seen as less damaging to the environment.
- Consumers are also more prepared to pay a premium for the more sustainable option, driving the demand for biodegradable, compostable, and recyclable paper packaging.

5.3.2.3 Paper Packaging Market-Industrial

Growth of E-commerce

- E-commerce market size in Thailand, as measured by gross merchandise volume, is expected to accelerate in growth by CAGR of 21.9% between 2019-2024, reaching USD 9.8 billion.
- E-commerce growth will drive the demand for corrugated board packaging. Brand owners would also be seeking for high quality printable material to display brand images on the package.

Movement of production sites out of China

- MNCs are relocating their supply chains in anticipation of the US-China trade war to ASEAN countries, taking advantage of the region's high growth potential.
- Thailand, Vietnam and Indonesia will be seeing an influx in manufacturing, particularly in the electronics, clothing, food, and personal care sectors.

Innovations to improve sustainable sourcing

- New technologies have enabled producers to increase the proportion of recycled paper, from 50:50 (recycled paper: virgin fiber) in 2010, to 70:30 in recent years.
- Stricter environmental standards have also ensured that virgin fibers are sourced from certified forests and plantations.

China's ban on RCP imports

- The import restrictions placed on RCP have placed a downward pressure on China's output and price of raw materials, therefore opening the opportunity for other leading producers such as Thailand to meet the market's demands.

5.3.2.4 Plastic Packaging Market-Food & Beverage

Increasing demand for packaged food and beverages

- Consumer preferences have shifted to on-the-go food and beverages due to busier lifestyles.
- However, since single use plastics (straw, carrier bags, cap seals) are falling out of favor and the government looks to phase them out by 2030, it is prudent for producers to meet the demand with more sustainable options.

Rise in health conscious consumers

- The rise in elderly population, as well as a general increase in awareness for health and food safety will lead to a positive growth as packaging is the key method to protect from contaminants, signal freshness and maintain shelf stability.
- A rising demand for rigid plastics is expected for fresh food and bottled beverages, particularly ready-to-drink coffees and other energy drinks.

Urbanization and smaller households

- The movement towards urban areas and delay in starting families in the younger generation mean that households are getting smaller. There is a higher demand for small format packaging for ease of transportation and storage.
- Increasing popularity of snacks and dried food are expected to drive this growth, particularly for flexible bags and pouches.

Changes in eating habits

- The offering for packaged meals has improved significantly in terms of variety, quality, and nutritional content. More Thai consumers are dining at home rather than going to restaurants.
- Ready to cook, ready to eat, and microwaveable containers and trays will be in high demand.

5.3.2.5 Plastic Packaging Market-Consumer Goods

Growth of the middle and affluent classes

- Both middle and high income classes in Thailand are expected to grow. Thailand's affluent class is projected to grow even faster than its middle class.
- As income levels rise, spending in indulgent items and luxury goods, in addition to consumer packaged goods, are expected to increase.
- This will drive the demand for premium, durable packaging. Using bioplastics and demonstrating reusability will also help overcome the negative perception associated with plastics.

Demographic shift in primary purchaser

- Thailand has one of the highest rates in female employment and disposable income compared to the rest of Asia.
- The changing demographics have placed women as the key decision maker in household purchases, particularly in consumer goods, from makeup and personal care to electronics and kitchen appliances.

Changes in shopping habits

- E-commerce has grown substantially. Digital savviness and smartphone penetration is high in Thailand, even in rural areas. Rural consumers make up 20% of online purchases, compared to 27% from urbanites.
- Convenience stores are also growing, as longer working hours and commute time reduced the consumer's available time to shop. Rather, they make infrequent, smaller size purchases from stores like 7-Eleven.

5.3.2.6 Plastic Packaging Market-Industrial**Movement of production sites out of China**

- MNCs are relocating their supply chains in anticipation of the US-China trade war to ASEAN countries, taking advantage of the region's high growth potential.
- Thailand, Vietnam and Indonesia will be seeing an influx in manufacturing, particularly in the electronics, clothing, food, and personal care sectors.
- Thailand has among the fastest growing E-commerce markets in the region, driving the demand for secondary and logistic packaging.

5.3.3 Top Market Restraints of Packaging Market in Thailand

5.3.3.1 Paper Packaging Market

Pressure to reduce environmental footprint

- From harvesting trees for the raw materials, to the use of water and coal energy in manufacturing, to the accumulation of end-use products in the landfill, the paper packaging industry places a significant strain on Thailand's resources as it is the largest producer in Southeast Asia.
- The goal set by the energy officials of ASEAN countries to reduce 20% of industrial carbon emission by 2025 may also dampen the production rate.

Scarcity of hardwood woodchips

- The supply of hardwood is expected to decline.
- However, the impact will likely be mediated by availability of other materials such as softwood to close the gap.

5.3.3.2 Plastic Packaging Market

Government policy to reduce plastic waste

- Concerns over marine pollution, most of which come from disposable plastic packaging, have prompted the Thai government to draft a policy framework to reduce plastic waste over the course of the next decade
- The policy will ban certain plastics, particularly those that can degrade into microplastics and microbeads, as well as encourage recycling and reusing of existing plastic packaging.
- Low density polyethylene (LDPE) will be the most affected by the new regulations as it is used for thin carrier bags and films.

Rising environmental awareness

- Single use plastics (straws, carrier bags and cap seals) are falling out of the public's favor, and the impact will be even stronger as the government ramps up awareness campaigns to discourage its use.
- Biodegradable options will be more preferred as consumers and manufacturers seek to minimize their environmental footprint.

5.3.4 Role of E-commerce in Thailand

Economic

Thailand is the second largest economy in Southeast Asia with one of the most engaged populations online.

The Thai E-commerce market is also the second largest behind Indonesia in the ASEAN region and is slated to showcase very strong growth potential in excess of 15% over the next few years.

Drivers in E-commerce

The packaging market for the E-commerce industry in Thailand is estimated to reach close to USD 554 million by 2024, which again will make it the second largest in terms of size, only behind Indonesia

With support from the Thai government, a “Digital Thailand” initiative started in 2016 has brought about a wave of opportunities for businesses across different industries to digitize their operations and services, especially for SMEs seeking to undergo digital transformation

As a result, cross-border market opportunities offer growth rates of approximately 25%, which is well above those found in most traditional retail markets. Cross-border B2C E-commerce is estimated to grow to \$1 trillion in 2020

Thailand's online retail commerce is driven by several factors. including increased smart phone penetration and intense competition among E-commerce operators. The government's PromptPay service, which falls under the national e-payment scheme, is the key driver to stimulate E-commerce activities.

Mobile E-commerce

Mobile commerce will continue to see strong growth in the coming years, especially among millennials who are comfortable using their smartphones to shop. Thailand is a regional leader in mobile commerce, as 52% of online transactions take place via mobile devices (only South Korea is higher with 58%).

According to the Thailand Marketing Research Society, 71% of smartphone users in Thailand shop online an average of twice a month, while 90% intend to shop online in the future. Thailand's smartphone penetration increased from 30% in 2015 to 37% in 2018.

Online Retail

Thailand's online retail market is expected to reach \$10-15 billion by 2020, a significant increase from \$2 billion in 2015.

Impact on Packaging

The growth of the E-commerce industry will directly impact the packaging industry.

E-commerce uses a mix of paper, plastic and other types of packaging with paper and plastic being the most popular substrates.

In line with the growth of the E-commerce industry, the packaging volumes specifically used for E-commerce will also grow at approximately 14%-15% CAGR over the next few years; meanwhile, the E-commerce packaging market value is projected to increase from \$251 million in 2019 to \$554 million in 2024, with a CAGR of 17.16%.

5.3.5 Market Trends of Packaging Market in Thailand

Sustainable packaging

- The Thailand government has committed to reduce the volume of waste, particularly plastic.
- In addition to banning certain types of plastic packaging and styrofoam containers, Thailand also aims to improve recycling rate.
- Environmentally friendly options including recyclable packaging, bio-plastics, and biodegradable materials such as paper trays will be preferred, as consumers look to minimize their footprint and make ethical choices in their purchasing habits.

Smart and interactive packaging

- Packaging technology has progressed to now be able to dynamically respond to the environment and convey relevant information to the consumers.
- Packaging can be functionalized to sense internal and external conditions, connect with smart devices, and respond to an input. For example, sensors can be embedded in the packaging to monitor optimal temperature, or send alerts if there are any breaches.
- This will improve product safety and traceability as well as user experience. Businesses also benefit from having access to data and insights that can be used to improve supply chain efficiency.

Innovations to improve weight, cost, and shelf attributes

- The trend for consumer goods packaging is moving away from rigid plastic packaging, towards more lightweight, flexible packaging such as stand up pouches.

- Design innovations have also optimized manufacturing and supply chain efficiency. For example, stand up pouches use 50% less energy to produce compared to rigid plastic packaging, and thus reduce shipping volume and weight.

Lifestyle change influencing purchasing habits

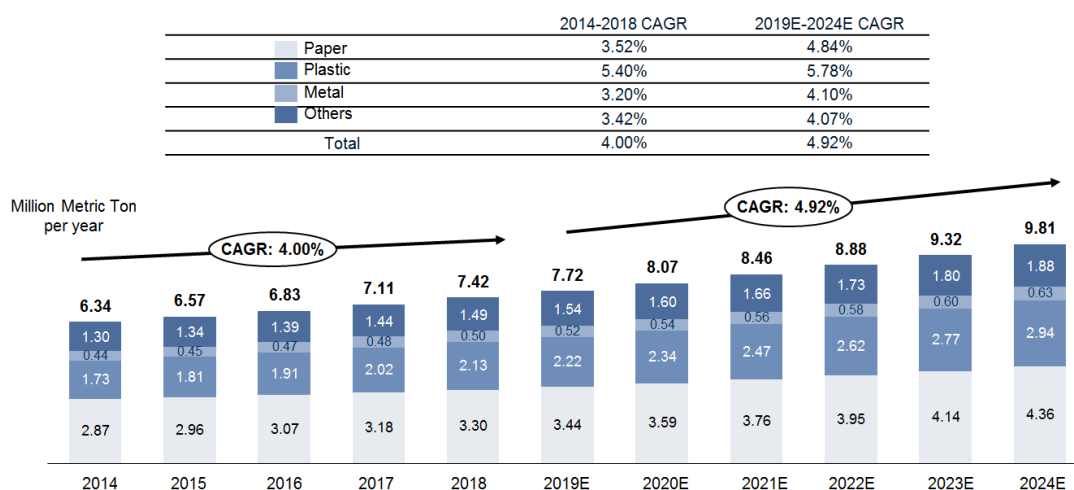
- Thailand is experiencing a shift from a rural lifestyle to a predominantly urban lifestyle, opening up opportunities in food service, E-commerce, and luxury products.
- According to a study of consumer habits, Thai consumers are more inclined to spend, rather than save, compared to their regional counterparts. Discretionary items tend to be purchased online, 40% of which through social media platforms.

5.3.6 Market Size of Packaging Products in Thailand

5.3.6.1 Consumption Volume of Packaging Products

Total consumption increased from 6.34 million MT per year in 2014 to 7.42 million MT per year in 2018, with a growth of 4.00%. Going into 2024, it is projected to grow by 4.92% to 9.81 million MT per year. Growth is supported by plastic products, particularly flexible plastic packaging, driven by busier lifestyles and the need for lightweight, conveniently packaged consumer products.

Chart 5-15: Consumption Volume of Packaging Products, Thailand, 2014-2024E



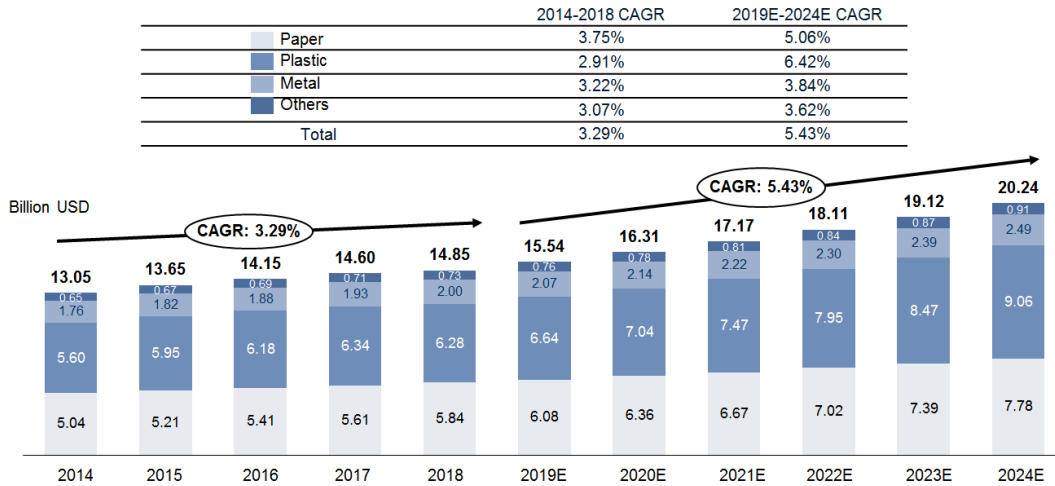
Source: Frost & Sullivan

5.3.6.2 Revenue of Packaging Products

Sales revenue grew by a CAGR of 3.29% during between 2014-2018, and projected to increase to USD

20.24 billion by 2024, registering a CAGR of 5.43%. Paper and plastic packaging accounts for most of the growth, in line with the demand for conveniently packaged food, E-commerce, and the expansion of manufacturing facilities into ASEAN countries.

Chart 5-16: Sales Revenue of Packaging Products, Thailand, 2014-2024E

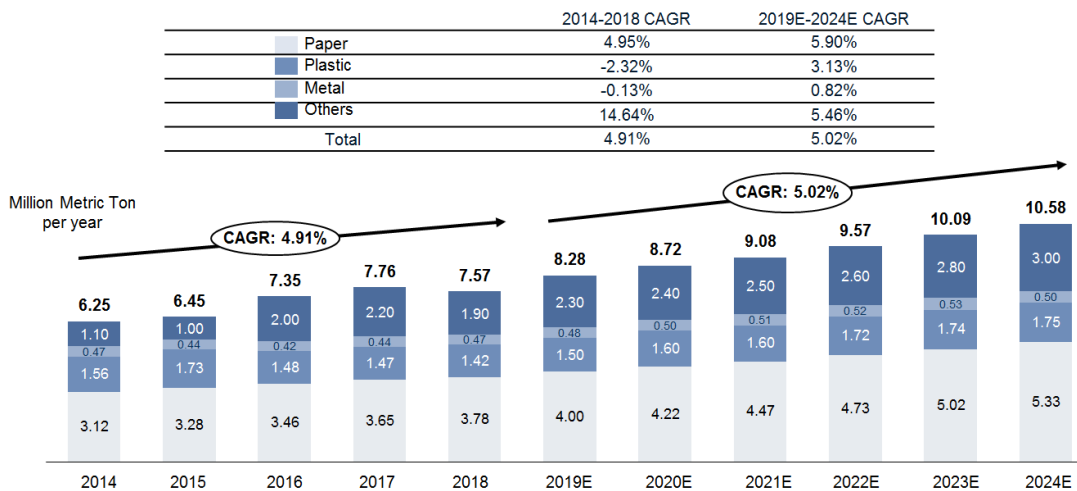


Source: Frost & Sullivan

5.3.6.3 Production Volume of Packaging Products

Thailand’s packaging industry grew at healthy rate of 4.91% between 2014 to 2018, to 7.57 million MT per year. Production is expected to trend upwards during the forecast period.

Chart 5-17: Production Volume of Packaging Products, Thailand, 2014-2024E



Source: Packaging Intelligence Unit of Thailand, Frost & Sullivan

5.4 SOUTHEAST ASIA-INDONESIA

5.4.1 Policy and Regulation of Packaging Market in Indonesia

5.4.1.1 Paper Packaging Market

Policies and Regulations: 《Government Regulation (PP) No. 57/2016 Protection and Management of Peatland Ecosystems》

Execution Year: 2016

Issuing Department: President of the Republic of Indonesia

Main Content and Emphasis:

- The regulation affects the supply of raw materials for the paper and pulp industry.
- Regulations apply to industrial forests and plantations that overlap the peatlands. It includes expansion of protected areas, stricter criteria for water management, and illegalization of peat forest burning under any circumstances.

Policies and Regulations: 《Draft Decree: Mandatory Implementation of Indonesian National Standard (SNI) for Paper and Paperboard for Food Packaging》

Execution Year: 2020 (upon approval)

Issuing Department: Directorate of Forestry and Plantation Product Industries, Minister of Industry

Main Content and Emphasis:

- The draft decree stipulates that all paper and paperboard food packaging will need to comply to the Indonesian National Standard, as detailed in SNI 8218:2015.
- It applies to paper products, packaging materials and accessories, and any material in contact with food stuff; whether made locally or imported into Indonesia.
- The draft was announced and opened for comments in April 2018. If approved, it would become effective in 2020.

5.4.1.2 Plastic Packaging Market

Policies and Regulations: 《Ban on Single Use Plastics – Bali》

Execution Year: June 2019

Issuing Department: Governor of Bali

Main Content and Emphasis:

- Aimed at reducing marine plastic waste by 70% within a year, the ban will apply to plastic carrier bags, styrofoam containers, and straws.
- The policy applies to all participants, including producers, suppliers, distributors, and business operators.
- Non-compliance will result in administrative sanctions, such as non-renewal of business permits.

Policies and Regulations: 《Extended Producer Responsibility (in progress)》

Execution Year: Q4 2019 (expected)

Issuing Department: Environmental Ministry

Main Content and Emphasis:

- The Indonesian government has pledged to institute new laws and a budget of USD 1 billion a year to reduce plastic pollution by 70% by the year 2025.
- It is expected to be decreed by end of 2019.
- The Ministry has stated that the new legal framework will place more responsibility on FMCG and packaging manufacturers as well as retailers to reduce plastic waste through packaging redesign, material replacement, and implementation of sustainable waste management practices.

5.4.2 Top Market Drivers of Packaging Market in Indonesia

5.4.2.1 Paper Packaging Market-Food & Beverage

More sustainable alternative to plastic

- Indonesia struggles with waste management, and plastic debris has been a glaring issue in the landfills and coastal areas. As Indonesia ramps up effort to reduce plastic pollution, paper packaging will gain some traction particularly for single use packaging, as paper cartons can be collected and recycled.

Brand premiumization

- High quality prints on paper packaging conveys health and premium quality, attributes that are sought after by the upper middle class and younger segments.

5.4.2.2 Paper Packaging Market-Consumer Goods

Growth of E-commerce

- As the digital economy grows more sophisticated, it becomes easier to sell and shop online at the consumer's convenience. Demand for paper and corrugated board packaging is expected to rise along with the growth of E-commerce.

Rapid urbanization

- Smaller cities outside of metropolitan Jakarta are urbanizing at a rapid pace. The economies of Bandung, Makasar, Medan and Surabaya are growing healthily, with a proportionate increase in consumer spending.
- The packaging industry can meet the demand as a way to address the logistical challenges presented by the archipelagic geography and fragmented markets in these localities.

Rising disposable incomes

- The rise in disposable income will lead to increased consumption of paper packaging particularly for beauty and personal care products. Eco-friendly attributes will also be key for the environmentally conscious purchasers.

5.4.2.3 Paper Packaging Market-Industrial

Sustainable alternatives to plastic

- Indonesia's commitment to reduce plastic waste will fuel a demand for sustainable paper packaging.
- With a thriving paper and pulp industry Indonesia is capable of meeting this demand.

Thriving E-commerce market

- With a high percentage of internet-connected citizens and social media users, Indonesia has a thriving E-commerce market that includes online retailers such as Lazada and Zalora, as well as informal sellers who rely on social media.
- E-commerce is forecasted to reach 65 million users by 2022, further fueling the growth of the packaging industry.

China's ban on RCP (Recovered Paper) import

- In the short term, the new import restrictions mean that more raw materials are available at more competitive price.

- The new contaminant standard of 0.5% will also lead to higher material quality in the long term.

Innovations to improve sustainable sourcing

- New technologies have enabled producers to increase the proportion of recycled paper, from 50:50 (recycled paper: virgin fiber) in 2010, to 70:30 in recent years.
- Stricter environmental standards have also ensured that virgin fibers are sourced from certified forests and plantations.

5.4.2.4 Plastic Packaging Market-Food & Beverage

Busier lifestyles

- Food & beverage continues to be the primary consumer of plastic packaging as consumer priorities shift towards cost and time saving.
- With busier lifestyles, meals and snacks that can be consumed on the go will rise in demand. Bottled water and non-alcoholic beverages such as coffee, tea, and dairy-based drinks are expected to increase in popularity in Indonesia, along with ready to eat meals and snacks in small, flexible packages.
- Compared to glass, plastic bottles, pouches and sachets are favored for being more lightweight and less bulky.

Price sensitive middle class

- Concurrent with favorable economic prospects, Indonesia will witness a rapid growth of its middle class. The increase in income levels will contribute to the upward mobilization of the lower income segment.
- While consumption levels are expected to increase, cost is still a priority for many. Plastic packaging will be the first choice for most as it is the cheapest option, with a wide variety of size formats to choose from.

Growth of local and foreign brands

- Globalization of the food trade has opened Indonesia to international brands that are eager to tap into the USD 81 billion per year market. With a mature domestic food processing industry, rapid urbanization, and expanding millennial population, Indonesia is an attractive market for both local and foreign manufacturers.

5.4.2.5 Plastic Packaging Market-Consumer Goods

Price sensitive middle class

- Indonesia's middle class is currently estimated to be 81.25 million people. By 2024, that number will increase to 112.1 million, or 39% of the population as the thriving economy is enabling upward mobilization of the lower income segment.
- This will stimulate the demand for convenient and economical packaging solutions, as consumers are still generally cost conscious.

Rapid urbanization

- Smaller cities outside of metropolitan Jakarta are urbanizing at a rapid pace. The economies of Bandung, Makasar, Medan and Surabaya are growing healthily, with a proportionate increase in consumer spending.
- The packaging industry can meet the demand as a way to address the logistical challenges presented by the archipelagic geography and fragmented markets in these localities.

Growth of E-commerce

- Like the rest of Asia, E-commerce has changed the retail landscape of Indonesia and is expected to continue to grow at a CAGR of 22.2% in the period 2019-2024. It is estimated that by 2024, will translate into a revenue of USD 24.3 billion.
- Social commerce (informal transactions through social media channels) is also thriving in Indonesia, driving the demand for lightweight packaging materials (e.g. envelopes) that don't necessarily need to be highly durable. Rather, the priority for the social commerce sellers is cost efficiency as they gain much smaller profit margin.

5.4.2.6 Plastic Packaging Market-Industrial**Movement of production sites out of China**

- In anticipation of Indonesia's steady growth and the trade war, manufacturing companies have moved productions out of China.
- Apple smartphone chip supplier Pegatron and Uniqlo are among the companies that have set up manufacturing plants in Indonesia in recent years.

Rapid urbanization

- Smaller cities outside of metropolitan Jakarta are urbanizing at a rapid pace. The economies of Bandung, Makasar, Medan and Surabaya are growing healthily, with a proportionate increase in consumer spending.
- The packaging industry can meet the demand as a way to address the logistical challenges presented by the archipelagic geography and fragmented markets in these localities.

5.4.3 Top Market Restraints of Packaging Market in Indonesia

5.4.3.1 Paper Packaging Market

Government policies to reduce pollution

- Paper packaging, while considered to be eco-friendlier compared to plastics, can still be a burden on Indonesia's resources and landfills.
- Landfill is at the forefront of Indonesia's struggles with waste, as the available lands are reaching capacity faster than expected and fatal accidents have occurred due to poor security and management.
- Concerted effort to increase recycling rate and improve public perception will likely take some time, but it is expected that the government policies will also tackle paper waste.

Forest preservation

- Illegal harvesting and burning, some of which have been linked to the paper and pulp industry, has prompted the government to place stricter policies to protect Indonesia's forest.
- This move would reduce the availability of local source and increase reliance on imported raw materials.

5.4.3.2 Plastic Packaging Market

Government policy to reduce plastic waste

- Indonesia's beaches have been inundated with plastic waste due to decades of waste mismanagement and public apathy. The government has begun to take more concrete steps to undertake a nationwide policy that aims to reduce plastic pollution by 70% over the next 5 years.
- The Extended Producer Responsibility (expected to be decreed in late 2019) will place the onus on the manufacturers and retailers to reduce unnecessary packaging and replace plastic with more sustainable materials.

Environmental awareness among consumers

- The public's perception on the impact of single use plastic is also shifting, particularly the younger generation who are more attuned to environmental issues.
- The demand for single use plastic will likely decline unless it is replaced with bioplastics, recycled, or fed into energy plants.

5.4.4 Role of E-commerce in Indonesia**Economic**

Indonesia is the largest economy in Southeast Asia with one of the most engaged populations online in the region.

In a country of 262 million inhabitants with over 143.26 million internet users in 2017.

Drivers in E-commerce

The packaging market for the E-commerce industry in Indonesia is estimated to reach close to USD 978 million by 2024, which again will make it the largest in terms of size in the region.

The government's recent decision to withdraw implementation of PMK 210/2018, a regulation to tax E-commerce transactions that was first announced in January, has been met with a lot of positivity, which will enable the E-commerce market in the country to become a much bigger sector.

E-commerce Opportunity

With an estimated online population of 103 million who are currently spending an average \$228 online, Indonesia has become one of the world's fastest growing in terms of E-commerce revenue and interest.

Consumers in Indonesia, especially those in the non-urban areas, have enjoyed a more affordable quality of life owing to E-commerce.

Consumers outside the island of Java have experienced net savings of close to 25% owing to the E-commerce market and the ease of shopping associated with it.

Impact on Packaging

The growth of the E-commerce industry will directly impact the packaging industry.

E-commerce uses a mix of paper, plastic and other types of packaging with paper and plastic being the most popular substrates.

Indonesia wants to be the leader for E-commerce and E-commerce packaging solutions across the region.

The packaging volumes specifically used for E-commerce will also grow at approximately 12%-13% CAGR over the next few years; meanwhile, the E-commerce packaging market value is projected to increase from \$546 million in 2019 to \$978 million in 2024, with a CAGR of 12.36%.

5.4.5 Market Trends of Packaging Market in Indonesia

Sustainable practices

- Consumers are increasingly making purchasing decisions that would minimize their impact on the environment. This shift was especially apparent after incidences of trash emergencies in tourism hotspots of Bali and Bandung.
- A recent survey showed that more than 90% of Jakartans have agreed to take steps to reduce their plastic waste.
- While packaging is a relatively small contributor to the pollution, the negative perception persists among the public.
- Sustainability practices such as circular economy, using eco-friendly materials, and increasing recycling rate will help reduce environmental impact in addition to shifting public's perception.

Changes in distribution channels

- Retailers are adapting to the decline in traditional physical stores.
- A product can go through multiple distribution channels – wholesale, E-commerce, and discount stores, for example – and each channel require a specific packaging format.

Solutions for E-commerce

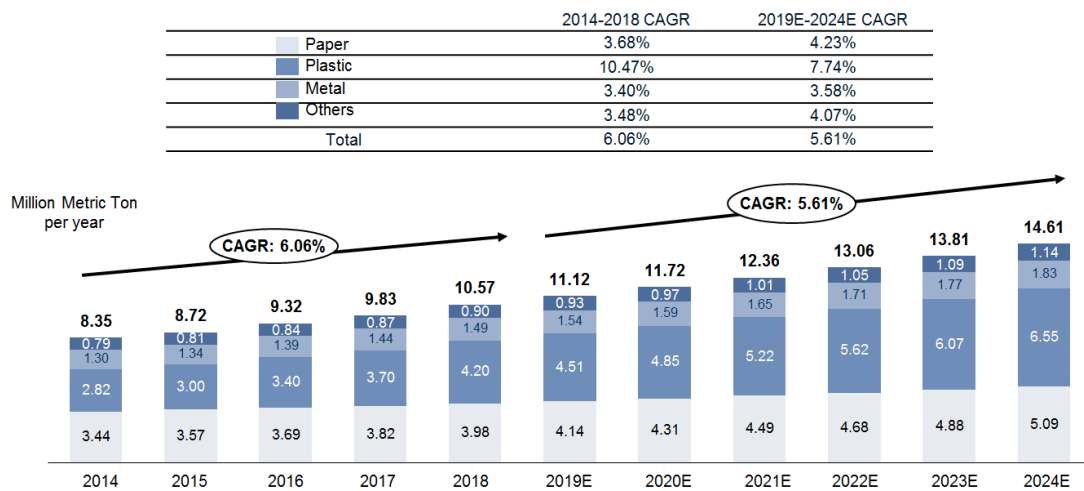
- The explosive growth of E-commerce brings about a layer of logistical complexity, as well as opportunities to provide customized solutions for retailers.
- Packages need to be lightweight, strong, and durable enough to protect the contents and survive the delivery process, which can be extensive.
- Ability to customize packaging with high quality prints will be valuable for brand owners as a way to enhance brand visibility outside of a traditional store display.

5.4.6 Market Size of Packaging Products in Indonesia

5.4.6.1 Consumption Volume of Packaging Products

Indonesia’s consumption of packaging products is projected to grow to 14.61 million MT by 2024, registering a CAGR of 5.61% between 2019 to 2024. Plastic packaging remains the most popular given its economical value and functionality, two attributes that are key in price-sensitive Indonesia.

Chart 5-18: Consumption Volume of Packaging Products, Indonesia, 2014-2024E

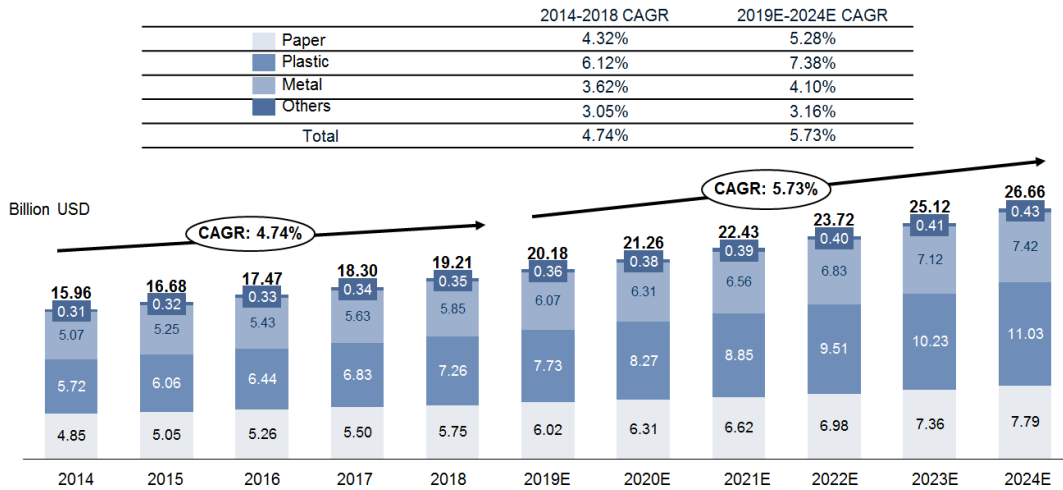


Source: Frost & Sullivan

5.4.6.2 Revenue of Packaging Products

Indonesia’s market will remain strong as the food and beverage and consumer goods sectors continue to grow in parallel with rapid urbanization and changing lifestyles. Trade war uncertainties will also fuel demand for industrial packaging as manufacturers migrate out of China. Total market size is expected to grow to USD 26.66 billion at a CAGR of 5.73%.

Chart 5-19: Sales Revenue of Packaging Products, Indonesia, 2014-2024E

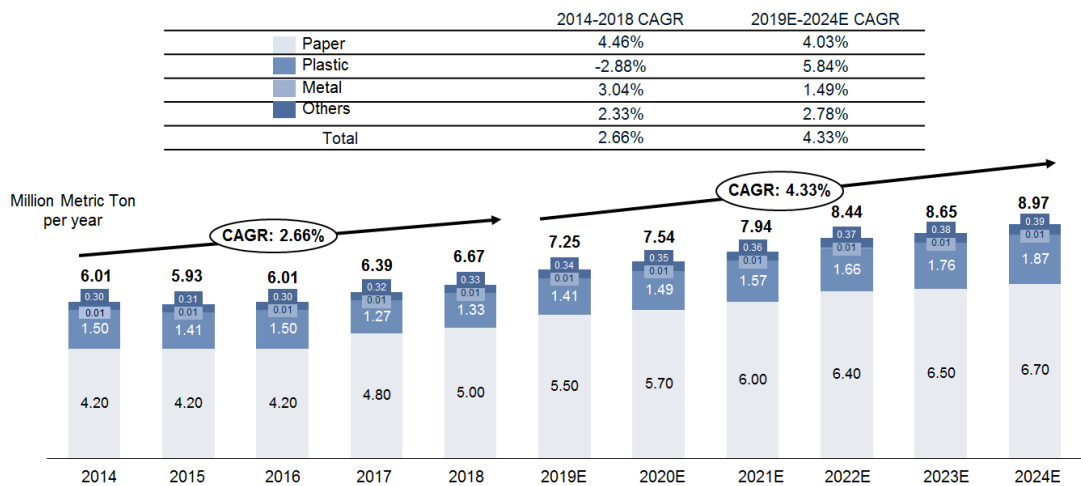


Source: Frost & Sullivan

5.4.6.3 Production Volume of Packaging Products

Indonesia's manufacturing industry is a major contributor to GDP and highly attractive for foreign investments. The packaging manufacturing sector in particular has grown by a CAGR of 2.66% from 2014, and projected to grow another 4.33% by 2024. Indonesia's trade surplus of paper packaging products reached USD 3 billion in 2018.

Chart 5-20: Production Volume of Packaging Products, Indonesia, 2014-2024E



Source: Frost & Sullivan

5.5 SOUTHEAST ASIA-VIETNAM

5.5.1 Policy and Regulation of Packaging Market in Vietnam

Policies and Regulations: 《QCVN 12-1:2017/BYT Technical Regulation on Food contact plastics made from 13 types of synthetic resin or polymer》

Execution Year: 2017

Issuing Department: Ministry of Health (Legislation on Food Safety – FSL)

Main Content and Emphasis:

- According to the FSL, food packages, containers, and equipment in direct contact with food must register an Announcement on Conformity with Technical Regulations and Food Safety Regulations with MOH before being circulated on the market.
- The law is provided to limit the levels of impurities in packaging as well as specific emissions of chemicals such as formaldehyde, heavy metals, potassium permanganate etc that are allowed in specified heating/chemical soaking conditions.

Policies and Regulations: 《Vietnam Food Administration’s (VFA) Decree on the Provision on Civil Penalties for Food Safety Violations [(115/2018/ND-CP)]》

Execution Year: Oct 2018

Issuing Department: Vietnam Food Administration

Main Content and Emphasis:

- This decree “specifies various fines, including those for the production of unsafe food contact packaging, implements and containers.”
- Compared to the previous Decree 178/2013/ND-CP that is being replaced now, fines for certain actions have increased by 3.5 times.
- A fine of up to 7 times the value of the goods will also be levied.
- In addition to fines, “products deemed unsafe may also be recalled, confiscated, or destroyed.

5.5.2 Top Market Drivers of Packaging Market in Vietnam

5.5.2.1 Paper Packaging Market

Alternative to Plastic Packaging

- Paper packaging is viewed an environmentally friendly and biodegradable packaging option in Vietnam. With the country being one of the world’s largest polluters for plastics, alternatives such as paper packaging are expected to grow at a robust rate. However, the cost of paper

packaging which could imply premiums in terms of pricing, could see a slower adoption in Vietnam, which is considered to be a price sensitive country.

Major Exporter for Paper Packaging

- Approximately 45% of the paper packaging produced in Vietnam is exported to neighbouring countries in Southeast Asia, China and Far East Asia. Vietnam is the hub for paper packaging production in Southeast Asia according to the Vietnam Pulp & Paper Association. Japanese companies such as Bandai Namco Holdings and Oji Holdings Corporation are increasing their investments for paper packaging production facilities in Vietnam.

Strong E-commerce growth in the country

- Vietnam's Internet Penetration Rate stood at 54% in 2018 and is expected to grow rapidly over the next five years. Higher internet penetration and cellular phone access will directly impact the growth of the E-commerce market in VN which is currently centered around HCM City and Hanoi.

Ban of RCP in China

- China's ban on imports of RCP implies that countries such as VN could import these volumes in order to produce paper and paper packaging products.
- With pulp prices being volatile and in short supply, a greater use of RCP in the paper manufacturing industry could be beneficial.
- The proximity of VN to China, implies that logistics companies need to travel the same distance from their origin, which will have no additional bearing on logistics costs.

5.5.2.2 Plastic Packaging Market

Robust demand from sectors such as Food and FMCG

- The packaged food sector in Vietnam accounted for approximately USD 10-11 billion in 2018 which used close to 4-5 million MT of plastics. Packaged FMCG products accounted for close to USD 3 billion in 2018. Both these end use sectors are estimated to grow between 7% to 9% over the next five to seven years, signaling a strong demand for plastic packaging products.

Stronger Regulations for safer packaging options

- The Ministry of Health along with the Legislation for Food Safety has passed certain laws in 2017 and 2018, to make plastic packaging used in the F&B segment safer and more compliant to international standards. This will not only improve the quality of plastic packaging in Vietnam but will also provide opportunities for implementing new production technologies to meet these improved standards.

Strong E-commerce growth in the country

- The E-commerce market in Vietnam is estimated to grow at approximately 25.98% CAGR over the course of 2019-2024, which presents a very strong opportunity for the growth of plastics used in the packaging of various goods ranging from electronics, FMCG, Household Items and others.

5.5.3 Top Market Restraints of Packaging Market in Vietnam

5.5.3.1 Paper Packaging Market

Higher Raw Material Costs

- Vietnam's paper industry is currently a net importer of raw materials such as wood, pulp and paper, and is highly susceptible to price fluctuations in the global markets, for these raw materials. In 2018, global prices for pulp increased by 42% as compared to 2017, and were expected to continue increasing in the near future. This has a direct impact on the cost of the paper packaging that is supplied to the country. People in Vietnam tend to be price sensitive and may not be willing to pay premiums for items such as packaging.
- Vietnam is expected to continue being a net importer of raw materials such as wood and pulp for the next five to ten years.

Raw Material Competition with China

- Vietnam competes with China for the imports of raw materials such as Pulp and Wood. Since China has a strict environmental policy regarding wood plantations, it looks to the global market for wood & pulp.
- Vietnam and China tend to use the same sources for wood & pulp. The demand from China implies higher prices for smaller importers such as Vietnam, which ultimately has a negative impact on the pricing of paper packaging.

Fragmented Manufacturing & Outdated Technology

- Paper packaging manufacturers in Vietnam tend to be Small & Medium Enterprises who do not have the ability to leverage economies of scale. The fragmentation of the market also makes quality control more difficult and reduces the overall competitiveness of the firm.
- In addition, the manufacturing technology used by most SME producers in the country is outdated and is more expensive as compared to the technologies used in neighbouring countries such as China, which once again leads to a higher cost of paper packaging.

Lack of Strong Policy for Paper Production & Recycling

- The Ministry of Natural Resources & Environment does not classify the Paper Production & Recycling Industry as 'Green', which would give rise to a larger number of production facilities, better technologies and in-turn a more competitive Paper Packaging industry
- A policy which also provides a few subsidies to companies that could be categorized as Green will also help boost the local pulp, paper and packaging industries

5.5.3.2 Plastic Packaging Market

Move towards Sustainable Packaging Solutions

- Vietnam is one of the 5 countries across the world which is a major contributor to ocean plastic waste. The country along with Thailand, China, Indonesia and Philippines that dumps more plastic waste in the ocean than the rest of the world combined. In order to reduce this wastage, Vietnamese supermarkets are trying replace plastic packaging with more sustainable and environmental friendly solutions such as Banana Leaves. Thailand is the other country to implement this solution in early 2019.
- The main challenge with plastic packaging is the 'One Time Use' tag it carries, which implies that a consumer tends to throw the plastic packaging away once it has been removed from the product. This single usage of plastic is also the main polluter of oceans across the world.

Low Degree of Recycling

- Currently, only 27% of all plastic packaging waste is recycled, which implies that the remaining 73% is either dumped into landfills or finds its way directly into the water bodies in and around Vietnam. The lack of a strong Recycling Industry, has not only increased the amount of plastic waste being disposed in an improper manner, but is also making the Vietnam Ministry of Natural Resources and Environment, in conjunction with the Vietnam Environmental Administration has set a target to reduce non-biodegradable plastic bags in supermarkets by 65% by 2020 to 0% by 2025.

Alternatives – Paper Packaging

- Paper packaging is viewed as a more environmental friendly product as compared to plastic packaging. In urban areas of Vietnam, especially Ho Chi Minh City and Hanoi, a small section of middle class consumers are willing to pay a premium for packaging solutions that do not involve plastic. While this may be a challenge for plastic packaging, it is a key driver for the paper packaging industry.

5.5.4 Role of E-commerce in Vietnam

Economic

Vietnam is expected to be one of the fastest growing economies in Southeast Asia with an estimated GDP growth of 8.58% CAGR between 2019 and 2024.

E-commerce in Vietnam still has a huge potential to grow as its penetration is tiny (less than 2%).

Drivers in E-commerce

The packaging market for the E-commerce industry in Vietnam is estimated to reach close to USD 261 million by 2024, which again will make it the third largest in terms of size in the region.

Vietnam is one of the most attractive E-Commerce markets in the region for investors. With a strong 52.19% CAGR over course of 2014-2018, Vietnam ranks high among the fastest-growing E-commerce markets in the region. And China is helping to move forward on this trend. Chinese E-commerce giant JD.com completed its large-scale investment in Tiki.vn last year while PRC online retailer behemoth Alibaba leads foreign ventures with Lazada, the largest digital marketplace in Southeast Asia, which reportedly has more than 31 million visits every month.

E-commerce Opportunities

There were 48 million E-commerce users in 2018 and this figure is estimated to reach close to 52 million by 2019.

Impact on Packaging

The growth of the E-commerce industry will directly impact the packaging industry.

E-commerce uses a mix of paper, plastic and other types of packaging with paper and plastic being the most popular substrates.

Vietnam wants to leverage the proximity to China and its relationships with the country in order to become an E-commerce hub in the region.

It also wants companies to set up their E-commerce warehouses in the country that will cater to the entire region.

The packaging volumes specifically used for E-commerce will also grow at approximately 13.5%-15% CAGR over the next few years; meanwhile, the E-commerce packaging market value is projected to increase from \$138 million in 2019 to \$261 million in 2024, with a CAGR of 13.59%.

5.5.5 Market Trends of Packaging Market in Vietnam

Sustainable packaging & Waste Reduction

- Vietnam is one of the world's largest polluters of ocean plastic and this has caused widespread concern among consumers as well as governmental agencies.
- Sustainable solutions such as replacing plastic packaging with natural sources such as Banana Leaves (for fresh food) are being considered on a large scale.
- The government is also planning to make supermarkets adhere to Zero plastic usage by 2025 (with a target of 65% reduction by 2020).
- While plastic packaging does have advantages such as being more resilient and cheaper to manufacture, alternatives such as paper packaging and cellulose packaging will have a higher market penetration in the future.

Stronger Regulations for Plastic Packaging in F&B

- The Vietnamese Government wants Plastic Packaging companies providing solutions to the F&B industry to comply with International Standards. The regulation was passed in 2018.
- This will not only lead to higher quality plastic packaging solutions, but will also increase the safety of the packaged F&B goods sold in Vietnam and exported from Vietnam.
- The correct implementation of this regulation could also give rise to newer production technologies being used for plastic packaging as well as a higher quality of polymer resins being imported or manufactured.

Requirement of Innovations in Paper Packaging

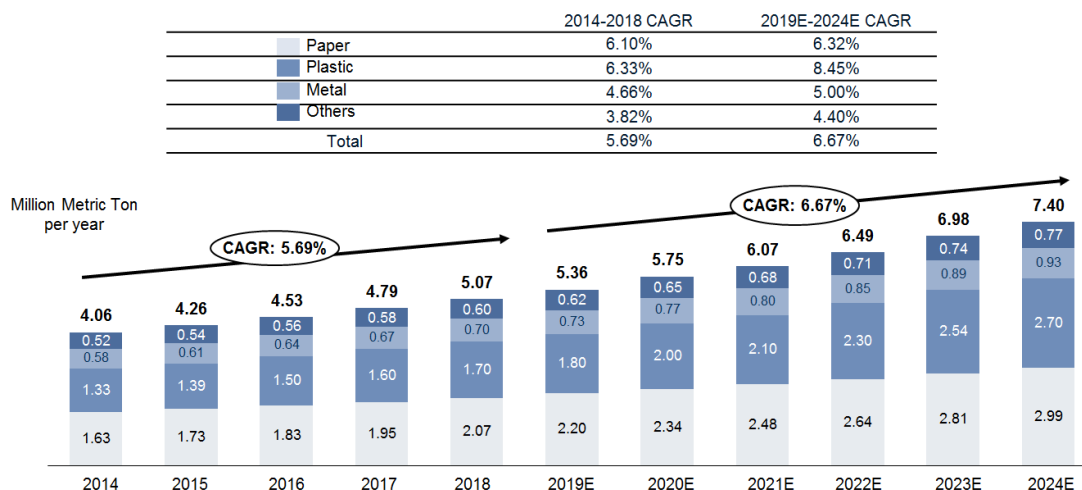
- Vietnam’s paper packaging industry is not only highly reliant on raw materials from other parts of Southeast Asia, but is also a highly fragmented market. According to the Vietnamese Paper & Pulp Association, 14 paper packaging companies account for approximately 54% of the total market share. Several companies are also classified as SMEs, which do not have sophisticated manufacturing technologies, that ultimately leads to a higher cost of paper packaging solutions.
- This is a critical requirement, as Vietnam exports close to 45% of its paper packaging to neighbours in Southeast Asia, China and Japan.
- Vietnam’s packaging industry is expected to mirror the innovations and improvements in product quality happening in the Thailand market, albeit with a lag of a few years.

5.5.6 Market Size of Packaging Products in Vietnam

5.5.6.1 Consumption Volume of Packaging Products

Packaging industry in Vietnam is set for a robust growth during the forecast period. Demand for plastic packaging especially will rise by a CAGR of 8.45%, fuelled by a strong manufacturing industry and healthy appetite for consumption as Vietnam’s population becomes increasingly middle class.

Chart 5-21: Consumption Volume of Packaging Products, Vietnam, 2014-2024E



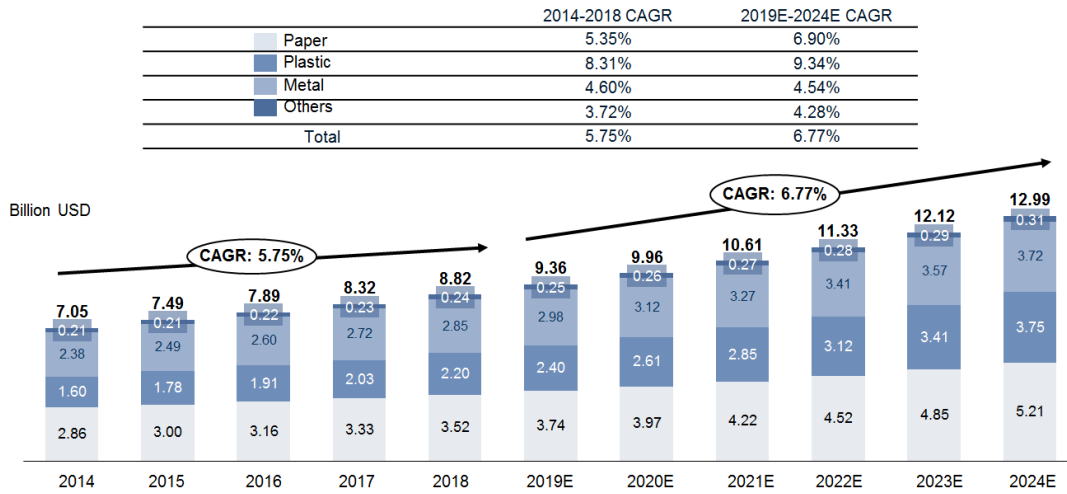
Source: Frost & Sullivan

5.5.6.2 Revenue of Packaging Products

Vietnam’s packaging market was valued at USD 8.82 billion in 2018, and projected to grow to USD 12.99 billion in 2024, registering a CAGR of 6.77%. Vietnam’s demand is slated for a robust growth as its economy continues its positive trajectory, driven by higher disposable incomes and expanding end-user

sectors particularly packaged food and personal care.

Chart 5-22: Sales Revenue of Packaging Products, Vietnam, 2014-2024E

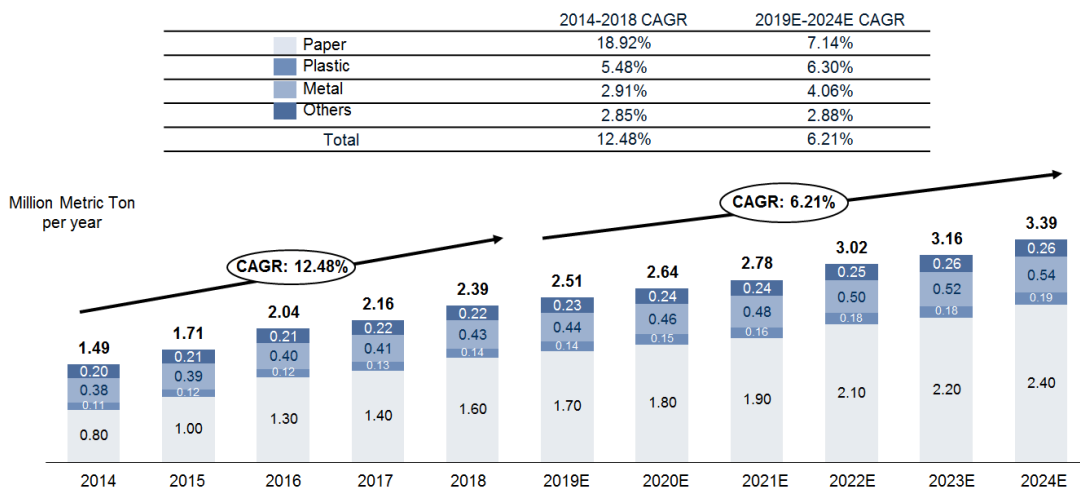


Source: Frost & Sullivan

5.5.6.3 Production Volume of Packaging Products

Vietnam has witnessed a strong growth in its manufacturing industry, and will continue its positive trajectory up until 2024. Rising demand from the food & beverage sector has seen major manufacturers planning to expand their facilities and increase their production to meet the demand.

Chart 5-23: Production Volume of Packaging Products, Vietnam, 2014-2024E



Source: Frost & Sullivan

5.6 SOUTHEAST ASIA- PHILIPPINES

5.6.1 Policy and Regulation of Packaging Market in Philippines

Policies and Regulations: 《Food Safety Act of 2013》

Execution Year: 2013

Issuing Department: Food & Drug Administration, National Food Authority and Dept of Health

Main Content and Emphasis:

- Under the Food Safety Act of 2013, food in containers with any poisonous or deleterious substance is considered adulterated
- With respect to food packaging, the Food Safety Act of 2013 specifies that DOH is responsible for ensuring the safety of all food processing and product packaging activities
- For example, the Revised Guidelines on Current Good Manufacturing Practice in Manufacturing, Packing, Repacking, or Holding Food (Administrative Order No. 153), issued May 7, 2004, states, "There shall be appropriate quality control operations procedures to ensure that food is suitable for human consumption and that food-packaging materials are safe and suitable."

Policies and Regulations: 《BFAD Circular No. 2006-016》

Execution Year: 2006

Issuing Department: Philippines FDA

Main Content and Emphasis:

- Under BFAD Circular No. 2006-016 (Undated List of Food Additives), any food packaging material that "results or may reasonably be expected to result, or indirectly, in its becoming a component or otherwise affecting the characteristics of any food," and is safe under the conditions of its intended use, falls under the definition of a food additive.
- The Philippine FDA also has stated in correspondence to individual firms that the Agency recognizes clearances for food-contact substances in the U.S. and Japan.

5.6.2 Top Market Drivers of Packaging Market in Philippines

5.6.2.1 Paper Packaging Market

Ideal Alternative to Plastic

- Paper is not just biodegradable but also more environmentally friendly as compared to plastic. With plastic pollution being a major issue in the country and region, paper is well placed to become the preferred choice of packaging across various end use industries.

High Fiber Content Recycling

- Certain grades of paper produced in the Philippines have a recycled fiber content of 95-100%, compared to the minimum recycled content of 25-35% implemented in developed countries.
- This high degree of recycling makes paper one of the most sustainable packaging options in the Philippines.
- Approximately 1.5 million Tons of wastepaper is generated per year and the paper industry provides strong support to the country's solid waste management efforts.

Strong Domestic Demand

- The growth of the Philippines economy coupled with the demand growth of packaged F&B, FMCG, Electronics and other products is the main growth driver for the paper packaging market in the country. While factors such as sustainability will play an important role, bulk of the volume growth will come from the increased demand for packaged goods & services

Availability of Land for Plantations

- The Philippines has suitable areas for fast-growing and sustainably-managed commercial forests. For instance, in the eastern half of Mindanao, pulp production can be established based on privately-owned tree farms, industrial tree plantations, and community-based forestry.
- This will also enhance the production of paper used for packaging in the country as well as for export purposes. The Philippines, is currently a net importer of paper used for the packaging industry.

Ban of RCP in China

- China's ban on imports of RCP implies that countries such as Philippines could import these volumes in order to produce paper and paper packaging products.
- With pulp prices being volatile and in short supply, a greater use of RCP in the paper manufacturing industry could be beneficial.

5.6.2.2 Plastic Packaging Market

Economy, Disposable Incomes and Growth in F&B and FMCG

- The Philippines economy is estimated to grow at between 6% to 6.8% over the next three to five years, and disposable incomes have been steadily increasing as well, at approximately 5% to 6% per annum. This has a very positive effect on sectors such as F&B and FMCG, which are the largest consumers of plastics packaging in the country.

Wider Range of SKUs

- Manufacturers in the Philippines are launching products in different sizes to cater to consumer needs. Companies in the food and beverage industry are coming out with smaller packs for on-the-go convenience.
- Examples include 200ml soft drink bottles and snack-sized servings of condensed milk or sandwich spread.
- On the other hand, manufacturers of beauty products and personal care items are launching larger sizes, which often turn out to be cheaper than several smaller products summing up to the same amount. Powdered laundry soap, for instance, now has 4 kg options.
- This implies a greater requirement of plastic packaging in the country with the sophistication to be made available across various sizes.

Smart Packaging & E-commerce

- Aside from calls for waste reduction, demands for food safety and protection against damaged products have increased, making smart packaging a necessity.
- An E-commerce boom has led to more compact and robust packaging that can survive temperature changes during transport. Other smart packaging ideas include simple labels with color changing dots to indicate a product's freshness.
- The E-commerce marketplace in the Philippines is estimated to grow by 29.89% between 2019 and 2024, which augurs well for the packaging industry.

Internet & E Commerce Penetration

- Currently, approximately 2% of the overall retail market is done online, which also suggests that the current E-commerce penetration is approximately 2% as well. This penetration percentage is expected to increase to 6% to 7% by 2021-22.
- The Philippines is also ranked as number 1 in terms of the time spent online by people, which could also be leveraged to draw consumers towards E-commerce platforms.
- Approximately 61% of the total population has access to the internet and are considered to be one of the heaviest internet users across the world.

Replacement of Glass Bottles by Plastic

- Soft Drinks and other beverages (nonalcoholic) that were sold in glass bottles across the country and now being sold in plastic bottles.
- This is due to the heavy weight associated with the plastic, coupled with the 'deposit' that a consumer has to pay at a local shop when a beverage in a glass bottle is procured.
- The deposit is returned to the customer upon the return of the glass bottle.
- This tedious process of deposits and returning of bottles, has prompted several local and international soft drink and beverage manufacturers to switch to plastic bottles.
- This trend however does not hold good for alcoholic beverages such as Beers and Spirits.

5.6.3 Top Market Restraints of Packaging Market in Philippines

5.6.3.1 Paper Packaging Market

Reliance on Pulp Imports

- The Philippines relies on the imports of pulp for the manufacturing of paper and in-turn paper packaging. This reliance makes it vulnerable to price fluctuations on the global market which automatically has a direct impact on the price of the packaging material.
- The Philippines, like Vietnam is a price sensitive country and when prices of paper packaging increase, the added costs cannot be passed on to consumers.

5.6.3.2 Plastic Packaging Market

Alternatives to Plastics for Packaging

- 80 percent of post-consumption plastic waste in the country is made of sachets, single-use bags, and other plastic waste that often isn't collected or resold.
- Philippines along with Southeast Asian neighbours Thailand and Vietnam are among the top 5 plastic polluters of oceans and seas globally.
- Materials such as Corn Starch and other alternatives are being researched on for their usage in multi-sectoral packaging.

Reliance on Plastics Imports

- The Philippines imports close to USD 4 billion worth of plastics and polymer resins, a large part of which are used in the packaging industry. Hence the local plastic packaging industry is

susceptible to price fluctuations which cannot be passed on to end consumers. Filipino consumers are highly price sensitive as well.

5.6.4 Role of E-commerce in Philippines

Economic

Philippines is the fastest growing economy in Southeast Asia with an expected GDP growth rate of approximately 9.59% CAGR between 2019 and 2024.

The rising middle class, high consumer spending, and a young and vibrant, tech-savvy population is driving E-Commerce forward.

There is pressure from the Philippine Government for the private telecommunications companies to provide higher bandwidth capacity to the retail market.

Drivers in E-commerce

Filipinos are prolific users of social media. Estimates this year show that there are 76 million active social media users from the Philippines. Of this number, 75 million are on Facebook; 12 million on Twitter, and 4 million are LinkedIn users.

The urge to use E-commerce for purchases ranging from groceries, clothing, electronics, footwear and other products is on the rise owing to the growth in disposable incomes and the rapid urbanization within the country.

The E-commerce market size in the Philippines is estimated to reach close to USD 7 billion by 2024.

Recognising the importance of E-commerce for the Philippine economy, the country's Department of Trade and Industry (DTI) developed the Philippine E-commerce Roadmap 2016-2020. Its primary goal is to get online business activities to account for 25% of the country's GDP by 2020, up from 10% in 2015.

E-commerce Opportunities

71 million or 67% of the population of the Philippines are mobile internet users which represents a wide base of consumers for E-commerce companies.

Impact on Packaging

The growth of the E-commerce industry will directly impact the packaging industry.

E-commerce uses a mix of paper, plastic and other types of packaging with paper and plastic being the most popular substrates.

The packaging volumes specifically used for E-commerce will also grow at approximately 32%-33% CAGR over the next few years; meanwhile, the E-commerce packaging market value is projected to increase from \$74 million in 2019 to \$191 million in 2024, with a CAGR of 20.88%.

5.6.5 Market Trends of Packaging Market in Philippines

Sustainable packaging

- The Philippines one of the world's largest plastic polluters of oceans. In order to reduce the amount of plastic waste generated, more sustainable alternatives such as Paper, Cellulose and Starch based packaging solutions are being tried and tested in the market.
- One of the biggest challenges in the country is the prevalence of a 'Sachet Economy' where FMCG goods in plastic sachets are sold extensively. The one time use of these sachets is a key reason for the growing pollution crisis.

Demand Growth for F&B, FMCG and other products

- The Philippines is one of the fastest growing economies in Southeast Asia and has seen a rise in disposable incomes as well. This has directly lead to an increase in demand from the F&B, FMCG, Electronics, Automotive and other sectors, all of which use different types of packaging materials.
- In addition, the E-commerce market is set to have a greater degree of penetration from the current 2% of retail sales in 2018, to approximately 6% to 7% by 2020, which is a significant consumer of packaging material.

Reliance on Raw Material Imports for Packaging Materials

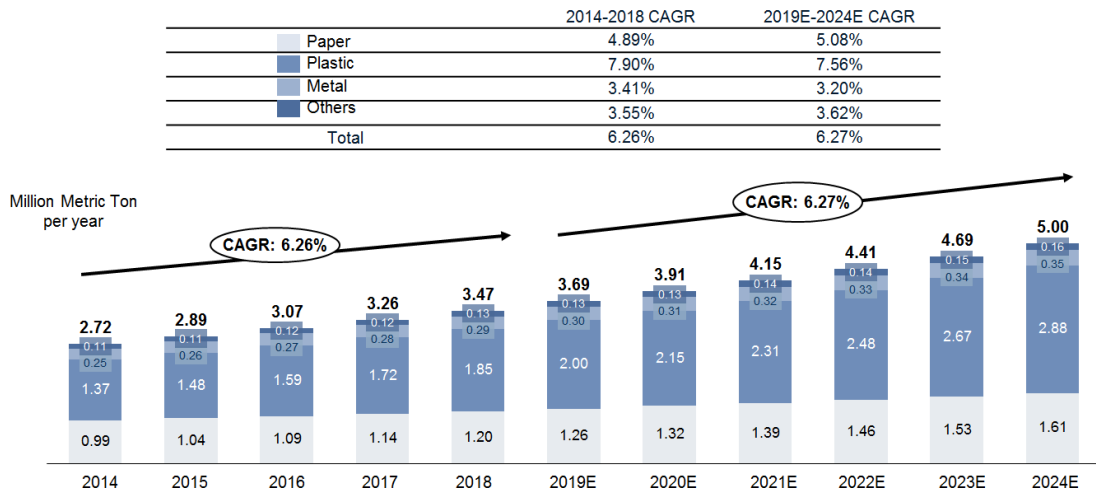
- The Philippines is a net importer of plastics and pulp as raw materials for packaging materials.
- This makes manufacturers of these packaging solutions susceptible to price fluctuations in the market.
- A price increase in raw materials cannot be passed on to customer as Filipino consumers are highly price sensitive.

5.6.6 Market Size of Packaging Products in Philippines

5.6.6.1 Consumption Volume of Packaging Products

The packaging industry will grow by a CAGR of 6.27% during the forecast period. Consumers in Philippines favor small, flexible sachet packaging for food, beverage, and personal care items. Demand for this packaging format will be sustained throughout the forecast period, with a slight decline projected due to the rise in environmental awareness.

Chart 5-24: Consumption Volume of Packaging Products, Philippines, 2014-2024E



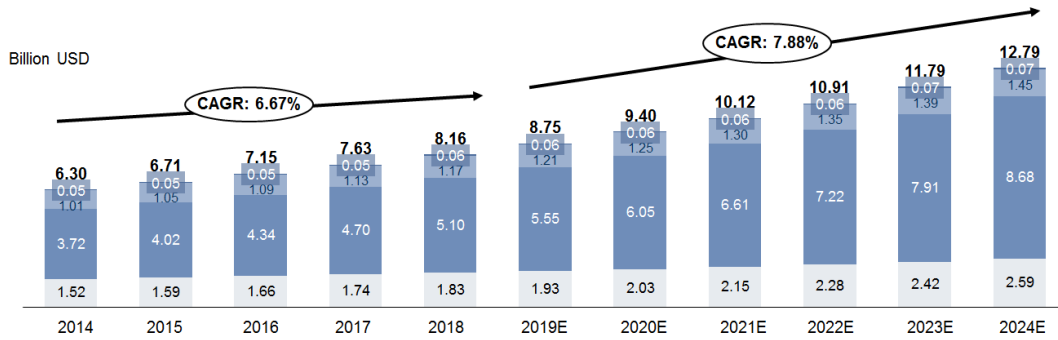
Source: Frost & Sullivan

5.6.6.2 Revenue of Packaging Products

Philippines’ packaging market was valued at USD 8.16 billion in 2018, and projected to grow to USD 12.79 billion in 2024, registering a CAGR of 7.88% between 2019-2024. Philippines’ demand is slated for a robust growth as its economy continues its positive trajectory, driven by higher disposable incomes and expanding end-user sectors particularly packaged food and personal care.

Chart 5-25: Sales Revenue of Packaging Products, Philippines, 2014-2024E

	2014-2018 CAGR	2019E-2024E CAGR
Paper	4.77%	6.12%
Plastic	8.22%	9.34%
Metal	3.65%	3.60%
Others	3.20%	3.88%
Total	6.67%	7.88%



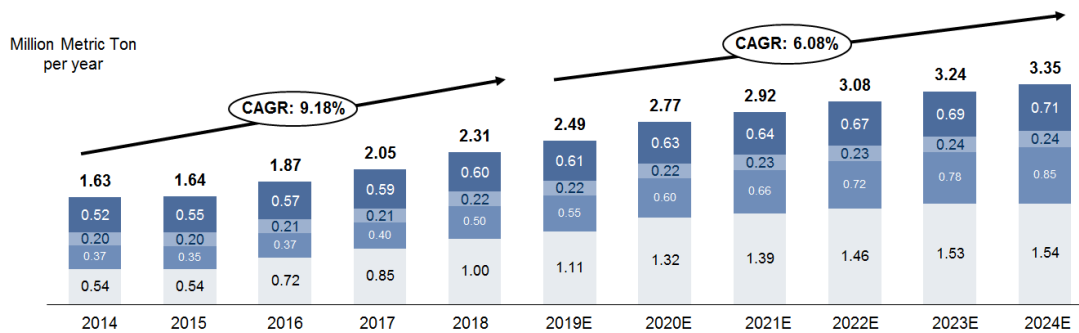
Source: Frost & Sullivan

5.6.6.3 Production Volume of Packaging Products

The packaging industry in Philippines has been growing at a CAGR of 9.18%, and is projected to register a CAGR of 6.08% during the forecast period. Philippines is dependent on other countries for raw materials, and this reliance may cause a slight decline in growth in the next 5 years.

Chart 5-26: Production Volume of Packaging Products, Philippines, 2014-2024E

	2014-2018 CAGR	2019E-2024E CAGR
Paper	16.65%	6.77%
Plastic	8.11%	9.18%
Metal	1.95%	1.80%
Others	3.43%	3.12%
Total	9.18%	6.08%



Source: Frost & Sullivan

6. ANALYSIS OF SOUTHEAST ASIA'S FORESTRY AND PULP MARKET

6.1 DEFINITION AND ILLUSTRATION OF FORESTRY & PULP MARKET

Definition

In broad terms, the Forestry refers to economic activities that rely on the forest for the production of goods and services. According to The Food and Agriculture Organization (FAO), the Forestry section includes the following divisions: Forestry, wood, pulp and paper, basic chemicals, and furniture. The first three are considered the major segments of this section, and is often collectively referred to as the “Forestry Sector”.

Agriculture, Hunting and Forestry Section

Forestry: Forestry, logging and related activities; Growing of timber and pulpwood; Logging and transporting of logs within the forest.

Wood: Sawmilling and planing of wood; Manufacturing of wood products such as plywood and particleboard.

Pulp and paper: Manufacturing of pulp, paper and paperboard; Manufacturing of corrugated papers and containers.

Basic chemicals: Manufacturing of charcoals.

Furniture: Manufacturing of wood-based furniture.

6.2 GLOBAL TRENDS IN FORESTRY & PULP MARKET

Paper Consumption at Unsustainable Levels

One of the most important trends associated with the global Pulp & Paper industry is that paper consumption is at unsustainable levels and globally it is steadily increasing, particularly in Asia, while remaining at unequal levels of access in some parts of the world, particularly Africa.

Impact on Climate Change

The industry has substantial climate change impacts, from its raw material sourcing in forests, through production, to the end of life of its products, so the opportunities for reducing greenhouse gas emissions through better land management and fibre choices need to be urgently seized.

Stakeholders must collectively bring forests to the forefront of action to address climate change.

Asia providing 50% of pulp & paper

The current nature of the Pulp & Paper industry is such that Asia accounts for close to half of the world's supply of pulp & paper.

This automatically leads to a greater degree of deforestation coupled with generation of large amounts of waste water during the processing of pulp and paper.

Non Uniform Usage of RCP

Currently recycled fibre use in products is by no means uniform: while many newsprint and packaging grades have more than 50% recycled content, printing and writing paper has a global average of only 8% recycled content.

By more effectively controlling contamination and implementing more robust recycling systems in developing countries, the amount of recycled fibre that could be used could still be nearly doubled before it reaches the upper limit of technical potential.

Rising Input Costs

Input costs such as energy, chemicals and other ancillaries are rising, while demand for paper and prices for wood product and market pulp are falling. The outlook for the global paper and forest products industry has been changed to negative from stable.

Global operating income will fall 2%-4% over the next 12 to 18 months.

US-China Trade War

U.S. hardwood lumber, logs and veneer exports are among the products impacted in a new round of tariffs announced recently by the Chinese government. The tariffs will be implemented in two phases, beginning Sept. 1 and Dec. 15, 2019.

6.3 OVERVIEW OF SOUTHEAST ASIA'S FORESTRY & PULP MARKET – REGIONAL TRENDS

Rising demand from emerging markets

- China's rapid economic growth has also stimulated the growth of all the underlying end use industries for pulp and paper products. Production facilities in China have expanded considerably to keep pace, but the country relies on imported pulp as raw materials. Much of this comes from Southeast Asia, notably Indonesia. Exports of bleached hardwood kraft pulp

from Southeast Asia to China alone amounted to more than 2.5 million tons in 2018, more than other destinations combined.

- Similarly, demand from other emerging markets such as India is also expected to rise.

Declining demand from mature markets

- On the other hand, demand from the mature markets in Western Europe, North America, and Japan has declined, driven mainly by the shift away from P&W and newsprint products.
- While per capita paper consumption in these markets is still higher than SE Asia, the prominence of digital media points towards a further decline of these paper grades.

Machine conversions into packaging grade and dissolving pulp

- Due to the decline in graphic papers (P&W and newsprint) demand, many production facilities have converted their machines to produce packaging products.
- Because the feedstock will shift from pulp to recovered paper, these conversions are expected to cause a short term increase in availability of the raw materials.
- Dissolving pulp, which is used mainly by the textile industry, has seen a rise in demand as an alternative to cotton. Subsequently, some producers have also converted from paper to dissolving pulp grade, and additional conversions are expected in the next 5 years.

6.4 SOUTHEAST ASIA - TRENDS IN FORESTRY & PULP MARKET INDONESIA

It is estimated that Indonesia's forestry products sector which includes pulp and paper, gets a third of its wood from illegal sources.

The illegal sources of wood could potentially increase in the near future as downstream pulp and paper companies increase their production capacity to serve the growing market for paper and packaging products in Indonesia.

This unsustainable wood – which may come from the unreported clearing of natural forests and other illegal sources - amounts to about 20 million cubic metres of wood, or 1.5 million logging trucks according to the study, titled 'Indonesia's Legal Timber Supply Gap and Implications for Expansion of Milling Capacity'.

The current scenario exists with downstream mills operating at reduced capacity, which implies that the amount of illegal wood could grow significantly if these mills were to operate at full capacity.

The challenge in Indonesia is to meet the growing end use demand while complying to the 'Zero Deforestation Pledge' taken by various plantations and downstream companies in 2013.

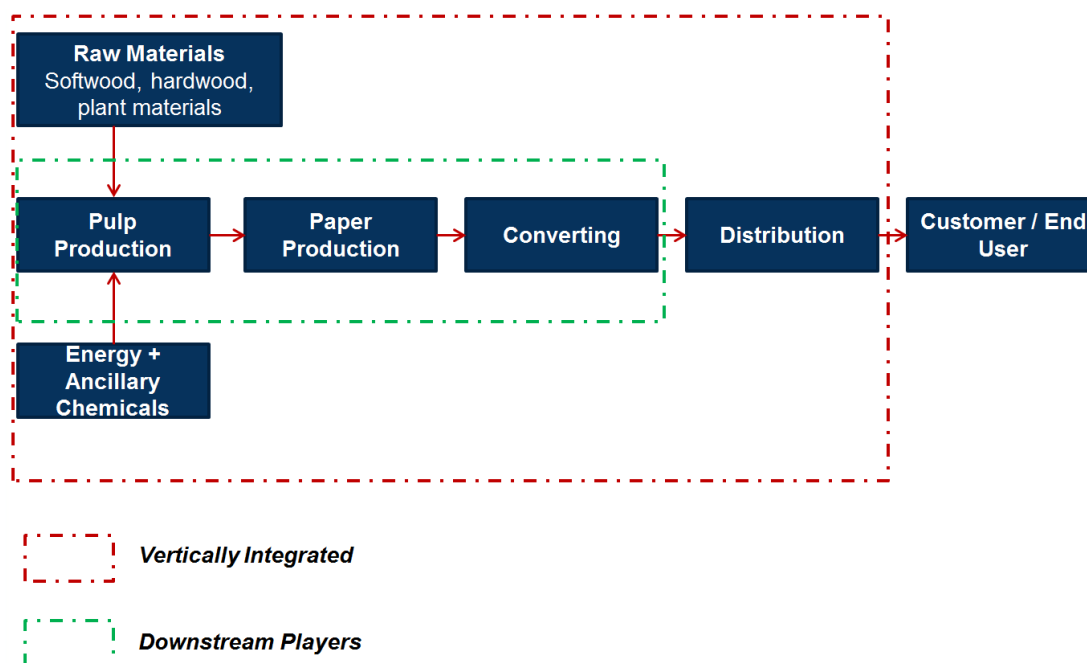
Between 2013 and 2014, Indonesia had the dubious distinction of having the world’s highest rate of Deforestation, primarily driven by the requirements for Palm Oil land.

Indonesian companies have also invested in excess of USD 10 billion for new mills in Sumatra, Kalimantan and Papua (Irian Jaya) which could create a wider gap between the supply and demand scenario that exists in the country today.

6.5 OVERALL VALUE CHAIN OF FORESTRY & PULP MARKET

Figure 6-1: Forestry & Pulp Market – Overall Value Chain

The forestry & pulp value chain starts from the raw material, and the overall manufacturing process involves pulp production, paper production, converting and final distribution to the end users:



Source: Eco Business, Frost & Sullivan

Raw material (softwood/hardwood)

They are generally the plantation or forestry companies that have timber & wood plantations specific for the manufacturing of paper products.

These companies either provide wood & timber to the downstream plants if they are integrated or sell the timber based on contracts with pulp & paper companies.

Some plantation companies also sell directly in the open market based on global pricing.

Energy & Ancillary Chemicals

The process of pulp and paper manufacturing requires significant amounts of energy as well as chemicals for bleaching, dyeing, cleaning and other processes. While they are not an integral part of the value chain in a direct way, they are critical resource providers for the smooth functioning of a pulp & paper plant.

Pulp Production

The cutting, milling and processing of wood logs into pulp is one of the most critical steps of the entire value chain.

Cooking the wood chips in the presence of sodium hydroxide and sulfide liquor under high pressure removes the lignin and separates the wood into cellulose fibres. During the cooking process approximately half the wood dissolves. The pulp is then washed, screened for quality and bleached.

The spent cooking chemicals and dissolved wood material is called black liquor. This substance is recovered and burned in a recovery boiler to produce energy that keeps the process running.

Washed and bleached pulp resembles fluffy white cotton balls.

The pulp is then dried, cut into sheets and baled for easier handling, warehousing and transportation.

Paper Production

From the pulp, a variety of paper products can be made: coated, uncoated, or newsprint. The pulp can also be used as material to make containerboards and cartonboards, which are covered in the next section.

Both softwood and hardwood pulps are usually mixed together as they both have attributes that contribute towards better paper products. Softwood pulp is generally smoother, making it suitable for P&W paper.

The pulp mixture is roughened, diluted, cleaned and screened in successive steps before being fed into the papermaking machine.

The pulp stock passes through one or two headboxes onto the paper machine. The paper web is formed from the head box onto the wire and dewatered through the wire primarily by the action of gravity and suction/vacuum. Further dewatering by mechanical means takes place in the press section where water is taken out of the sheet by pressing between felts.

The final drying takes place in the drying section of the paper machine where the sheet runs against steam heated cylinders to get a desired dryness. The collected water is reused for diluting the thick stock coming from the stock preparation.

Converting

This is the step where the bales of paper are converted into paper for printing & writing, newsprint and others.

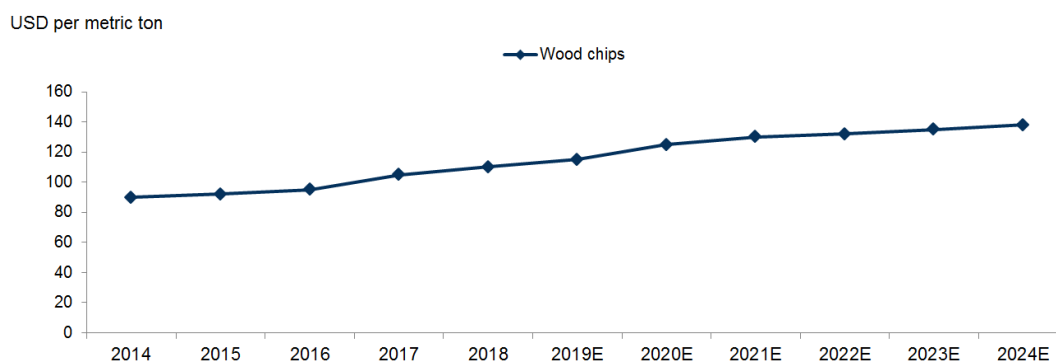
Distribution

Once the finished product is ready, it is distributed to printing houses and agents before sent to the end users.

6.6 SOUTHEAST ASIA’S FORESTRY & PULP MARKET – COST & PRICE ANALYSIS

From a historical high in 2011, wood chip costs have had a downward trend until 2014 when it began to pick back up in Indonesia, China, Europe and North America. Wood chips constitute between 45% to 70% of production costs for a pulp mill. Southeast Asia may continue to see a modest increase in price as a shortage of wood supply is expected on the horizon.

Chart 6-1: Price of Wood Chips, USD per metric ton, 2014-2024E

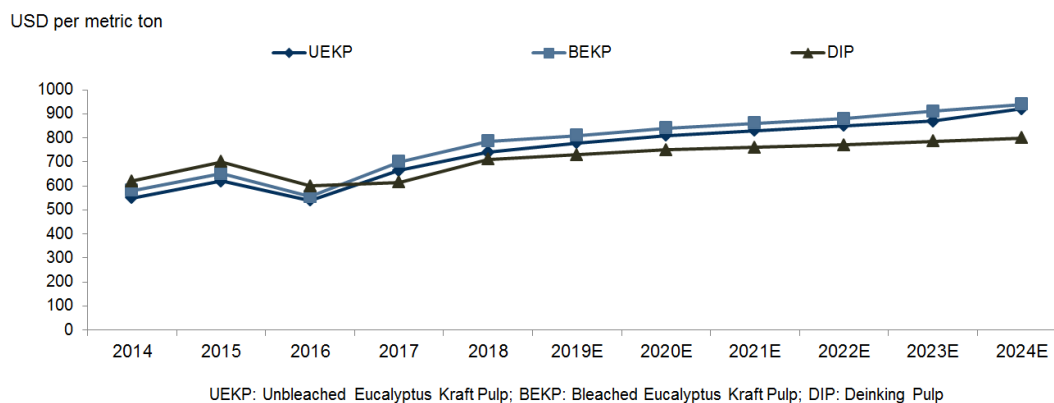


Source: Hawkins Wright, Frost & Sullivan

The declining supply of woodchips will place an upward pressure on pulp prices, but the effect on individual pulp mills will vary depending on the pulp grade, the efficiency of the mill, its geographical proximity to supply and distribution, and the degree of vertical integration. The slowdown of China’s

economy placed a downward pressure on pulp prices in 2016. Higher demand and reduced supply due to mill closures caused the price to climb back up in 2017, and prices have remained high throughout 2018 partly as a result of China's ban on RCP imports.

Chart 6-2: Price of Pulp, USD per metric ton, 2014-2024E



Source: Hawkins Wright, Frost & Sullivan

6.7 GLOBAL SUPPLY & DEMAND FOR PAPER PRODUCTS

Below describes the global supply and demand dynamics for paper products:

Production Growth

The global supply for paper & paper products is estimated to grow at a CAGR of approximately 0.7% between 2019 and 2024. Supply is expected to reach approximately 428 million MT by 2024.

Demand Growth

Similarly, demand for paper & paper products is estimated to grow at a CAGR of 0.5% between 2019 and 2024. Global demand in 2018 was approximately 404 million MT and is expected to reach 416 million MT.

Oversupply Scenario

Over the course of the forecast period, supply is expected to outstrip demand, owing to a drop in end use industries such as newsprint as well as printing & writing.

Containerboard Growth

Of all the key end use applications for paper, containerboards is the only application that is expected to show stable growth over the next few years with a CAGR of approximately 2.8% between 2019 and 2024.

Newsprint

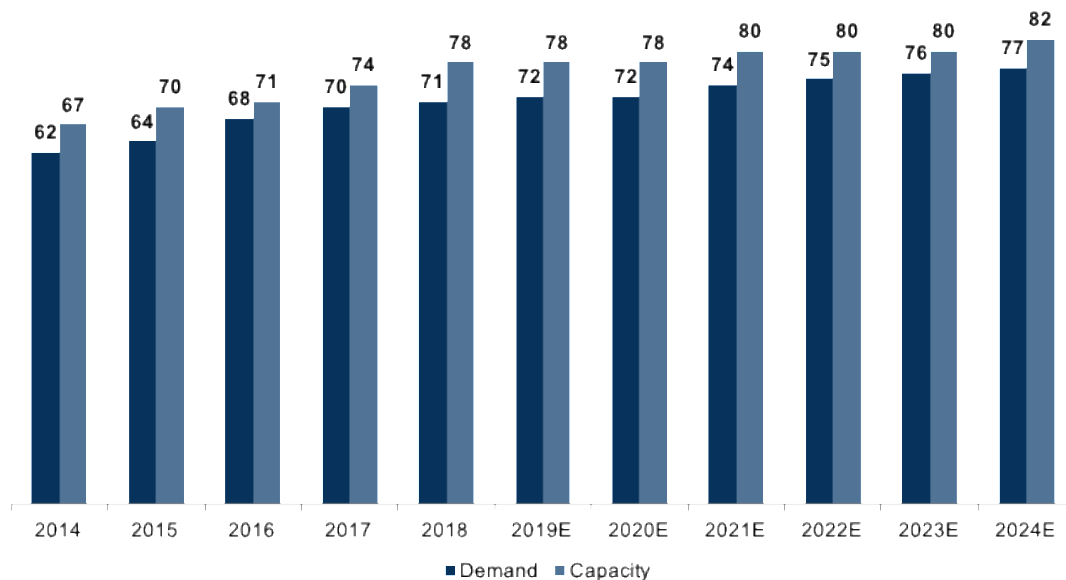
With magazine and newspapers having a greater online presence, the sales of actual newspapers and magazines have dipped across the world. This will have a direct impact on the demand for paper in the future.

Printing & Writing Paper

Printing & writing paper is also expected to show reduced demand between 2019 and 2024, owing to a greater degree of awareness surrounding unwanted printing as well as the greater usage of laptops, tablets, mobile phones and other electronic devices for writing and taking notes.

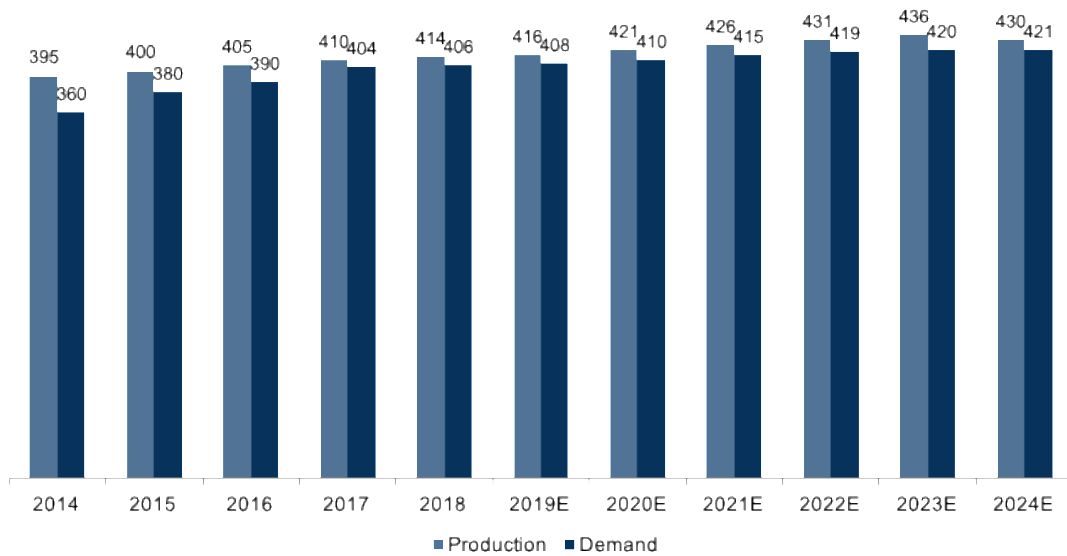
6.8 GLOBAL SUPPLY & DEMAND FOR PAPER PRODUCTS

Chart 6-3: Global Pulp Market, Demand & Capacity in Million MT, 2014 to 2024



Source: Frost & Sullivan

Chart 6-4: Global Supply & Demand Forecast for Paper Products, by volume, 2014 to 2024, (Million MT)



Source: Frost & Sullivan

The global demand for paper products, including containerboard, increased at a CAGR of 3.1% over the course of 2014 and 2018.

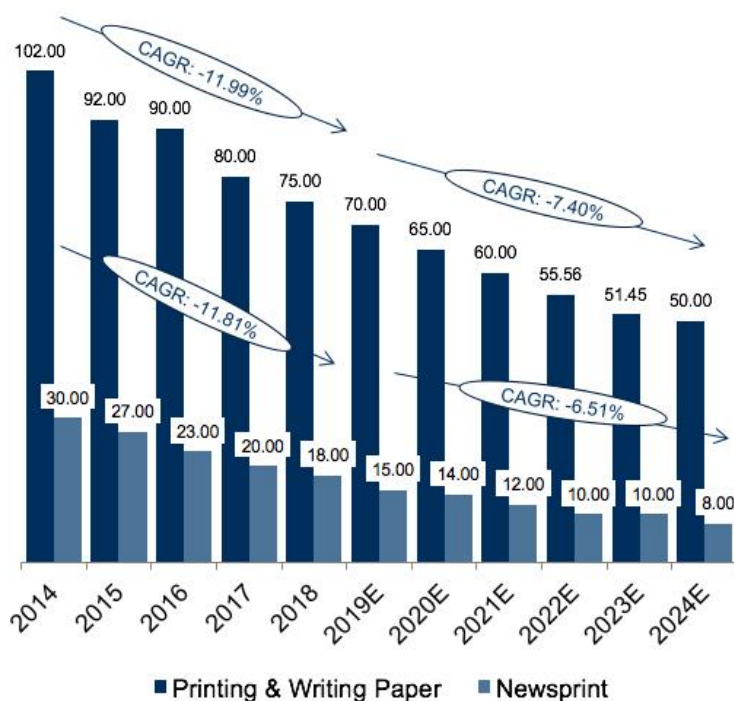
However, the demand for printing & writing (P&W) paper and newsprint paper declined by a CAGR of -11.99% and -11.81% respectively, between 2018 and 2024.

Over this period, digital media has edged out traditional media. The shift is especially prominent in mature markets in North America, Europe, and Japan.

Thus, the demand for paper products, as shown previously, is driven mainly by the demand for paper packaging (containerboard), giving a competitive edge for companies with a large presence in this sector.

Analysis of the containerboard market is covered in more detail in the next section.

Chart 6-5: Global Demand Forecast for Graphic Paper, by volume, 2014 to 2024 (Million MT)



Source: Frost & Sullivan

6.9 MARKET DRIVERS OF SOUTHEAST ASIA'S FORESTRY AND PULP MARKET

Affordable / Cheap supply source

Countries in Southeast Asia, such as Vietnam are one of the largest suppliers of hardwood woodchips globally.

The woodchips from Vietnam are also cheaper in comparison to exports from other regions, owing to lower labor costs as well as other manufacturing costs.

However, owing to ageing technology and lack of access to capital, Vietnam may not be able to sustain its position as one of the cheapest sources of hardwood woodchips over the next few years.

Growing demand from end use industries

Pulp is converted to paper which then becomes the main raw material for paper based packaging. This end use industry is expected to show robust growth across the region owing to various factors such as rise in the E-commerce business, growth in the F&B segment coupled with F&B delivery applications, FMCG packaging as well as E&E packaging.

Paper based packaging is also environmentally friendly when compared to plastic packaging.

Pulp which is used for these purposes will continue to show strong potential over the next few years.

6.10 MARKET RESTRAINTS OF SOUTHEAST ASIA'S FORESTRY AND PULP MARKET

Illegal logging / Deforestation

A significant grey market exists which includes illegal logging on protected forests, which is a key challenge faced by various governments in the region.

Southeast Asia is home to some of the world's most diverse rainforests and illegal logging of these forests is an existing threat owing to lack of strong policies and implementation of these policies by agencies.

Illegal logging also erodes soil quality which makes tree plantations unsustainable in the medium and long term.

Illegal logging has slowed down owing to a drop in demand from major importers such as China.

Outdated downstream processing technology

The pulp and paper mills in Southeast Asia are relatively fragmented and use converting technologies that are fast becoming inefficient and expensive.

This can also be attributed to factors such as lack of access to capital for plant upgrades.

The outdated technologies used also leads to a higher release of untreated effluents and chemicals which tend to contaminate ground water as well as nearby water bodies.

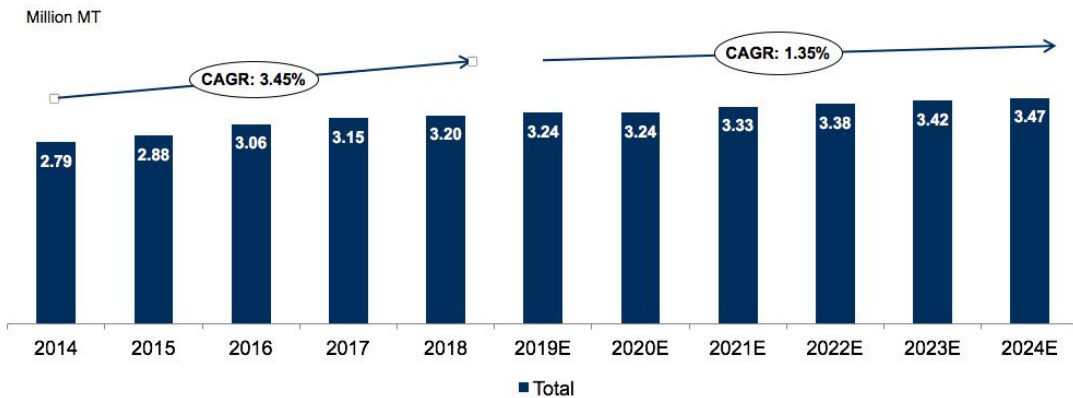
6.11 SOUTHEAST ASIA'S FORESTRY & PULP MARKETS

6.11.1 Market Demand for Pulp by Volume

While market demand for pulp is expected to grow at a steady CAGR of 1.35% between 2019 and 2024, the demand for certain end use paper products such as Printing & Writing Paper is diminishing in the region owing to the advent of electronic media and devices.

The bright spots for pulp demand will continue to be paper packaging coupled with manufacturing of tissues.

Chart 6-6: Total Pulp Demand, Southeast Asia, 2014-2024E, Million MT



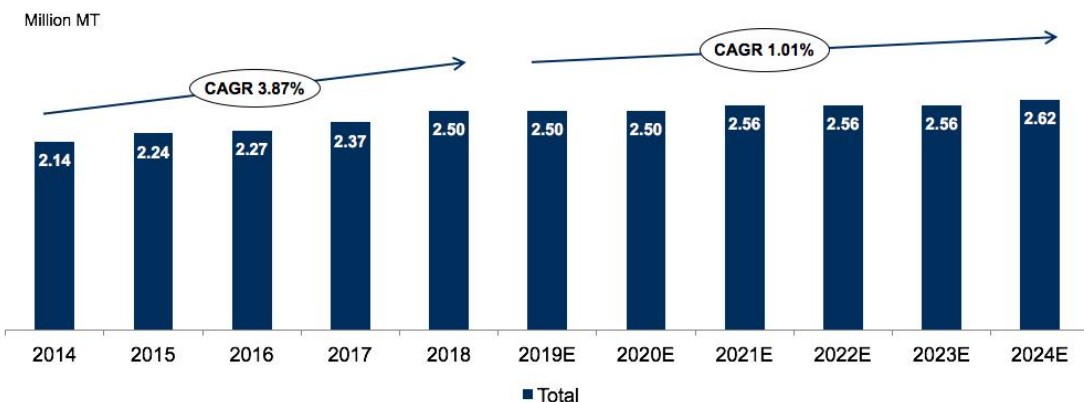
Source: Frost & Sullivan

6.11.2 Market Production for Pulp by Volume

Production of pulp in Southeast Asia is expected to grow at a slow pace over the next five years owing to reasons such as:

- Increasing reliance on imports of woodchips & wood, owing to stronger logging regulations.
- Lack of access to capital, especially for small & medium sized companies for expansions of facilities.
- Reduced demand from end use segments such as Printing & Writing Paper.

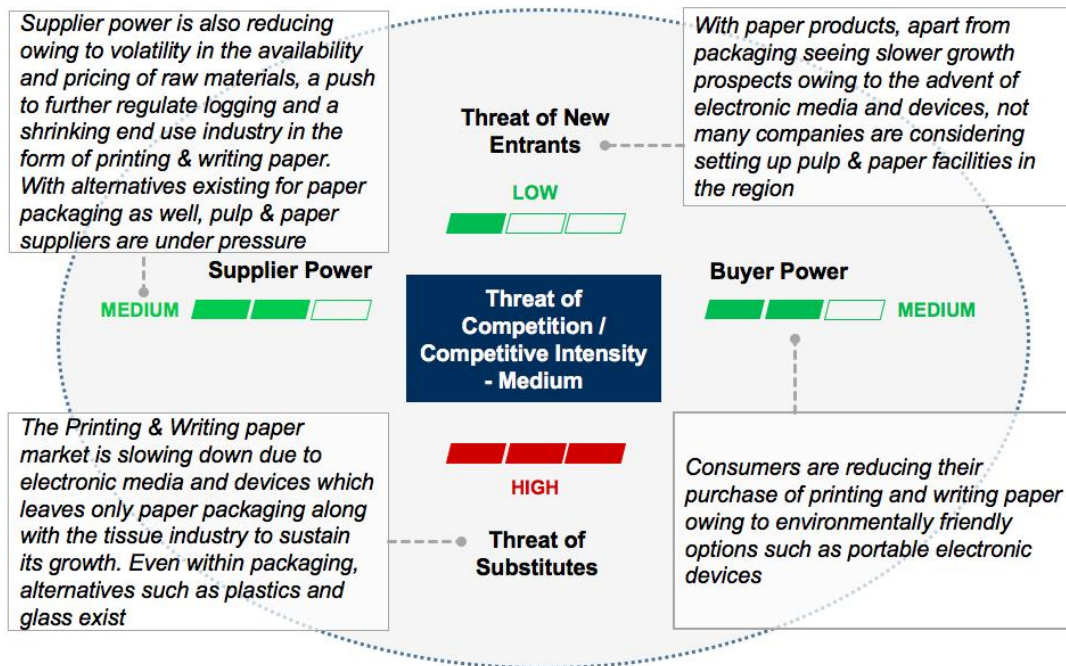
Chart 6-7: Total Pulp Production, Southeast Asia, 2014-2024E, Million MT



Source: Frost & Sullivan

6.12 PULP & PAPER MARKET – BARRIERS TO ENTRY IN SOUTHEAST ASIA

Figure 6-2



Source: Frost & Sullivan

6.13 COMPETITIVE ANALYSIS – SOUTHEAST ASIA’S FORESTRY & PULP

Because of the exposure to price volatility for the raw materials, major players in the market have strong presence across the value chain, from plantations to converting facilities. With a high degree of vertical integration and wide range of product portfolio, SCG Packaging has emerged as the market leader in the region’s forestry & pulp industry, followed by Nine Dragons, Lee & Man Paper, Indah Kiat, and Nippon Paper.

Figure 6-3

✓ Denotes presence in SE Asia

	SCG PACKAGING	ND PAPER	Lee & Man Paper	indah kiat pulp and paper products	NIPPON PAPER
Raw Materials	✓				
Pulp Production	✓	✓	✓	✓	
Paper Production	✓	✓	✓	✓	✓
Converting	✓	✓			✓
Waste recovery	✓				
Level of integration	●	◐	◐	◐	◐

Source: Frost & Sullivan

6.14 REGULATORY OVERVIEW

6.14.1 Thailand

Policies and Regulations: 《National Reserved Forest Act, BE 2507》

Execution Year: 1964

Issuing Department: Forestry Department of Thailand, Ministry of Agriculture

Main Content and Emphasis:

- This Act was established in 1964 to promote efficient logging in Thailand and to counter any illegal logging activities in protected forests / sites.
- The Act also gives power to the appointed Minister to determine any forest land to be placed under a Reserved Forest category in order to preserve its timber, resources and nature.
- Any company interested in setting up or acquiring a timber plantation / forest site must go through the Royal Forestry Department and the Ministry of Agriculture for the required approvals.

Policies and Regulations: 《Commercial Forest Plantation Act》

Execution Year: 1992

Issuing Department: Ministry of Agriculture

Main Content and Emphasis:

- The demand to promote private forest plantation in deteriorated reserve forest according to the National Forest Policy centered on the forest land management and lawfully register rightful land which forest is established as forest plantation so plantation can be made with no need to ask for the permission as demanded in Forest Law of 1941.
- However, the creation of laws and numerous policies to enforce forest management will not arrest forest destruction. On the contrary, strict laws and policies focusing on enforcement have the opposite affect.

6.14.2 Indonesia

Policies and Regulations: 《Forestry Law》

Execution Year: 1999

Issuing Department: Ministry of Forestry

Main Content and Emphasis:

- Indonesia's national Forestry Law came into effect in 2000, and regulates the management of forests in Indonesia. Forestry Law No. 41/1999 replaced the Basic Forestry Law (Law No. 5 of 1967), which had focused mainly on timber management, and not conservation.
- In contrast, the 1999 Law includes some conservation-oriented policies. It divides forests into three categories, including: Conservation Forests, Protection Forests and Production Forests.
- The 1999 Forestry Law reaffirms the Ministry of Forestry as the lead authority for almost all things related to forests.
- The purpose of this Presidential Instruction is to establish the government's commitment and responsibilities to eradicate illegal logging from within Indonesia's forests and to stop its distribution throughout the Indonesian territory. It orders the government and several named Ministries to take action against anyone harvesting, collecting or distributing timber without an authorized license; to stop anyone who receives, buys or sells illegal timber; to expose anyone who fails to carry the necessary certificates during transport, etc.

6.14.3 Vietnam

Policies and Regulations: 《Law on Forest Protection & Development》

Execution Year: 1992/2004

Issuing Department: Ministry of Agriculture & Rural Development Ministry of Natural Resources & Environment

Main Content and Emphasis:

- The Forest Protection and Development Law is the prevailing forestry policy in Vietnam. It lays out the management, protection, development, and use rules of Vietnam's forests. It also defines forest owner's rights and obligations as owners. The law also explicitly bans unplanned and unpermitted timber logging.
- Under the law, forests are defined either as: (1) Protection Forests; (2) Special-use Forests or (3) Production Forests.
- Article 9 of the Forest Protection Law addresses the basic principles surrounding forest protection and development in Vietnam. Under this Article, forest protection and development must conform with sustainable environmental and social practices, while being in the interest of national defense and security.
- Article 12 explicitly prohibits illegal conduct in forests, including: unlawful logging, exploitation, hunting, trapping, foraging, and destroying of resources or ecosystems.

- Article 24(3) lays out the Production Forest assignment principles. The State will assign natural production forests and planted production forests without levies to any households or individuals living on the land. For economic organizations, these levies will be assigned. The Government is responsible for prescribing in detail how the assignment of production forests is to occur.

6.14.4 Philippines

Policies and Regulations: 《Forestry Resources Bill》

Execution Year: 2017

Issuing Department: Bill passed in Philippines senate

Main Content and Emphasis:

- This Forest Resources Bill (FRB) prioritizes the conservation, protection, and rehabilitation (CPR) of the Philippines' remaining few forests.
- It institutionalizes some key provisions of President Benigno Simeon C. Aquino III's Executive Order No. 23 (issued in February 2011), which declared a national moratorium in the cutting and harvesting of timber in natural and residual forests.
- This bill attempts to rationalize a forest land use policy, management and strategy based on ecologically-sound science. Among the other key provisions of the bill are as follows:
- The use of a functional definition of "forest";
- Inclusion of a definition of "protection forestlands" which cover all natural (primary), residual (secondary), key biodiversity areas (KBAs) among others;
- Prioritization of forest restoration utilizing indigenous or native tree species;
- Recognition of "watershed continuum" as the baSic forestland management unit;
- Strengthening of the role of local government units (LGUs) in forest management;
- Empowerment of indigenous people, local communities, and other civil society organizations through their active participation or engagement in the forest management, governance, and law enforcement.

Policies and Regulations: 《Legal Requirements for Timber》

Execution Year: /

Issuing Department: Department of Environment & National Resources (DENR)

Main Content and Emphasis:

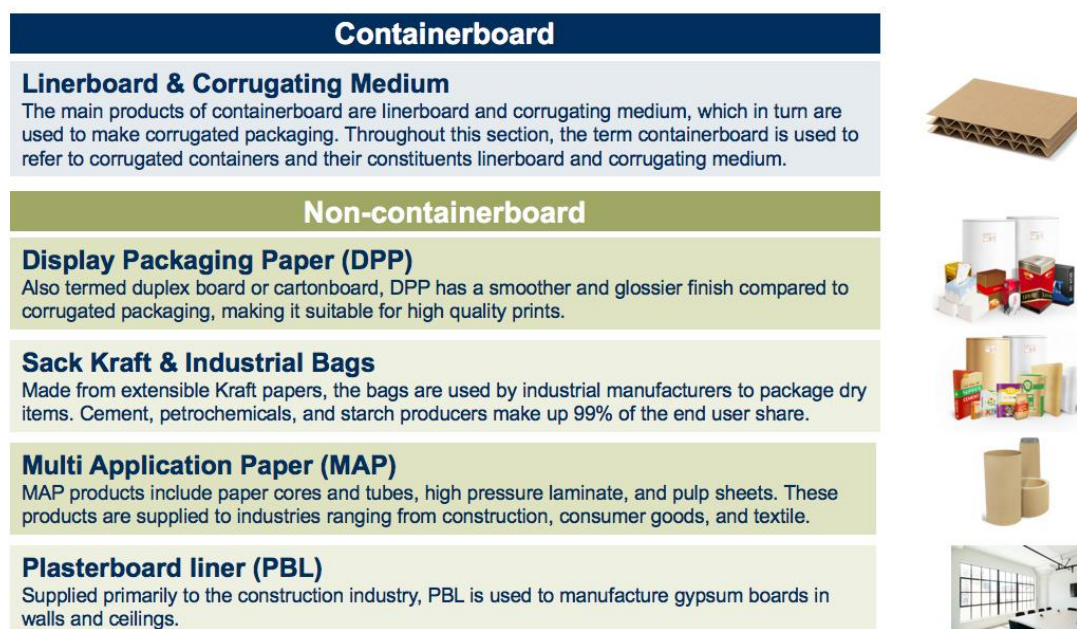
- Extraction or harvesting of TIMBER & including non-timber products requires specific type of AUTHORITY in the form of PERMIT i.e. short and long-term permits (Contracts or Agreement) issued by the Department of Environment & Natural Resources-DENR.
- Duration of such PERMITS vary from one year to 25 years.
- The Presidential Decree 705 is one of the most important laws surrounding the forestry and timber business in the Philippines.
- Processing of round timber in to lumber, veneer, plywood, etc likewise requires Wood Processing Plan Permit issued by the DENR.
- Log Supply Contracts are required to establish and operate a Wood Processing Plant.
- Log Supply contracts from foreign suppliers are required to be authenticated by the nearest Philippine Embassy or Consular Office where the supplier is located.
- All entities that harvest timber must have possession of valid permit or license issued by appropriate authorities (PD 705 - Basic Forestry Law in the Phil.).

7. ANALYSIS OF SOUTHEAST ASIA'S CORRUGATING PACKAGING MARKET

7.1 OVERVIEW OF PAPER PACKAGING

Paper packaging manufacturers produce a range of products that not only fulfill packaging needs for various consumer industries, but also supplementary materials in the construction and textile industries. It can be categorized into containerboard and non-containerboard products. The containerboard products mainly include linerboard and corrugating medium, which in turn are used to make corrugated packaging. Non-containerboard products include products including display packaging paper, sack kraft & industrial bags, multi-application paper and plasterboard liner. Paper packaging market, which is defined here as inclusive of both containerboards and cartonboards, has grown considerably in APAC.

Figure 7-1



Source: Frost & Sullivan. Image Sources: Siam Kraft, Pixabay

7.2 DEFINITION AND ILLUSTRATION OF CORRUGATED PACKAGING

Definition

Corrugated packaging (containerboard) is a type of paper packaging made out of sheetboards. Sheetboards consist of one layer of corrugated medium, sandwiched between two flat sheets ("linerboard"). The series of connected arches formed by the fluting gives it considerable strength, rigidity, and resistance.

Raw Material

Virgin cellulose fibers from woodchips; Recycled fibers from recovered paper; Old corrugated containers

Advantages

- Biodegradable and recyclable.
- The flutes allow air to circulate, providing insulation and protection from extreme temperature fluctuations.
- Customizable in terms of shape, size, and strength.
- Printable surface can be used to convey useful information such as brand images and contents.

Disadvantages

- Higher cost of manufacturing compared to plastic containers.
- Can be misshapen and deformed under extreme weight and pressure.
- Low resistance to moisture. Water is also easily absorbed and transferred to the contents.

7.3 OVERVIEW OF GLOBAL TRENDS IN CORRUGATED PACKAGING MARKET

Favourable shifts in demographics and associated changes in lifestyle such as smaller households, demand for individual portion sizes, rising demands for packaged food, food deliveries and FMCG products, rising willingness to spend, etc. result in more diversified demand for packaging solutions. The rise of a younger, more educated and affluent population in Southeast Asia has and is expected to change dominant consumer behaviours, in particular in the retail market. For example, as income level rises, spending in indulgent items and luxury goods, in addition to consumer packaged goods, is expected to increase which will drive the demand for premium, durable packaging which is becoming the integral part of brand differentiation for retailers; the movement towards urban areas and delay in starting families in the younger generation mean that households are getting smaller and the demand for small format packaging is rising, as well as changing their eating habits towards packaged meals or food deliveries.

Food and beverage is the largest end-user of paper packaging in Southeast Asia, and will remain the largest moving towards 2024, constituting about 47% of the total market size by 2024. The increasing food related applications will also trigger stronger regulations for food safety which will improve the quality and standards of packaging.

Chart 7-1: Split of Paper Packaging by End Use Industries, Thailand, Indonesia, Vietnam and the Philippines, in Percentage of Paper Packaging Revenues, 2018 and 2024E



Growing consumer focus on more sustainable products: consumers are increasingly making purchasing decisions that would minimise their impact on the environment, and more prepared to pay a premium for the more sustainable option. Single use plastics are falling out of the public's favour, and the impact will even be stronger as the government ramps up awareness campaigns to discourage its use. For instance, concerns over marine pollution have prompted the Thai government to draft a policy framework to reduce plastic waste over the source of the next decade and encourage recycling and reusing of existing plastic packaging. The Vietnamese government is also planning to make supermarkets adhere to zero plastic usage by 2025 (with a target of 65% reduction by 2020). Manufacturers will strive to make further reductions in water, land, and energy resources that are being funnelled into production. These initiatives are expected to make a significant impact on the industry within the next 5 years. Furthermore, improving the material-to-product yield or light-weighting is also a key trend observed in the industry. Most paperboards in the market are now in the range of 70-150gsm, a significant reduction from an average of 500gsm in 2008

The growth of E-commerce and the omni-channel sales model has created and will continue to create new demand and specifications from the packaging solutions providers. The E-commerce market size of Thailand, Indonesia, Vietnam and the Philippines in aggregate reached USD 13.0 billion in 2018 with a CAGR of 38.2% in the period from 2014 to 2018 and it is anticipated to amount to USD 52.0 billion in 2024 at the CAGR of 23.8% in the period between 2019 to 2024.

In particular, Indonesia and Thailand are the two largest E-commerce markets across Southeast Asia. In Thailand, with support from the Thai government, a "Digital Thailand" initiative started in 2016 has brought about a wave of opportunities for businesses across different industries to digitize their operations and services, especially for SMEs seeking to undergo digital transformation. According to the Thailand Market Research Society, 71% of smartphone users in Thailand shop online an average of twice a month, while 90% intend to shop online in the future. In Indonesia, the government has recently decided to withdraw implementation of PMK210/2018, a regulation to tax E-commerce transactions, and

such decision is expected to enable the E-commerce market in the country to become a much bigger sector.

The increase in the penetration of E-commerce in Southeast Asia is expected to increase demand for secondary and logistics packaging. E-commerce packaging is also increasingly becoming the only interface through which end-consumers interact with products as they shop online as opposed to visiting retail stores. Moreover, E-commerce packaging solutions providers must be able to serve changing orders depending of volumes of goods sold and respond to unexpected and sudden peak in demand.

The E-commerce market is becoming more and more popular across all strata of society, irrespective of income classes. The promotions and discounts offered by E-commerce companies appeals to the middle income and lower income classes in a significant manner. However, the key attribute that makes the E-commerce market attractive to consumers is the convenience factor. The ability to order products without having to go to the stores, thereby saving time and effort is a big draw. Factors such as increased urbanization rates in key areas across the region, have led to increases in traffic jams, working hours as well as a lack of time to go out shopping. This drawback is a boon for the E-commerce industry, as consumers in Southeast Asia also order their groceries through E-commerce platforms.

Innovations to Improve Sustainable Sourcing Sourcing of raw materials for paper packaging has received a significant amount of emphasis over the last eight to nine years, with stricter regulations being placed on the content of recycled paper being used for manufacturing paper packaging solutions. New technologies have enabled producers to increase the proportion of recycled paper, from 50:50 (recycled paper: virgin fiber) in 2010, to 70:30 (recycled paper: virgin fiber) in recent years. Stricter environmental standards have also ensured that virgin fibers are sourced from certified forests and plantations.

China's Ban on RCP Imports China's ban on imports of RCP implies that countries such as Vietnam could import these volumes in order to produce paper and paper packaging products. With pulp prices being volatile and in short supply, a greater use of RCP in the paper manufacturing industry could be beneficial. The proximity of Vietnam to China, implies that logistics companies need to travel the same distance from their origin, which will have no additional bearing on logistics costs.

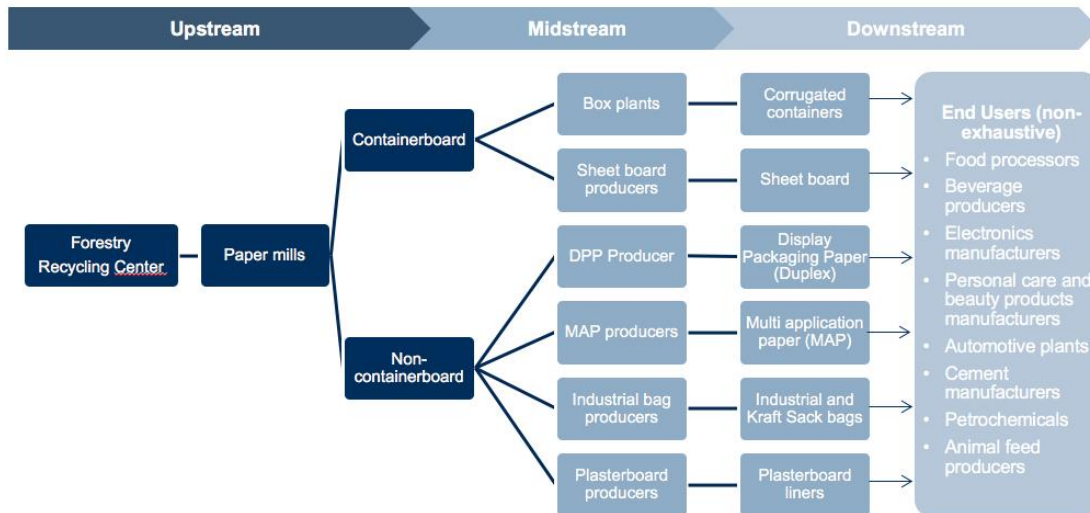
7.4 OVERVIEW OF VALUE CHAIN

7.4.1 Paper Packaging

Paper packaging manufacturers produce a range of products that fulfil not only packaging needs for various consumer industries, but also supplementary materials in the construction and textile industries. It can be categorized into containerboard and non-containerboard products. The containerboard products include corrugated boxes and display paper packaging that mainly serve end-users in the

consumer goods sector. Non-containerboard products include multi-application paper, industrial bags and plasterboard liner and are mainly sold to industrial customers.

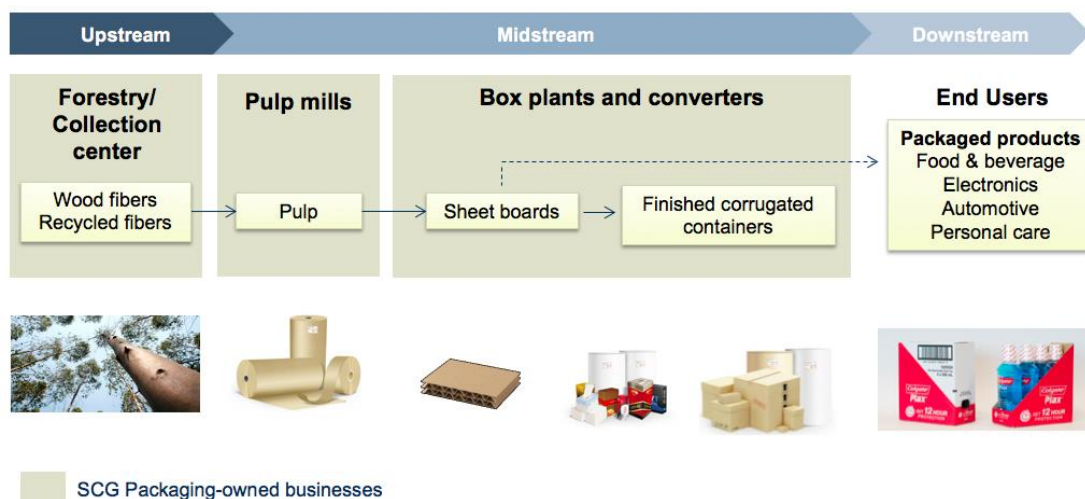
Figure 7-2: Value Chain of Paper Packaging



7.4.2 Corrugated Packaging

Although corrugated packaging uses virgin fibers, the vast majority are made from recycled materials like waste paper and old corrugated containers (OCC). Major players such as SCG Packaging has significant cost advantage due to vertical integration, which includes ownership of the forestry and collection centers, pulp mills, and box plants and converters across Southeast Asia that produce the final containerboard products for various domestic and international end-users.

Figure 7-3: Value Chain of Paper Packaging - Containerboard



SCG Packaging-owned businesses

Source: Frost & Sullivan

Image sources: SiamKraft, SCG Packaging

7.5 PROCESSES AND TECHNOLOGIES

7.5.1 Containerboard – Corrugated Packaging

Raw materials processing

Wood: harvested wood is debarked and chipped, and delivered to the mills.

Recovered paper: these are delivered as bales. Recovered paper vary by grades, which determine the input ratio and the type of liner that can be produced.

Pulping

Wood chips are placed through either a mechanical or a chemical pulping process.

In mechanical pulping, the chips are ground into cellulose fibers by forcing it through a revolving stone. While this process is cheaper, an extra step is necessary to remove lignin, a glue-like substance within the wood chips.

In chemical pulping, also called the sulfate process and Kraft process, the wood chips are digested with alkaline solution and sodium sulfate, and cooked in high pressure, high temperature conditions. This process simultaneously reduces lignin content and improves material strength.

Recovered paper bales are broken up into a suspension. Unwanted materials such as pieces of fabric and plastic are cleaned out during screening.

The suspension is then disperged, a process whereby the suspension is dehydrated and steamed, and passed through a deflaker. This step removes contaminants such as wax, ink, and coating binders, and improves the fiber bonding quality.

Fluting

The pulps are pressed and dried into paper rolls, and are characterized as linerboard reels or corrugating medium reels depending on its composition.

The corrugating medium is steam heated and folded to form the structural flutes. This is then adhered to a linerboard, forming a “single face” board.

The single face board is then attached to another liner, forming the single wall sheet board. Double wall or triple wall sheet boards are also formed, with 2 and 3 layers of corrugating medium respectively.

Conversion and production

The sheet boards are then cut, stacked or palletized, in preparation for the final stage. Sheet boards may also be sold directly to end-users.

During conversion, the sheet boards are printed and cut according to customer's specification. The outputs can be categorized into 2 categories: a) regular slotted boxes or b) die-cut boxes.

Regular slotted boxes are produced with an all-in-one printer, slotter, folder, and gluer machine.

Die-cut boxes have a more complex design and are made with a die-cutter.

Finished boxes are stacked, palletized, and ready to be delivered to customers.

7.5.2 Cartonboard

Raw materials processing

The raw materials for carton board are virgin fibers, recovered paper, and pulp.

Stock preparation

To make carton board, the raw materials are first dissolved into a dilute suspension of fiber and water.

The suspension is cleaned out of foreign contaminants before being fed into the carton board machine.

Production

The suspension is placed onto a moving wire mesh to form a thin layer of fiber. As the mesh moves, water is drained to help set the fiber sheet.

The sheets are combined according to the desired grammage, thickness, and composition. These are further dehydrated by running them through large rollers and steam-heated cylinders.

Once the right moisture content is achieved, the board is coated with clay and chalk. This step improves visual appearance and smoothness to enable high quality printing on its surface.

Finishing

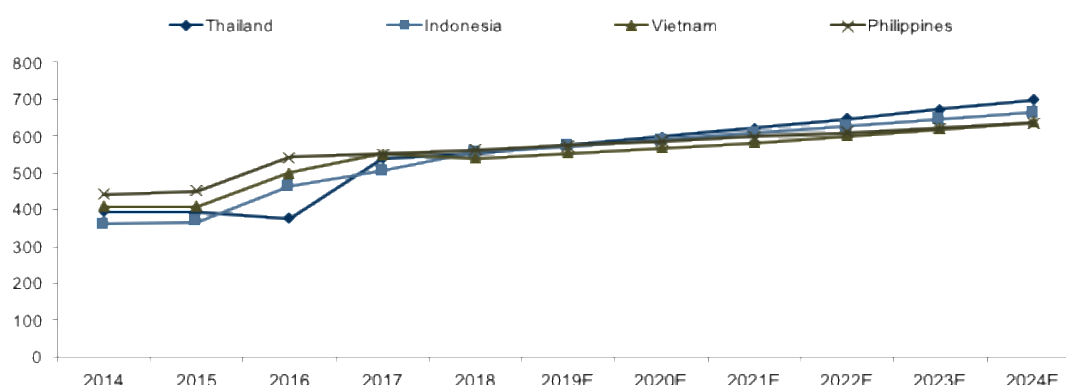
At the finishing stage, the boards are cut according to customer’s specifications. Depending on the end-user, boards are sold as sheets, or as small reels that can be fed into printers at the customer’s own sites.

7.6 ANALYSIS OF SOUTHEAST ASIA’S CORRUGATING PACKAGING MARKET

7.6.1 Price of Containerboard in Southeast Asia

Containerboard prices (average of linerboard, sheetboard, and corrugating medium prices) increased in 2016-2017, largely due to the decline in Chinese containerboard production. Moving into 2019, prices are likely to steady as the market adjusted. Looking ahead, containerboard price is estimated to grow between 2-4%, as supply aligns with demand with expansion of several plants in Southeast Asia.

Chart 7-2: Price of Containerboard, USD per metric ton, 2014-2024E

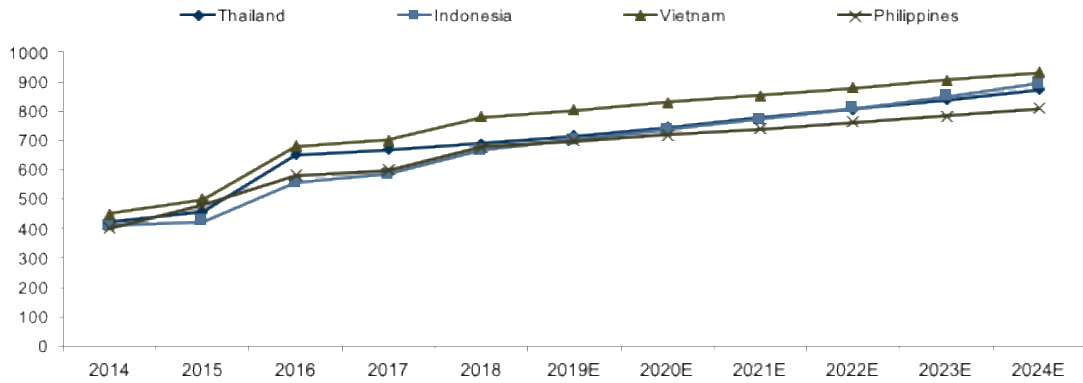


Source: Frost & Sullivan

7.6.2 Price of Cartonboard in Southeast Asia

According to RISI, the cartonboard demand from Southeast Asia and India remained strong in 2018, despite a 6% decline in China’s demand. Decline in prices is muted owing to a reduction in supply, thus prices remained on the upward trend. Moving forward, demand from China is expected to rebound in 2020 with continuing positive trend in consumption in the Southeast Asian domestic market.

Chart 7-3: Price of Carton board, USD per metric ton, 2014-2024E

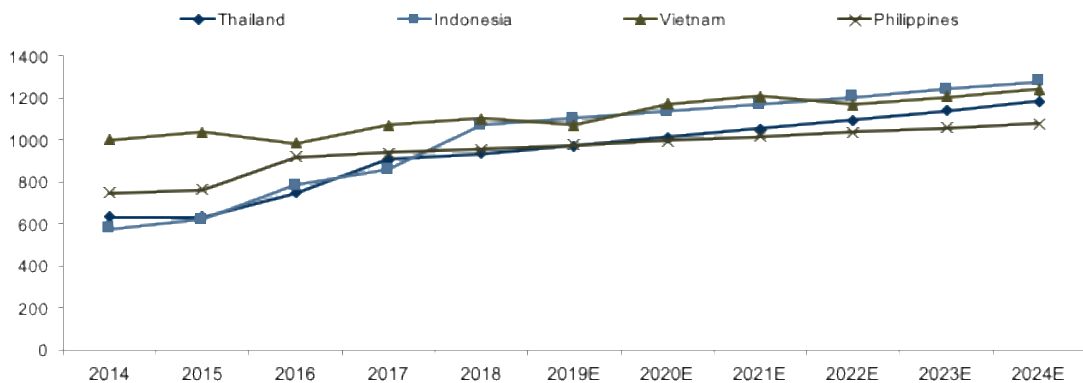


Source: Frost & Sullivan

7.6.3 Price of Corrugated Containers in Southeast Asia

Corrugated containers continue to be in high demand in Southeast Asia with the growth of E-commerce and retail consumption. Rise in raw materials, fuel and logistics throughout 2016-2017 were key factors for the price increase of the corrugated containers. Costs of liner and corrugating medium constitute approximately 45% and 36%, respectively.

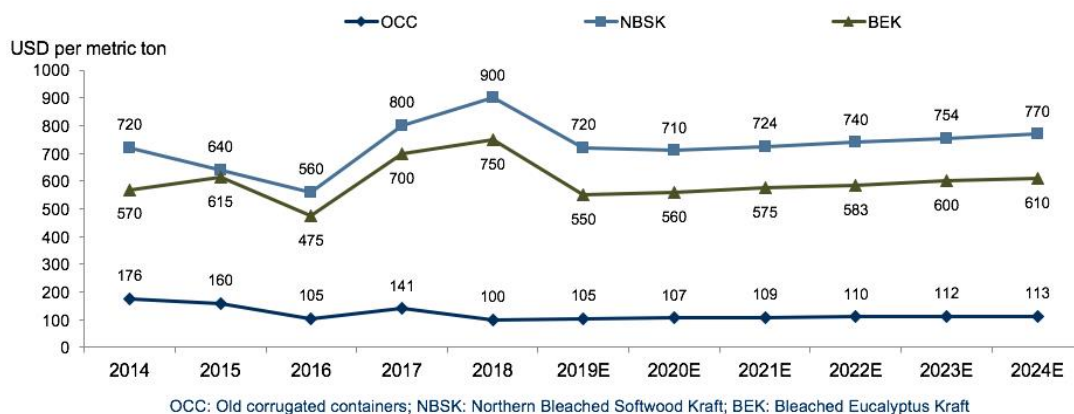
Chart 7-4: Price of Corrugated Containers, USD per metric ton, 2014-2024E



Source: Frost & Sullivan

7.6.4 Cost of Materials for Paper Packaging

Chart 7-5: Cost of Materials, Paper Packaging, USD per metric ton, 2014-2024E



Source: Frost & Sullivan

NBSK and BEK prices are frequently used as a benchmark in the pulp and paper industry to reflect the fluctuations in the global market. All prices shown are estimated for delivery to Asia. NBSK and BEK pulp are mixed with recovered paper pulp to strengthen the material prior to conversion into containerboard and cartonboard. Prices declined in 2016 due to a slowdown in China’s economy, but climbed back in throughout 2017 and 2018 as China’s ban on RCP imports places pressure on pulp availability.

According to SCG Packaging, the cost for recovered paper (including OCC) constitutes between 45-60% of the total variable cost, while imported pulp represents 1-5%.

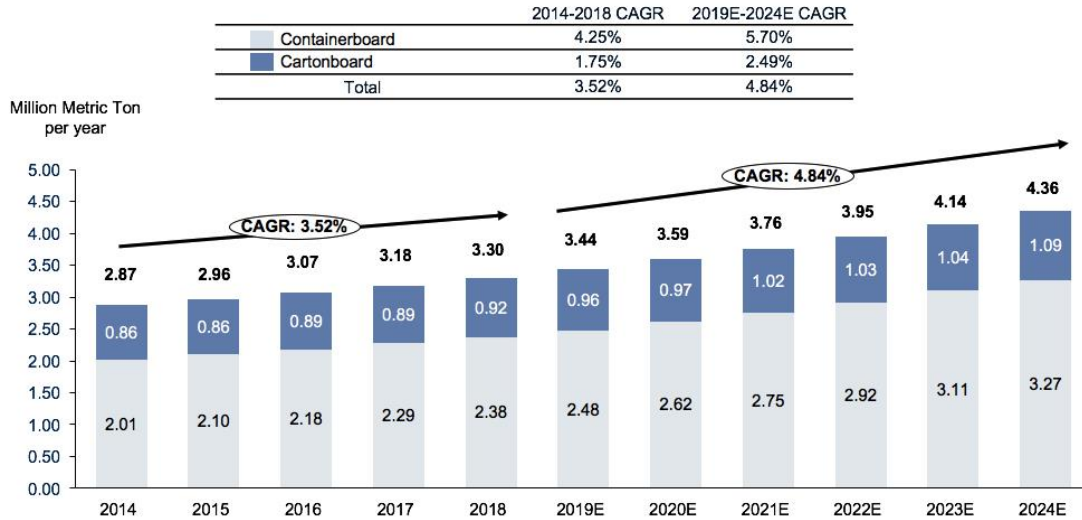
7.7 OVERVIEW OF SOUTHEAST ASIA’S CORRUGATED PACKAGING MARKET

7.7.1 Market Size by Consumption Volume

7.7.1.1 Thailand

Thailand’s per capita consumption of containerboard and carton board packaging is one of the highest in the region. Steady increase in household spending and demand for conveniently packaged food & beverage products will ensure a healthy growth throughout 2024.

Chart 7-6: Consumption Volume of Containerboard and Carton board Packaging, Thailand, 2014-2024E

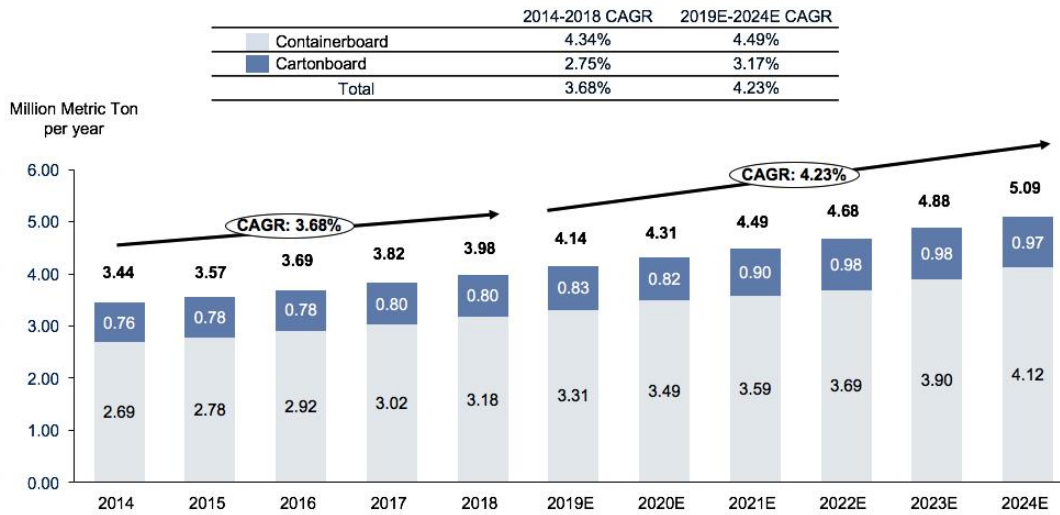


Source: Frost & Sullivan

7.7.1.2 Indonesia

Indonesia’s paper packaging consumption is set to increase by 4.23%, supported by a healthy demand for corrugated packaging, driven by growth of consumption, industrial manufacturing, and E-commerce.

Chart 7-7: Consumption Volume of Containerboard and Carton board Packaging, Indonesia, 2014-2024E

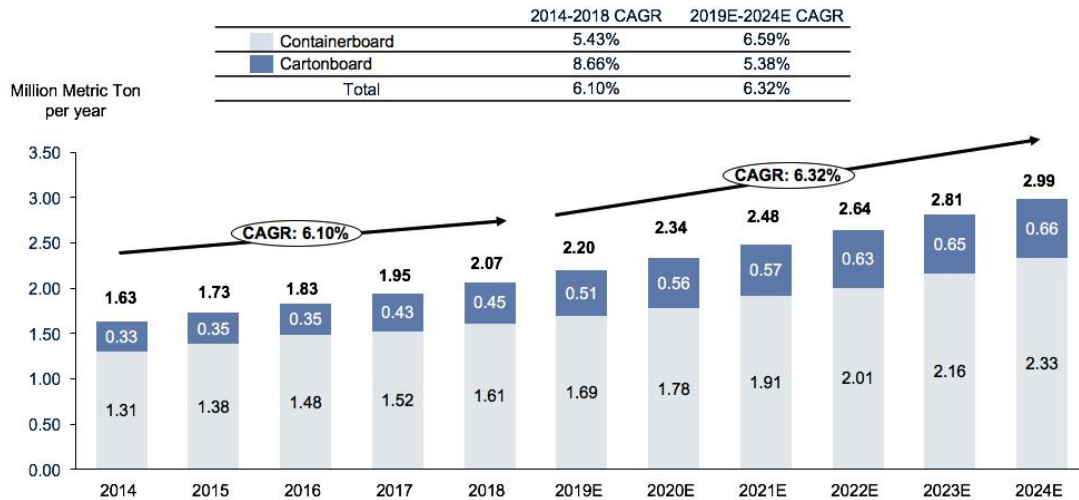


Source: Frost & Sullivan

7.7.1.3 Vietnam

Vietnam’s consumption of paper packaging at 20kg per capita (2018) is still low compared to its regional counterparts, with huge opportunity for growth as it reaches middle income status. Several manufacturing companies, including Samsung and LG, are set to expand in Vietnam in the near future, supporting the growth of demand for corrugated packaging.

Chart 7-8: Consumption Volume of Containerboard and Carton board Packaging, Vietnam, 2014-2024E

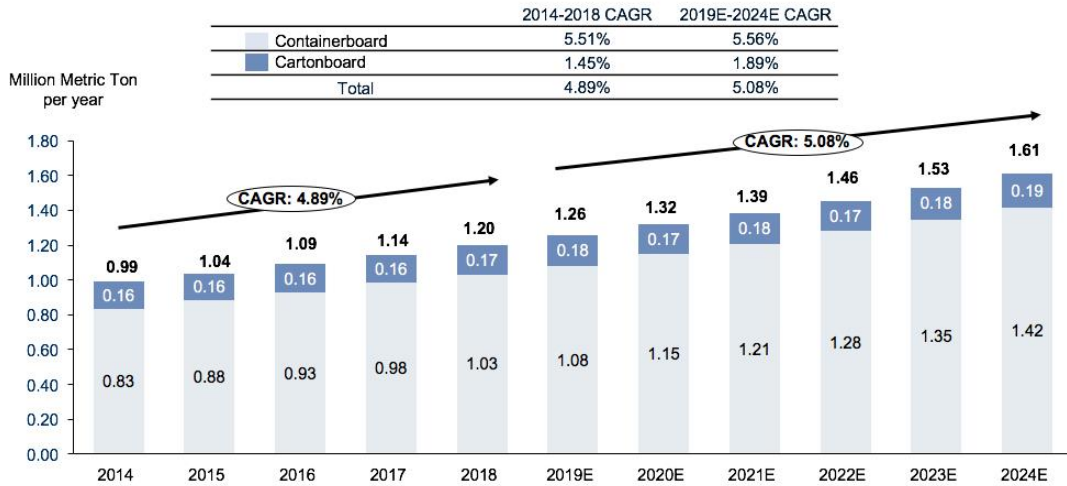


Source: Frost & Sullivan

7.7.1.4 Philippines

Philippines per capita consumption of paper packaging products is lower than most of its regional counterparts, however it is projected to increase by a CAGR of 5.08% during the forecast period in the backdrop of favorable socioeconomic prospects, increasing export sales of electronics, fresh produce, and clothing, as well as strong domestic demands of packaged food, appliances, and consumer goods.

Chart 7-9: Consumption Volume of Containerboard and Carton board Packaging, Philippines, 2014-2024E



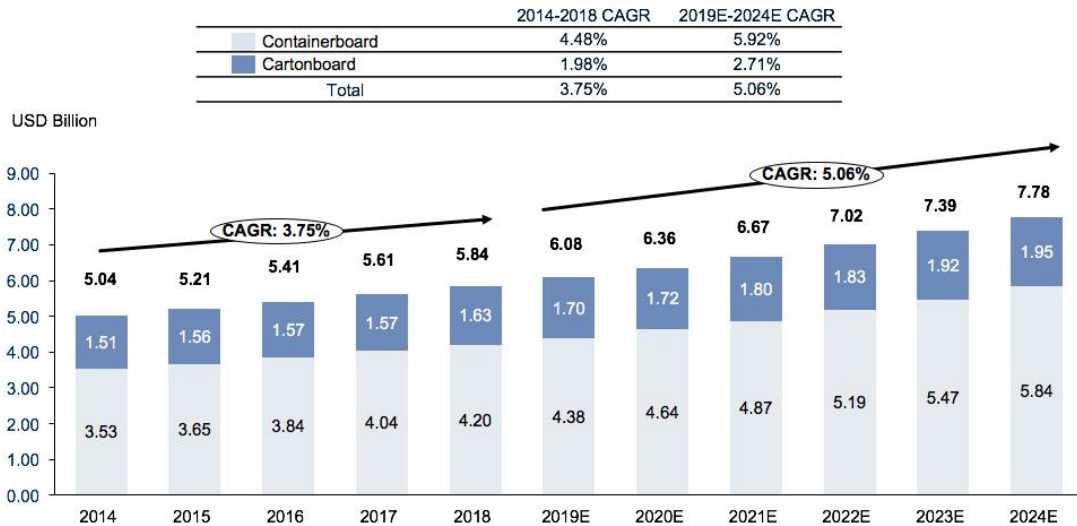
Source: Frost & Sullivan

7.7.2 Market Size by Sales Revenue

7.7.2.1 Thailand

Thailand's containerboard and carton board packaging market is valued at USD 5.84 billion in 2018, and is forecasted to grow by 5.06% during the forecast period, reaching USD 7.78 billion in 2024.

Chart 7-10: Sales Revenue of Containerboard and Carton board Packaging, Thailand, 2014-2024E



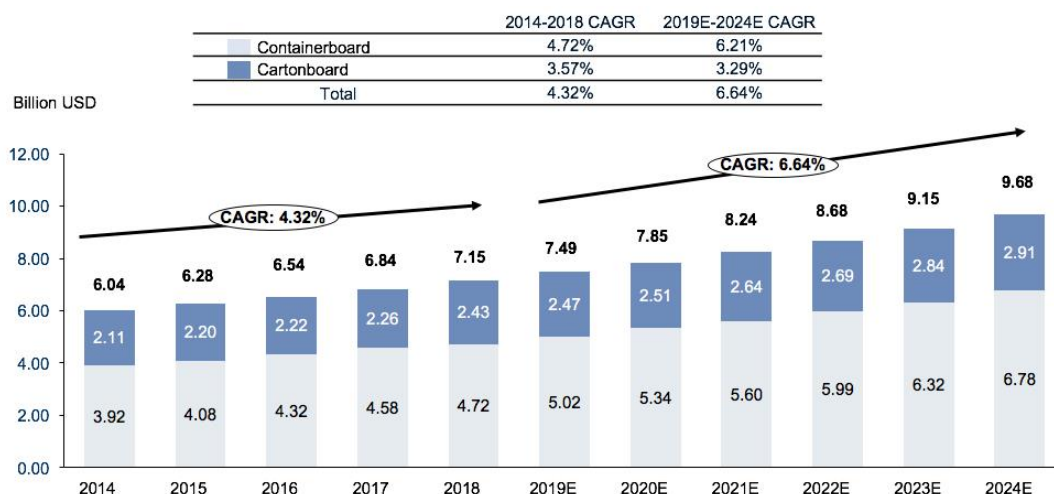
Source: Frost & Sullivan

7.7.2.2 Indonesia

Indonesia has been able to meet domestic and international demand with containerboard sales growing

steadily as it has good accessibility to waste paper and old corrugated containers (OCC) for feedstock. Sales growth is expected to remain positive in the forecast period at a CAGR of 6.64%, as demand continues to increase in line with capacity additions.

Chart 7-11: Sales Revenue of Containerboard and Carton board Packaging, Indonesia, 2014-2024E

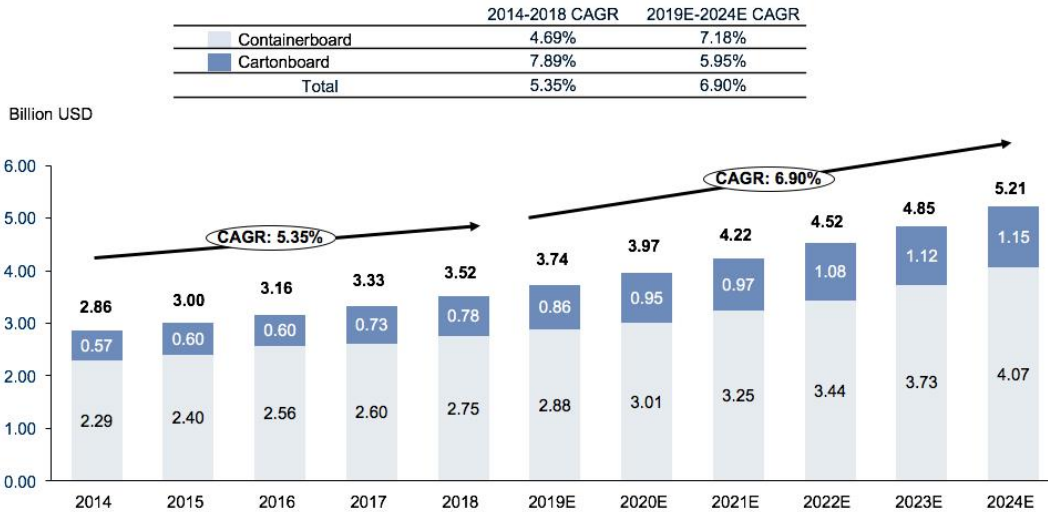


Source: Frost & Sullivan

7.7.2.3 Vietnam

As Vietnam's socioeconomic status continue to progress, the expanding middle class population and higher spending power will drive demand for paper packaging by a CAGR of 6.90% during the forecast period.

Chart 7-12: Sales Revenue of Containerboard and Carton board Packaging, Vietnam, 2014-2024E



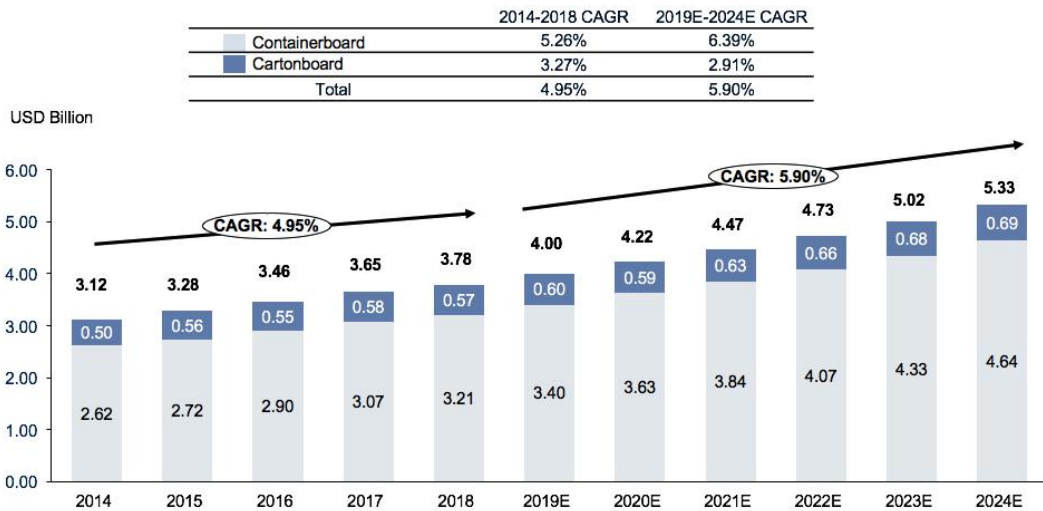
Source: Frost & Sullivan

7.7.3 Market Size by Production Volume

7.7.3.1 Thailand

In Thailand, containerboard production constitutes 85-87% of the production volume of paper packaging. Production capacity was added in 2017-2018 following strong domestic and regional demand.

Chart 7-13: Production Volume of Containerboard and Cartonboard Packaging, Thailand, 2014-2024E

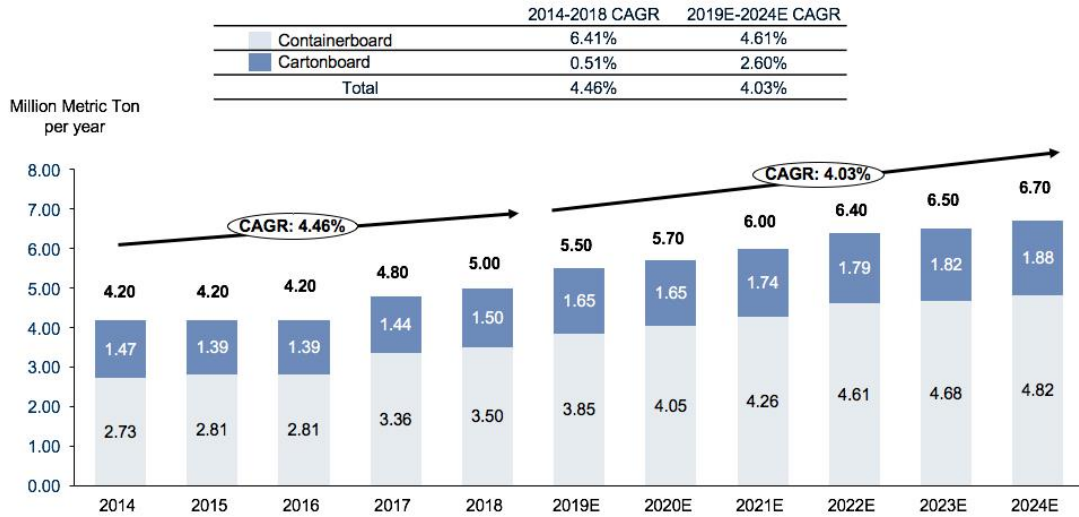


Source: Frost & Sullivan

7.7.3.2 Indonesia

Corrugated packaging production in Indonesia has seen steady increase in volume, with several more expansions being planned to meet the region’s strong demand.

Chart 7-14: Production Volume of Containerboard and Cartonboard Packaging, Indonesia, 2014-2024E

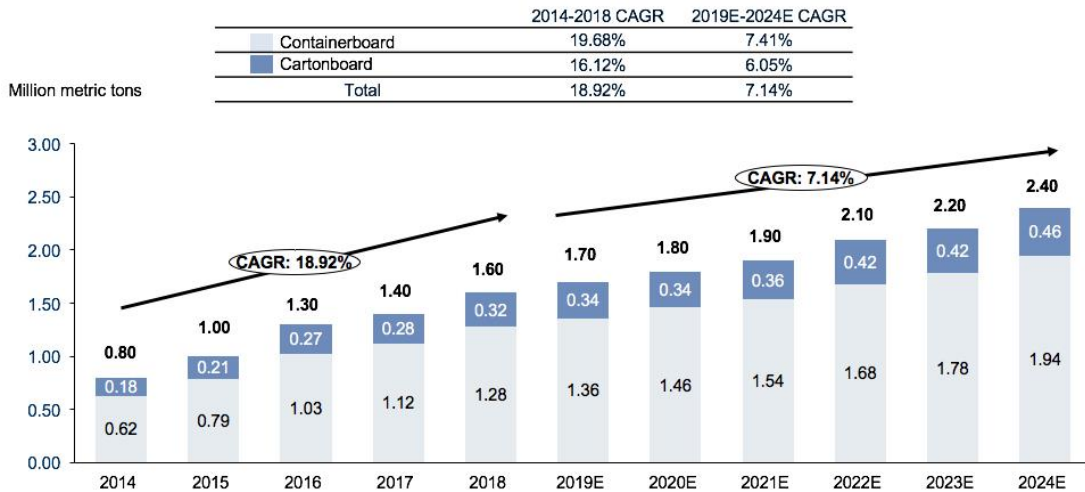


Source: Frost & Sullivan

7.7.3.3 Vietnam

Vietnam has seen considerable investments in the packaging industry by domestic and foreign players. In addition to capacity additions, the investments have also focused on upgrading existing equipment to boost productivity in order to meet the increasing demand for corrugated packaging by the consumer goods industry.

Chart 7-15: Production Volume of Containerboard and Cartonboard Packaging, Vietnam, 2014-2024E

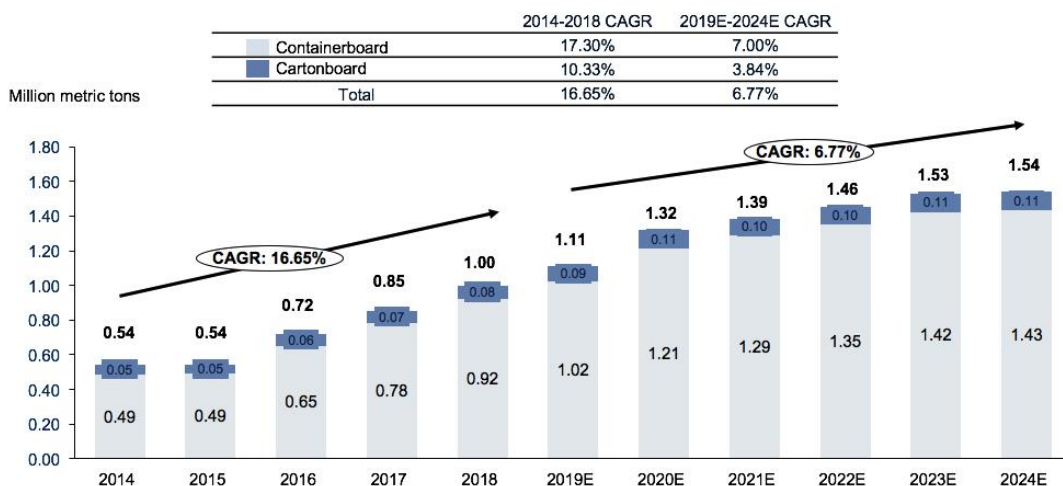


Source: Frost & Sullivan

7.7.3.4 Philippines

According to FAO, 80-90% of the paper packaging produced in Philippines are containerboard. Philippines does not produce virgin pulp, and is highly reliant on imported pulp and recycled paper which are subject to price volatility. However, strong support from the government in terms of improving infrastructure and providing training programs for the workforce should contribute to a positive growth during the forecast period.

Chart 7-16: Production Volume of Containerboard and Cartonboard Packaging, Philippines, 2014-2024E



Source: Frost & Sullivan

7.7.4 Market Drivers of Corrugated Packaging by End Use

7.7.4.1 Food & Beverage

Increasing demand for packaged food

Demand for corrugated packaging will remain healthy in the next 5 years. Globally, consumption of corrugated packaging will amount to 133 million tonnes in 2024, with 30% fulfilled by processed food and 10% by fresh produce.

Pressure to replace single use plastic

While packaged food continues to expand to meet the demand of the growing population, consumers and regulators are becoming wary of the amount of packaging waste, particularly from single-use plastics.

Given the higher recyclability of corrugated board packaging and the pressure from lawmakers to shift away from single use plastics, paper packaging will see a boost in demand in the next 5 years.

7.7.4.2 Electronics

Fast product cycle

Consumer electronics sector will continue to enjoy dynamic growth. As new products are continuously produced for the market, so does the need for custom packaging solutions.

Demand for ultra-compact packaging

One of the focus for electronics manufacturers have been to reduce packaging material without affecting its durability and efficiency.

This has stimulated the demand for ultra-compact, lightweight packaging for personal electronics i.e. smartphones, tablets, and laptops.

7.7.4.3 Personal Care

Growth of middle class and increase in discretionary spending

Personal care constitutes 33% of the packaging market in Asia in 2013, and is expected to amount to \$13 billion in 2024. As disposable income grows in the emerging economies of Southeast Asia, so too will discretionary spending in the personal and cosmetics care sector. This sector has seen a healthy rebound since the 2009 financial crisis which has seen a decline in spending for non-essential items.

Digital marketplace propelling the growth of cosmetic brands

Social media and smartphone usage is high in Southeast Asia, and has propelled the explosion of E-commerce.

In addition to traditional e-shops, social commerce (shopping via social media platforms e.g. Instagram and Facebook) is highly popular in the region and is especially effective for personal and cosmetics care. Indeed, 51% of shoppers in Thailand have purchased an item through a social media platform, making it the largest social commerce market in the world.

The digital marketplace provides the perfect avenue for homegrown, independent brands to expand their reach. Legacy and multinational brands also benefit from integrating social commerce to their marketing strategies.

7.7.5 Market Restraints of Corrugated Packaging

While paper is considered to be more sustainable than plastics, it is also more expensive as a packaging material, not to mention its lower durability and mechanical resistance when compared to plastics. However, it is completely recyclable and can be re-used once again in the paper packaging process. At the same time, the scarcity of virgin fibers for paper production, renewed focus on forest preservation and timber plantations, has also affected the supply of woodchips and pulp, the two key raw materials for paper production.

Southeast Asia is also an exporter of paper packaging solutions such as corrugated packaging and containerboards. Declining demand from China could be a key challenge for paper packaging manufacturers who rely on exports of these products to China. China's demand for containerboard fell by 3% in 2018, although the rest of Asia enjoyed a 3.8% increase. This reduction may be caused by an economic slowdown and preference for plastic packaging in certain sectors. Demand will remain sluggish in the short term, but a correction is expected within the next 5 years as the Chinese government takes action to stimulate the economy.

Exports to other destinations such as the United States could also be affected as personal consumption expenditure is projected to grow at 2.4%, a relatively slow increase compared to the decade prior to the recession. This may impact demand for consumer goods and in turn, packaging products, particularly for the export-reliant countries.

7.8 BARRIERS TO ENTER TO THE SOUTHEAST ASIA CORRUGATED PACKAGING MARKET

The barriers to entry for new players in the corrugated packaging market is considered to be quite challenging, as the competitive landscape is dominated by medium to large companies with strong bargaining power and established pathways to upstream suppliers and downstream distributors, making it difficult for new entrants. In certain countries such as Thailand and Indonesia, the containerboard market is highly consolidated with the top 5 to 6 players accounting for 82.8% and 86.0% market share respectively, in 2018. Furthermore, vertical integration provides significant cost advantage to the larger players, particularly as price for feedstock can be volatile and significantly impact profit margins.

Below are the several key challenges faced by the players in the corrugated packaging market:

High Capital Requirement

Barrier to Entry: high

The requirement of relatively high amounts of investments or capital for new state of the art box plants with large capacity, with the ability to leverage proximity to end users and economies of scale is an additional challenge for new players. Access to RCP is another key criteria that must be taken into consideration for new entrants.

Vertical Integration Confers Significant Advantage

Barrier to Entry: high

At the same time, a company in the paper packaging business has the potential to gain a strong market share and have healthy margins, provided it is vertically integrated. Paper packaging companies that are vertically integrated span the entire length of the value chain - from plantations to sale of packaging solutions. Hence, a new entrant will find it tough to compete in a market that is not only consolidated but relies on vertical integration for generating healthy profit margins. Vertical integration provides significant advantages from a business security perspective, with pricing stability and product differentiation being provided to downstream part of the value chain, and raw material security and substrate innovation for the upstream segment of the value chain.

High Operating Expenditure

Barrier to Entry: high

The operating expenditures for efficiently running corrugating plants is also high owing to high water and energy requirements, which again implies the need for strong lines of credit, working capital and cash.

Non-proprietary Processes

Barrier to Entry: low

The manufacturing techniques for corrugated packaging are not protected; this poses a low barrier for new entrants.

Recent innovations in packaging are mainly value added attributes such as printable electronics, intelligent packaging, and active packaging. While these innovations will provide significant improvements in consumer experience and supply chain efficiency, they do not change the fundamental processes that are already in use by established players.

Reliability of Packaging Suppliers

Barrier to Entry: High

From a customer perspective, reliability of packaging suppliers is one of the key factors considered while selecting a packaging solutions vendor. While packaging accounts for a relatively small percentage (2% to 3%) of the total product cost, any disruptions in supplies of packaging materials can have a big impact on production schedules of F&B, FMCG and other products, which ultimately leads to drop in efficiency and margins of these companies. Hence, considering the high switching cost, when a customer or end user selects a packaging supplier with a high degree of supply reliability, adherence to quality as well as delivery schedules, a long term relationship between the two is formed. Proximity to customers and strong collaborative efforts to innovate in terms of design, printability and product diversity are equally important loyalty factors. This leads to a relatively high degree of loyalty to existing suppliers and also lowers the propensity to switch between suppliers.

7.9 PAPER PACKAGING (CONTAINERBOARD) MARKET SHARE ANALYSIS

Paper Packaging (Containerboard) Market Share Analysis - Thailand

SCG Packaging has the largest market share in Thailand, in terms of sales volume in 2018, for paper packaging (containerboard), with a market share of 47.6%, and had sales volumes of approximately 1.12 million MT in 2018.

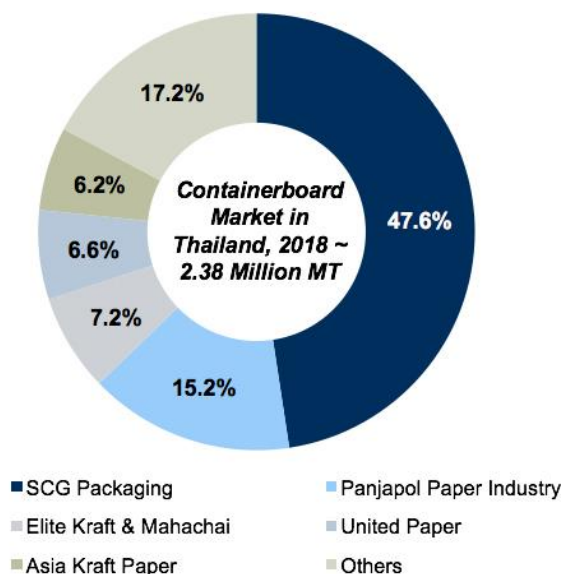
The company's long standing presence in the market coupled with its strong manufacturing & supply chain base in the country makes it one of the most preferred companies for end users to work with in Thailand.

The Hiang Seng + Panjapol Paper Industry group accounted for close to 353,000 MT of sales volume in 2018 across Thailand and is a distant second in terms of competition with respect to SCG Packaging.

The other three key players in the market accounted for a combined share of 20% and have a fragmented consumer base and can be considered to be opportunistic in nature.

SCG Packaging is expected to continue its dominance of the paper packaging market in Thailand and has a roadmap for gaining a significantly larger market share over the next three to five years, through product innovation as well as a combination of organic & inorganic expansion.

Chart 7-17: Paper Packaging (Containerboard) Market Share by Sales Volume (MT), 2018, Thailand



Source: Frost & Sullivan

Paper Packaging (Containerboard) Market Share Analysis - Indonesia

In Indonesia, SCG Packaging has a market share of 28.0% following its acquisition of Fajar, the second largest packaging paper manufacturer in Indonesia in terms of sales volume in 2018. It is in close competition with the PT Sinar Mas Group, which has the largest market share for paper packaging (containerboards) in the country.

Sinar Mas focuses extensively on the export market to Southeast Asia, China and Far East Asia with specific grades of containerboards developed solely for this purpose.

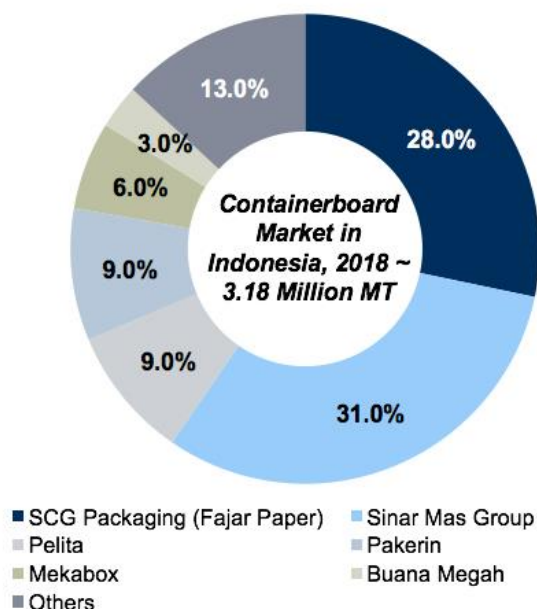
SCG Packaging has a total capacity of 1.4 million MT per year of paper packaging capacity in Indonesia with a total of 6 paper machines.

The containerboard market in Indonesia is less consolidated as compared to the market in Thailand with the top 6 companies accounting for close 87% of the market share.

While Sinar Mas had volumes of close to 1 million MT in 2018, SCG Packaging had sales volumes of containerboards of approximately 885,000 MT.

The other companies in the country have much smaller capacities and have a smaller network across Indonesia as compared to Sinar Mas Group and SCG Packaging.

Chart 7-18: Paper Packaging (Containerboard) Market Share by Sales Volume (MT), 2018,



Indonesia

Source: Frost & Sullivan

Paper Packaging (Containerboard) Market Share Analysis - Vietnam

SCG Packaging with a market share of 25.0% is the largest containerboard company in Vietnam and accounts for approximately 407,500 MT in sales volume.

The market for containerboard packaging is a mix between consolidation and fragmentation in Vietnam, with the top 5 companies accounting for close to 61.0% of the total market.

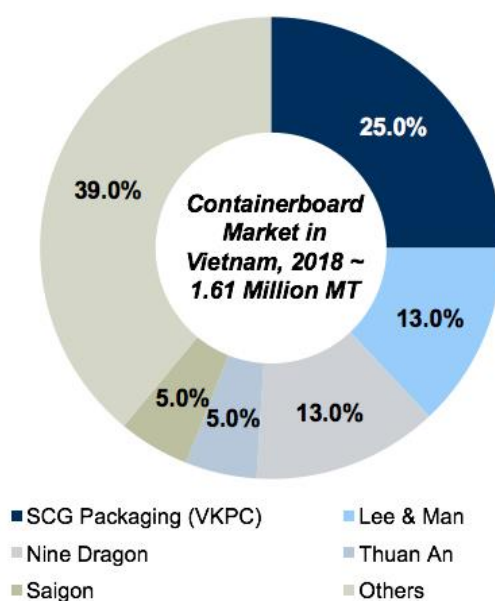
Chinese companies such as Lee & Man and Nine Dragon are establishing themselves in Vietnam, for both domestic and export markets

Since China has stringent policies surrounding the felling of trees for pulp & paper products, neighbouring Vietnam is an ideal location for manufacturers to produce containerboards and other paper packaging goods and ship it to Mainland China at very nominal costs.

These two Chinese companies had sales volumes of 218,000 MT and 216,000 MT respectively in 2018.

The highly fragmented segment which accounts for 39% of the market share consists of small & medium sized mills and companies which are opportunistic in nature and lag in terms of technology in comparison to SCG Packaging and the Chinese brands.

Chart 7-19: Paper Packaging (Containerboard) Market Share by Sales Volume (MT), 2018, Vietnam



Source: Frost & Sullivan

Paper Packaging (Containerboard) Market Share Analysis – Philippines

The paper packaging market for containerboards is highly fragmented in the Philippines with SCG Packaging being the single largest player with the highest production capacity in the country (25.0%).

SCG Packaging is also the most sophisticated player in the market with a high degree of importance given to production efficiency and technology.

The Philippines is a net importer of containerboards for end use industries such as Food Packaging, Electronics, Toys, FMCG and others.

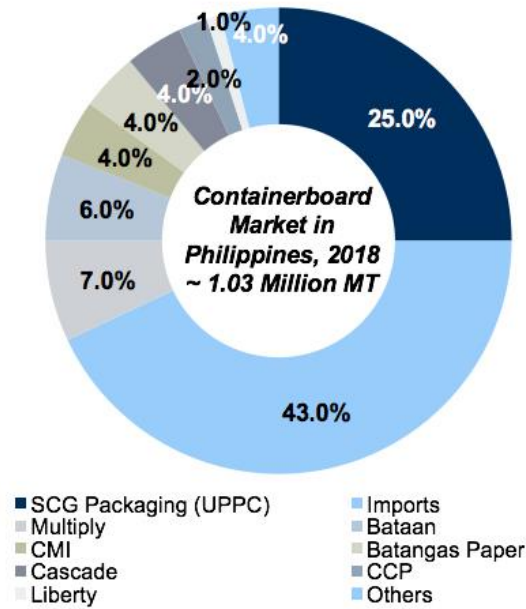
In 2018, the net imports of containerboards were approximately 438,000 MT.

There are several small & medium containerboard companies which have limited production capacity and outdated technology for manufacturing high quality containerboards.

These companies cater to smaller end users as compared to SCG Packaging and tend to have cyclical business orders.

The fragmentation of the market arises owing to the spread of the end users across various islands of the Philippines, which leads to smaller companies wary of supply chain costs and logistical challenges.

Chart 7-20: Paper Packaging (Containerboard) Market Share by Sales Volume (MT), 2018,



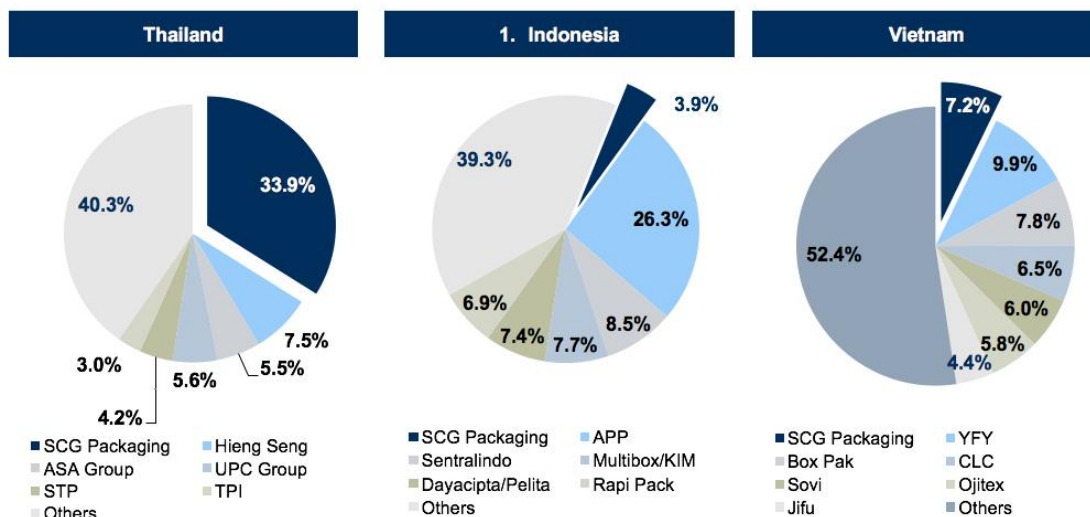
Philippines

Source: Frost & Sullivan

Paper Packaging (Corrugated Container) Market Share Analysis

Within the corrugated container segment, SCG Packaging holds the largest market share in Thailand, in term of sales volume in 2018, with 33.9% of the market. In Indonesia, SCG Packaging currently holds 3.9% following its acquisition of Fajar. In Vietnam, SCG Packaging holds the third largest market share of 7.2% in a highly fragmented market. Overall, SCG Packaging’s presence across the key markets in ASEAN for corrugates containers, makes it the leader in terms of market share followed by APP and others.

Chart 7-21: Market Share Analysis by Sales Volume, Corrugated Containers, Thailand, Indonesia and Vietnam, 2018



Source: Frost & Sullivan

7.10 POLICY AND REGULATION OF CORRUGATED PACKAGING IN SOUTHEAST ASIA

7.10.1 Thailand

Policies and Regulations: 《International Standards for Packaging (ISO TC122)》

Execution Year: 2015

Issuing Department: Thailand Industrial Standards Institute

Main Content and Emphasis:

- Thailand follows the international packaging guidelines set by ISO.
- The ISO TC (Technical Committee) is responsible for developing and updating the international standards for packaging, covering aspects of food safety, dangerous goods, and waste regulations.
- Other relevant standards for packaging are covered by the following TCs:
 - TC 261 – Additive manufacturing
 - TC 6 – Paper, pulp and board
 - TC 52 – Light metal containers
 - TC 104 – Freight containers

7.10.2 Indonesia

Policies and Regulations: 《Government Regulation (PP) No. 57/2016 Protection and Management of Peatland Ecosystems》

Execution Year: 2016

Issuing Department: President of the Republic of Indonesia

Main Content and Emphasis:

- The regulation affects the supply of raw materials for the paper and pulp industry.
- Regulations apply to industrial forests and plantations that overlap the peatlands. It includes expansion of protected areas, stricter criteria for water management, and illegalization of peat forest burning under any circumstances.

Policies and Regulations: 《Draft Decree: Mandatory Implementation of Indonesian National Standard (SNI) for Paper and Paperboard for Food Packaging》

Execution Year: 2020 (upon approval)

Issuing Department: Directorate of Forestry and Plantation Product Industries, Minister of Industry

Main Content and Emphasis:

- The draft decree stipulates that all paper and paperboard food packaging will need to comply to the Indonesian National Standard, as detailed in SNI 8218:2015.
- It applies to paper products, packaging materials and accessories, and any material in contact with food stuff; whether made locally or imported into Indonesia.
- The draft was announced and opened for comments in April 2018. If approved, it would become effective in 2020.

7.10.3 Vietnam

Policies and Regulations: 《Vietnam Food Administration’s (VFA) Decree on the Provision on Civil Penalties for Food Safety Violations [(115/2018/ND-CP)]》

Execution Year: Oct 2018

Issuing Department: Vietnam Food Administration

Main Content and Emphasis:

- This decree “specifies various fines, including those for the production of unsafe food contact packaging, implements and containers.”
- Compared to the previous Decree 178/2013/ND-CP that is being replaced now, fines for certain actions have increased by 3.5 times.
- A fine of up to 7 times the value of the goods will also be levied.

- In addition to fines, “products deemed unsafe may also be recalled, confiscated, or destroyed”.

7.10.4 Philippines

Policies and Regulations: 《Food Safety Act of 2013》

Execution Year: 2013

Issuing Department: Food & Drug Administration, National Food Authority and Dept of Health

Main Content and Emphasis:

- Under the Food Safety Act of 2013, food in containers with any poisonous or deleterious substance is considered adulterated
- With respect to food packaging, the Food Safety Act of 2013 specifies that DOH is responsible for ensuring the safety of all food processing and product packaging activities
- For example, the Revised Guidelines on Current Good Manufacturing Practice in Manufacturing, Packing, Repacking, or Holding Food (Administrative Order No. 153), issued May 7, 2004, states, "There shall be appropriate quality control operations procedures to ensure that food is suitable for human consumption and that food-packaging materials are safe and suitable."

Policies and Regulations: 《BFAD Circular No. 2006-016》

Execution Year: 2006

Issuing Department: Philippines FDA

Main Content and Emphasis:

- Under BFAD Circular No. 2006-016 (Undated List of Food Additives), any food packaging material that "results or may reasonably be expected to result, or indirectly, in its becoming a component or otherwise affecting the characteristics of any food," and is safe under the conditions of its intended use, falls under the definition of a food additive.
- The Philippine FDA also has stated in correspondence to individual firms that the Agency recognizes clearances for food-contact substances in the U.S. and Japan.

8. ANALYSIS OF SOUTHEAST ASIA'S PLASTIC PACKAGING MARKET

8.1 GLOBAL TRENDS IN PLASTIC PACKAGING MARKET

Growth in Economy and Population

Factors reflecting the growth of the global economy and population, such as rising disposable income, increasing consumer expenditure and growing population, will promote consumer spending, including food and beverage products.

Thus, growth in the global economy and population is a major driver for the plastic packaging industry due to the increasing use of packaging, particularly in packaged foods, beverages, and personal care products.

Changes in Consumer Lifestyle and Behavior

The increase in number of single or smaller households, along with busier lifestyle, drives demand for smaller portion sizes, on-the-go purchases of food and beverage products, as well as more convenient and flexible packaging solutions such as longer shelf-life, small packages, lightweight, durable, re-sealable, microwaveable and readily dischargeable retail packaging.

Consumers are becoming more interested in their own health issues, resulting in healthier lifestyles. This therefore increases demand for packaged products such as healthy foods and drinks in addition to non-prescription drugs and nutritional supplements.

Consumers Becoming More Environmentally Conscious

However, a strong push from plastic suppliers, packaging companies, end users and consumers for a robust requirement of recycling facilities, waste management systems and infrastructure for a circular economy has prompted governments across Southeast Asia to frame policies that will support the plastics and plastics packaging industry. While the efficient implementation of these policies is to be seen, the regulatory framework is the first step towards making plastic packaging a more sustainable and environmentally friendly solution.

Furthermore, plastic packaging companies such as SCG Packaging are taking the lead in implementing circular economy practices and policies in their plastics division. Positive steps such as this, if taken by all plastic packaging companies in the region, will make plastics a more eco-friendly solution.

As consumers become increasingly conscious of the environment, concerns are growing specifically about plastic pollution. Consumer and stakeholder pressure forces the plastics industry, including plastic packaging manufacturers, to ensure sustainability and adopt practices that promote a more circular

economy.

Though a circular economy is preferred, biodegradable plastics have a place in applications for which recycling is difficult. This includes single-use plastics such as bottle caps. The leading candidates for growth in the biodegradable plastic industry are PHA (Polyhydroxyalkanoates) copolymers due to their faster degradation rates.

Rapid Increase in Global Bottled Water Market

Increasing health awareness among consumers, premium quality and taste of bottled water, easy portability and convenience of use, as well as wider availability of flavored and functional water will accelerate demand for bottled and packaged water.

Almost all bottled water and drinks (95.4%) are packaged in PET (Polyethylene terephthalate) plastic bottles, while glass bottles accounted only for 3.3%. Recent awareness about PET bottles harming the environment have led to the emergence of sustainable packaging solutions, which contributes to 1.3% to the market. These solutions are expected to rapidly increase over the next few years.

Increasing Need for Smart Packaging

Packaging and labels have become increasingly informative and interactive. Smart packaging has a tremendous potential to transform pharmaceutical as well as consumer goods industry. Manufacturers are required to monitor and keep track of materials to prevent counterfeit, stolen or contaminated drugs and goods. This innovative packaging will allow for more advanced automated logistics, ensure product quality and enhance the consumer experience, while helping the industries become more digitally enhanced and readily monitored.

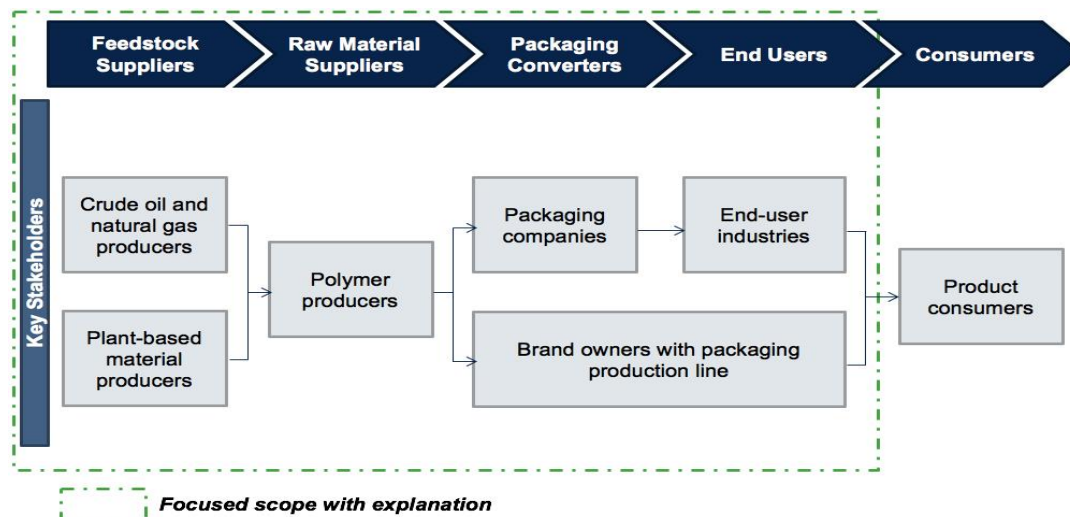
Innovations in Polymer Science

Innovations in polymer science have contributed to the invention of alternative materials for synthetic plastics. They are made out of natural polymeric materials which can readily biodegrade in oceans or at any conducive environment. Natural polymers can be classified into plant-based polymer derived out of various plant sources including straw fibers of wheat and maize, grass fibers of bamboo etc. and animal-based polymer gained from different animal sources such as wool, yarn, silk, milk, fungal- and algae-based materials.

8.2 OVERVIEW OF VALUE CHAIN OF PLASTIC PACKAGING

The plastic packaging value chain includes feedstock suppliers, raw material suppliers, packaging converters, end-users and consumers.

Figure 8-1



Source: United Nations Environment Programme, Frost & Sullivan

Feedstock Suppliers

The global value chain for plastics starts with the extraction of feedstocks for petro-based plastics or bio-based plastics manufacturing. At this point, the relevant stakeholders include producers of crude oil and natural gas, as well as farmers or manufacturers of crops.

For petro-based plastics production, due to the need to co-locate the fossil fuel and plastic production, a high degree of vertical integration is observed between the oil & gas and plastic industries. For instance, major oil and gas producing companies own plastic companies and vice versa. For example, ExxonMobil, the world’s largest investor-owned fossil fuel company, owns Exxon Chemical; and DowDuPont, the largest chemical company in the world, owns a hydrocarbon business.

Raw Material Suppliers

Raw materials refer to plastic resins and additives that are added to enhance the features of plastic packaging (e.g. UV stabilizers, processing aids, antioxidants, and anti-static agents).

Raw material suppliers mean polymer producers such as plastics and resins manufacturers, and film manufacturers who convert plastic resins into film sheets.

Packaging Converters

Plastic converters or packaging companies procure raw material from the suppliers to manufacture plastic semi-finished and finished products for a wide range of end-user industries, which includes food & beverage, homecare, lubricants, and cosmetics. For instance, RPC group procures raw material or polymer resin from individual polymer suppliers and converts them into final products.

In addition to being the end user of plastic packaging, brand owners who own the packaging production line can also act as a packaging converter.

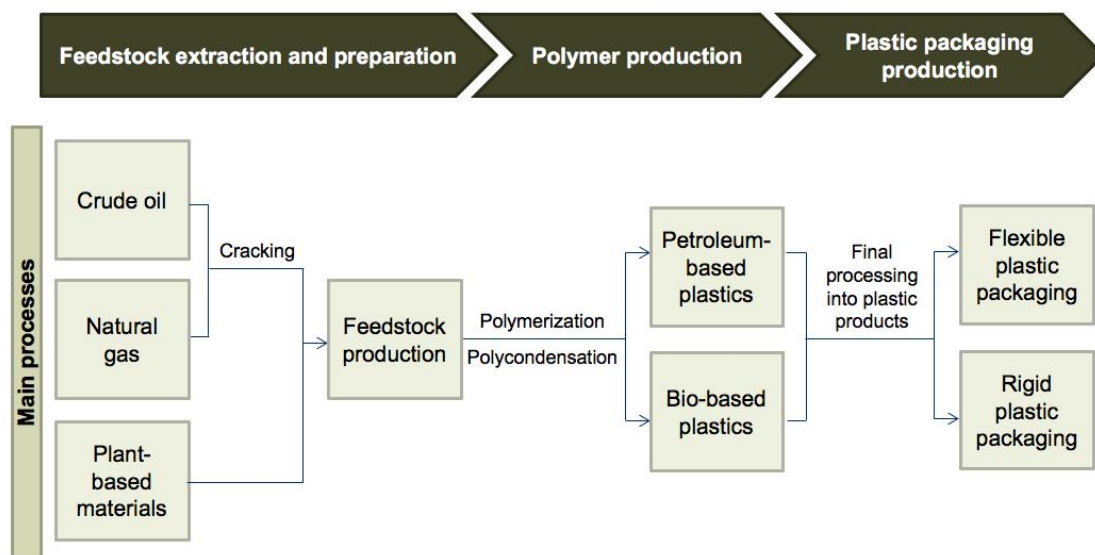
End Users

End users include end-user industries (which purchase packaging products through various distributors), brand owners, as well as the third-party service provider who packs the item as required by the brand owner on behalf of the supplier.

8.3 OVERVIEW OF PRODUCTION PROCESS OF PLASTIC PACKAGING

The production process of plastic of packaging includes three steps: feedstock extraction and preparation, polymer production, plastic packaging production.

Figure 8-2



Source: United Nations Environment Programme, Frost & Sullivan

Feedstock extraction and preparation

The large majority of plastics are synthesized from petrochemicals or natural gas, mostly because of the relatively low cost of these sources and the high scalability of petroleum-based sources.

Plant sources for the production of bioplastics include starch-rich plant materials (such as corn, potatoes, and rice), oil-rich plant materials (such as palm, soy, rapeseed, and castor oil), and cellulose-rich plant materials (such as sunflower stalks and sawdust).

Polymer production

Polymerization and polycondensation are two main processes used in plastics production. Monomers, such as ethylene and propylene, are connected together in a polymerization reactor to form long polymer chains. Each polymer has its own characteristics, composition, and size, depending on the different types of fundamental monomers used.

Bio-based plastics are produced from renewable biological resources in whole or in part. For instance, sugar cane is processed to produce ethylene, which can then be used in, for example, the production of polyethylene. Starch can be processed to produce lactic acid and subsequently polylactic acid (PLA).

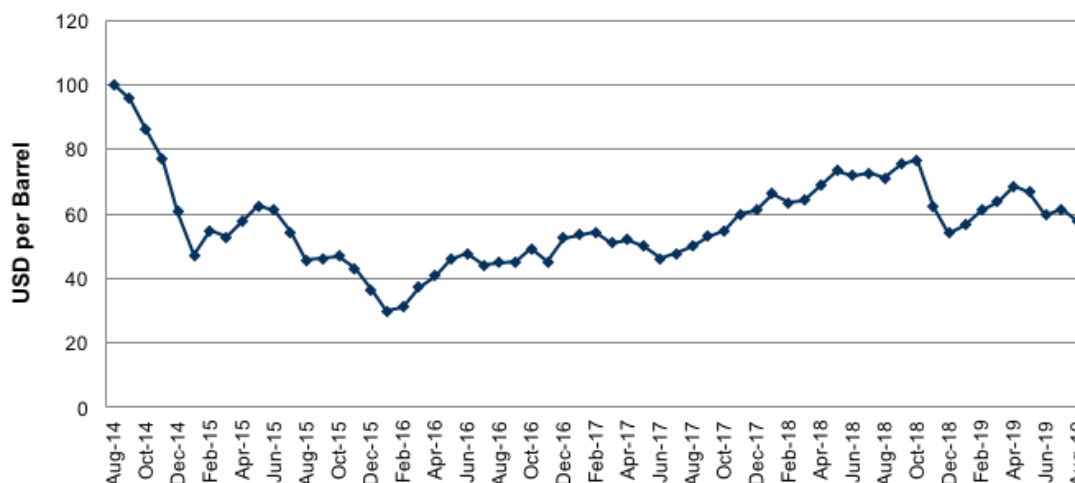
Plastic packaging production

There are various methods of processing used to convert polymers into finished plastic packaging products, such as **extrusion**, a basic step of plastic conversion process and generally used for melting and mixing plastics before forming; **injection molding**, a widely used manufacturing process for packaging items such as tubs, buckets, rigid tubes, screw caps, and closures; **blow molding**, a plastic molding process to create hollow and seamless objects; and **compression molding**, a high-volume, high-pressure plastic molding method that is preferred for molding high-strength objects.

8.4 ANALYSIS ON RAW MATERIAL SUPPLY OF PLASTIC PACKAGING MARKET

A decline in crude oil prices in the recent years has a beneficial effect on many stakeholders in the plastic packaging industry, as most plastics are derived from petroleum refining products.

Chart 8-1: Crude Oil Price, 2014-2019



Description: Crude oil, average spot price of Brent, Dubai and West Texas Intermediate, equally weighed

Source: World Bank, Frost & Sullivan

The most commonly used plastic polymers in the production of plastic packaging are Polypropylene (PP), Polyethylene (PE), Polyethylene Terephthalate (PET), and Polystyrene (PS).

Polypropylene (PP)

PP is used in a variety of applications, packaging being one of the important one. PP possess chemical properties such as chemical resistance and gas and moisture vapor barrier, which make it preferable for rigid packaging. Examples of applications include lunch boxes, yoghurt pots, prescription bottles, and plastic bottle caps.

Polyethylene (PE)

PE is broadly classified into HDPE (High Density Polyethylene), LDPE (Low Density Polyethylene), and LLDPE (Linear low-density polyethylene). HDPE is a low-cost material with an excellent balance between stiffness and toughness, making it the best choice for rigid packaging. LDPE and LLDPE are more flexible than HDPE and can be used in, for example, cling-film, squeezable bottles, food bags, and grocery bags.

Polyethylene Terephthalate (PET)

PET is clear, tough, and possess good gas and moisture barrier properties. The resin is commonly used in carbonated soft drinks bottles and many injection- molded containers and jars for cosmetics, toiletries, mineral water, refrigerated fruit juices, and foods. Thermoformed PET is used in clear trays and heat-resistant food containers.

Polystyrene (PS)

PS is hard and very brittle. This raw material is used for rigid packaging applications but is generally confined to thick, high-gloss, injection-molded components, which includes jar closures, lipstick applicator covers, and decorative screw caps. Other applications include disposable coffee cups, plastic food boxes, plastic cutlery, and packing foam.

Others

Other plastic polymers used in plastic packaging production include polyvinyl chloride (PVC), polyurethane (PUR), and bio-based plastics.

Bioplastic Materials

Bioplastics, referring to bio-based plastics, biodegradable plastics, or both bio-based and biodegradable plastics, have the same properties as conventional plastics.

According to European Bioplastics, bioplastics can be divided into 3 main groups: bio-based or partially bio-based plastics that are non-biodegradable such as bio-based PE, PP, or PET and bio-based technical performance polymers such as PTT or TPC-ET; plastics that are both bio-based and biodegradable, such as PLA, PHA, and PBS; and petroleum-based plastics that are biodegradable, such as PBAT and PCL.

PTT - Polytrimethylene Terephthalate

TPC-ET - Thermoplastic Polyester Elastomers

PLA - Polylactic Acid

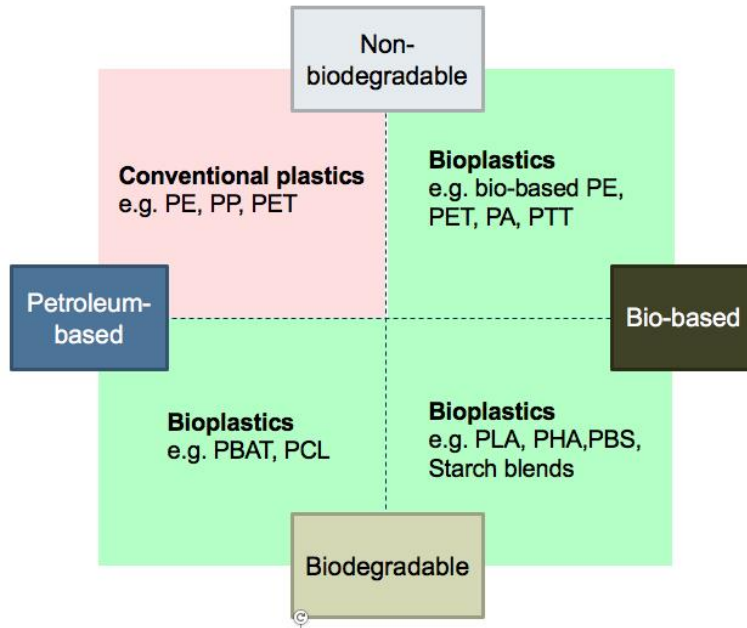
PHA - Polyhydroxyalkanoates

PBS - Polybutylene Succinate

PBAT - Polybutylene Adipate Terephthalate

PCL - Polycaprolactone

Figure 8-3



Source: European Bioplastics

Table 8-1: Distribution of Various Polymers Used in Certain Applications

Application / Polymer type	PET	LDPE, LLDPE	HDPE	PP	PS	PVC	PUR	Others	Bio-plastics
Packaging	100%	68%	57%	49%	30%	8%	2%	2%	58%
Transportation (excluding tyres)	0%	1%	5%	15%	0%	3%	19%	35%	7%
Building and construction	0%	6%	20%	7%	29%	69%	29%	12%	4%
Electrical/ Electronic	0%	3%	1%	5%	8%	3%	5%	7%	2%
Consumer & Institutional Products	0%	15%	10%	22%	24%	5%	12%	5%	7%
Industrial/ Machinery	0%	1%	1%	1%	0%	0%	4%	0%	0%
Others	0%	8%	6%	0%	9%	12%	30%	39%	22%

Source: United Nations Environment Programme, Geyer et al., European Bioplastics

PET - Polyethylene Terephthalate

LDPE - Low-Density Polyethylene

LLDPE - Linear Low-Density Polyethylene

HDPE - High-Density Polyethylene

PP - Polypropylene

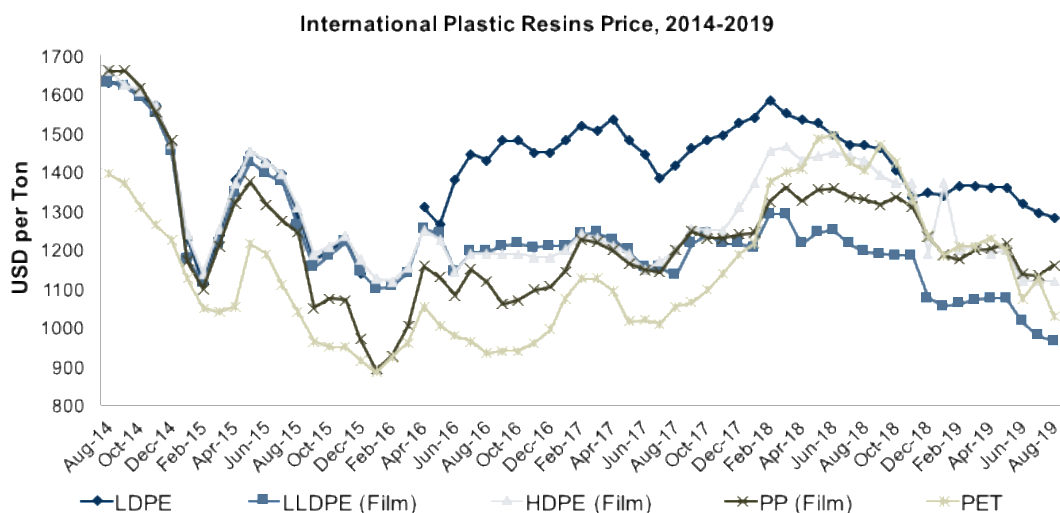
PS – Polystyrene

PVC - Polyvinyl Chloride

PUR – Polyurethane

Bio-plastics – Plastics that are bio-based, biodegradable, or both

Chart 8-2: International Plastic Resins Price, 2014-2019



Source: Plastic Intelligence Unit, Frost & Sullivan

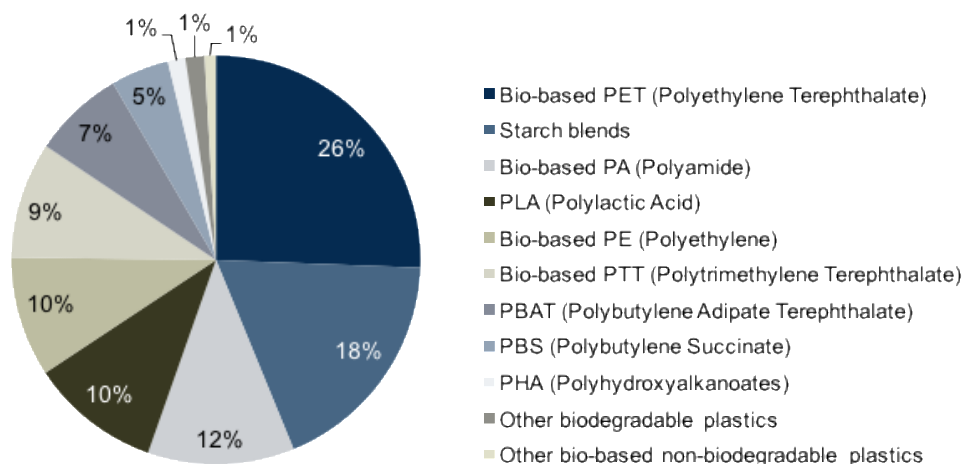
Prices of plastic resin are primarily influenced by the availability and production of oil and natural gas in a region.

In 2018, the average prices for LDPE, LLDPE, HDPE, PP, and PET were \$1,475.9, \$1,211.7, \$1,400.0, \$1,318.7, and \$1,389.0 per ton, respectively.

Bioplastics currently account for about 1% of the annual plastic production of around 335 million tons. However, this sector is expected to expand dramatically due to the increase in demand and the emergence of more advanced materials and products.

In 2018, the total production capacity of global bioplastics is 2.11 million tons, with bio-based PET being the most produced material (26%), followed by starch blends (18.2%) and bio-based PA (11.6%).

Chart 8-3: Global Production Capacities of Bioplastics, 2018



Source: European Bioplastics

8.5 MARKET SIZE BY REVENUE, PRODUCTION VOLUME, CONSUMPTION VOLUME AND TRENDS OF PLASTIC PACKAGING IN SOUTHEAST ASIA

Depending on the usage, plastic packaging can be categorized into flexible packaging and rigid packaging. Flexible packaging is primarily used in Food & Beverage packaging, industrial bags, consumer goods packaging and healthcare applications while rigid packaging is also used in the food & beverage industry, especially dairy products and ice-creams as well as other applications such as consumer & industrial goods

Table 8-2: Flexible versus Rigid Plastic Packaging Comparisons

Parameter	Flexible Plastic Packaging	Rigid Plastic Packaging
Materials Used	PVC, PE, PP	PVC, PE, PP
Advantages	Less Space, Easier to Transport	Resilient and durable
Weight	Lighter as compared to rigid plastics	Heavier
Durability	Less prone to dents and deformation	Prone to deformation
Disadvantages	Could be crushed, punctured	Heavier and takes up space during transportation

Printability	Easy	Extra Printed Layer is required
Customization	Easily Customizable	Comparatively difficult
Protection	Minimal protection from stress or pressure, Good shielding properties	Excellent protection from damage or spilling

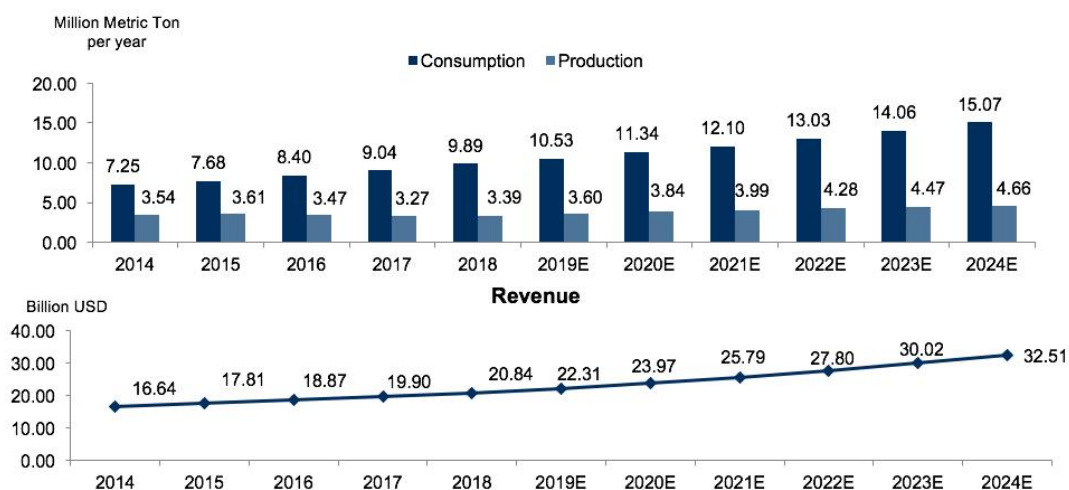
Source: Frost & Sullivan

8.5.1 Southeast Asia

Total consumption rose from 7.25 million MT per year in 2014 to 15.07 million MT per year in 2018, with a growth of 8.1%. The demand is driven by strong demand primarily from food & beverages and FMCG sector which grow substantially owing to thriving economy of major ASEAN nations. The demand outpaced regional production capacity at about five times, thus entailing the demand for plastic packaging import from other regions.

Market size for Southeast Asia is valued USD 20.84 billion in 2018 and is expected to grow by a CAGR of 7.82% into USD 32.51 billion in 2024.

Chart 8-4: Consumption and Production Volume of Packaging Products, Southeast Asia, 2014-2024E



Source: Frost & Sullivan

Flexible vs Rigid Plastic Packaging

The split between Flexible Plastic and Rigid Packaging is expected to remain relatively stable across the region over the next four to five years.

Chart 8-5: Flexible versus Rigid Plastic Packaging Market Split, 2018, by value, Billion USD (%)

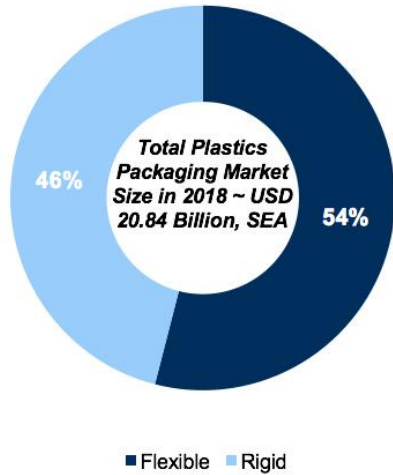
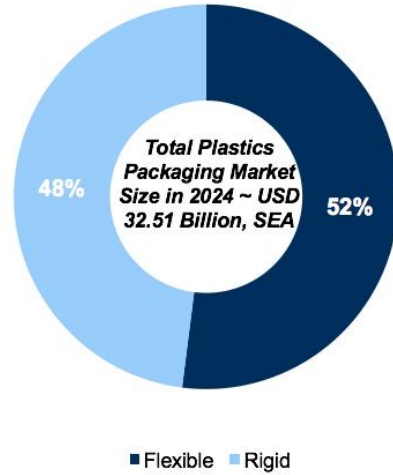


Chart 8-6: Flexible versus Rigid Plastic Packaging Market Split, 2024, by value, Billion USD (%)



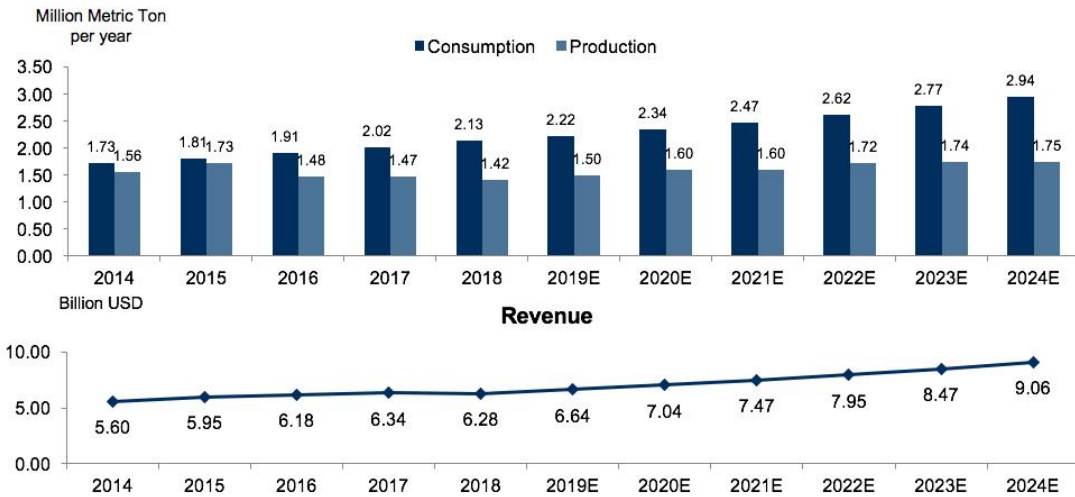
Source: Frost & Sullivan

8.5.2 Thailand

Thailand’s consumption of plastic packaging products is projected to grow to 2.94 million MT in 2024, registering a CAGR of 5.78% from 2019 to 2024. Growth is supported by plastic products, particularly flexible plastic packaging, driven by busier lifestyles and the need for lightweight, convenient consumer products.

Sales revenue grew by a CAGR of 2.91% during 2014-2018, and projected to increase to USD 9.06 billion by 2024, registering a CAGR of 6.42%. This is sustained by consistent rise in demand for flexible plastic packaging which has high value addition.

Chart 8-5: Consumption and Production Volume of Packaging Products, Thailand, 2014-2024E



Source: Frost & Sullivan

Flexible vs Rigid Plastic Packaging

Chart 8-8: Thailand, Flexible versus Rigid Plastic Packaging Market Split, 2018, by value, Billion USD (%)

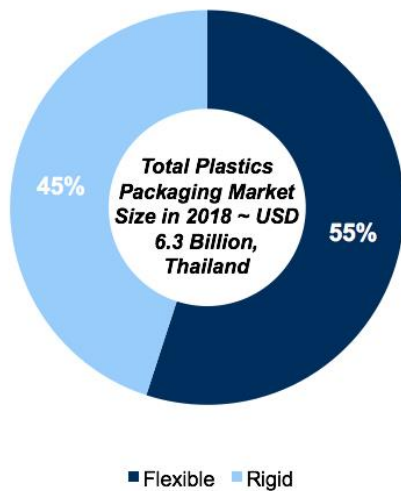
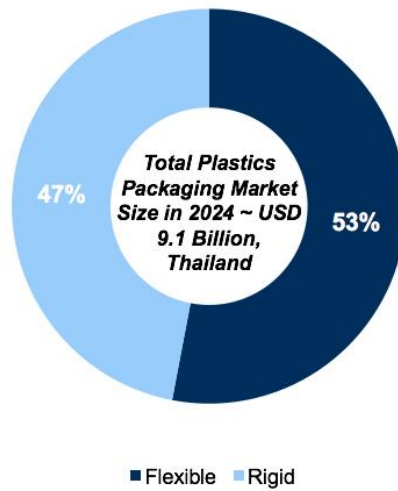


Chart 8-9: Thailand, Flexible versus Rigid Plastic Packaging Market Split, 2024, by value, Billion USD (%)



Source: Frost & Sullivan

A marginal increase in the consumption of Rigid Plastic Packaging is expected in Thailand owing to the strength and durability of rigid plastics over flexible packaging. The packaged food industry will be the main driver of this shift.

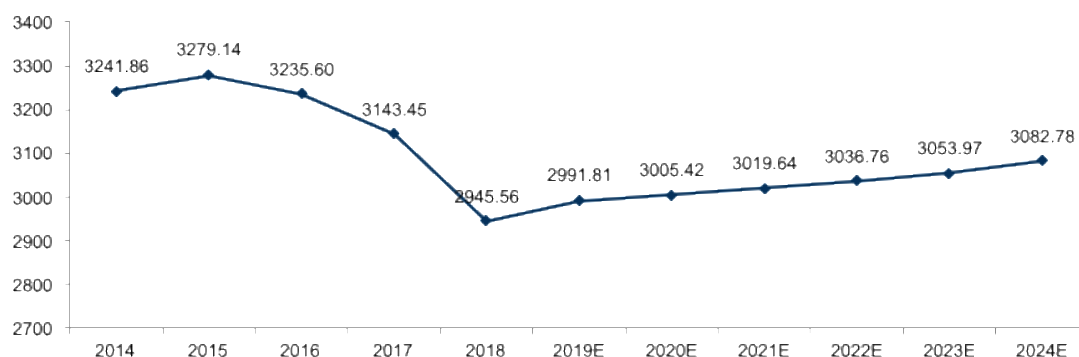
Price and Cost Analysis of Plastic Packaging in Thailand

Average prices for various plastics in Thailand will show growth in the near future owing to a strong increase in demand for both rigid and flexible plastic packaging solutions.

End use industries such as food packaging, E-commerce as well as electronics are all estimated to showcase robust growth curves in the country.

The volatility in the average prices of plastics can be attributed to the over-capacity of plastics production in China as well as the trade disputes and tariffs that exist between major economies such as the US and China.

Chart 8-10: Average Plastics Pricing in USD / MT



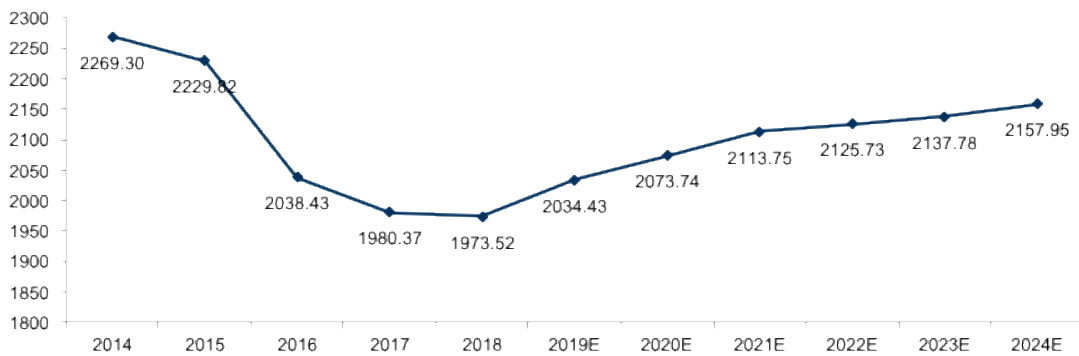
Source: Frost & Sullivan

Fluctuations in material prices (cost of polymer resins) is closely linked to the price fluctuations in crude oil and other downstream distillates.

Cost of materials dropped quite significantly in between 2014 and 2017 owing to a drop in global crude oil prices.

On average, the cost of raw materials is approximately between 63% to 70% in Southeast Asia, which is much higher than what is observed in the US. The access to cheap shale based ethylene in the US is the reason for lower raw material pricing in North America.

Chart 8-11: Average Cost of Materials in USD / MT



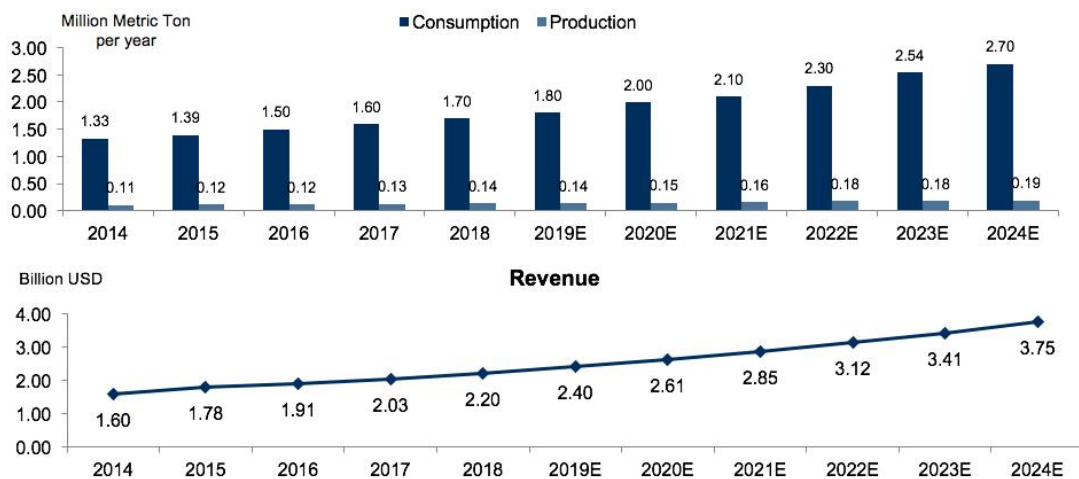
Source: Frost & Sullivan

8.5.3 Vietnam

Demand for plastic packaging will rise by a CAGR of 8.45% during 2019-2024, having the highest growth among packaging types. The trend has been fuelled by a strong manufacturing industry and healthy appetite for consumption as Vietnam’s population becomes increasingly middle class. There would still be significant gap between local output and demand. By 2024, domestic demand would be more than fourteen-fold the output of local plastic manufacturing.

Vietnam’s packaging market is valued at USD 2.20 billion in 2018, and projected to grow to USD 3.75 billion in 2024, registering a CAGR of 9.34%.

Chart 8-12: Consumption and Production Volume of Packaging Products, Vietnam, 2014-2024E



Source: Frost & Sullivan

Flexible vs Rigid Plastic Packaging

The growth of the E-commerce industry which tends to use a greater degree of rigid plastics packaging is one of the main reasons for the marginal growth of this segment in Vietnam.

Chart 8-13: Vietnam, Flexible versus Rigid Plastic Packaging Market Split, 2018, by value, Billion USD (%)

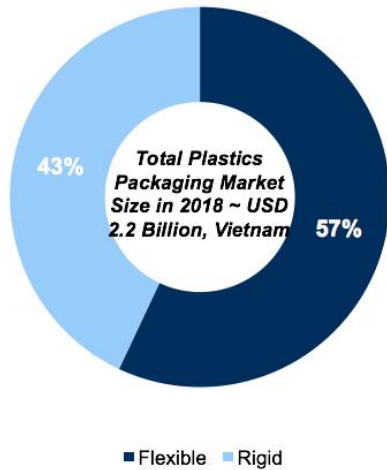
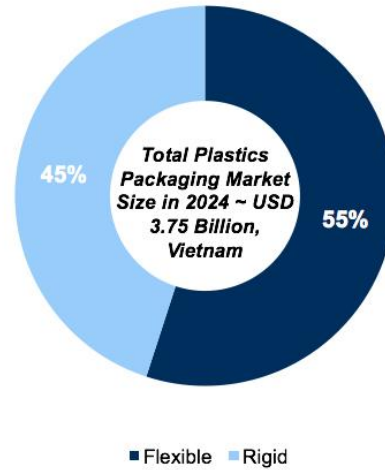


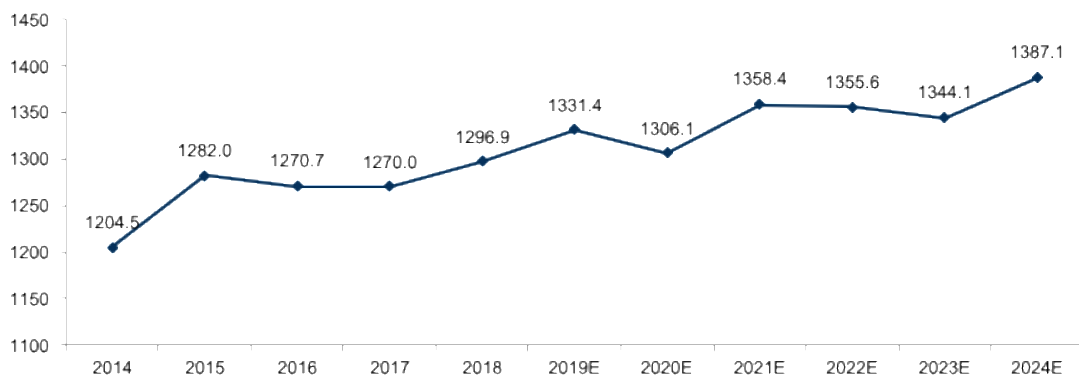
Chart 8-14: Vietnam, Flexible versus Rigid Plastic Packaging Market Split, 2024, by value, Billion USD (%)



Source: Frost & Sullivan

Price and Cost Analysis of Plastic Packaging in Vietnam

Chart 8-15: Average Plastics Pricing in USD / MT



Source: Frost & Sullivan

Average prices of plastics used in packaging across Vietnam is lower as compared to Thailand owing to the lower specifications used by the industry.

The plastics packaging eco-system in Vietnam has several domestic entities which cater to a highly price sensitive population and hence rely on lower specs to reduce the cost of plastics in packaging.

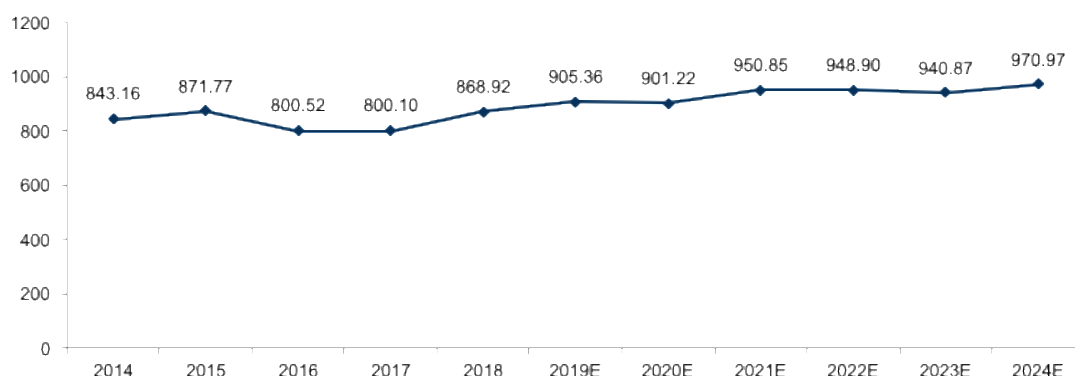
The proximity of Vietnam to China also reduces the logistics costs of imports of plastics into Vietnam which ultimately can be passed on to end consumers at lower prices.

The cost of materials in Vietnam is lower as compared to Thailand owing to specifications employed during production of plastic packaging solutions.

However, the volatility in costs follows a similar trend to that of Thailand, with cost of polymer resins being affected by volatility in crude oil prices, availability of cheaper ethylene derivatives from North America, owing to the rise of ethylene crackers using cheap shale gas.

Costs are expected to go up marginally in the near future, as crude oil prices pick up over the course of the next few years.

Chart 8-16: Average Cost of Materials in USD / MT



Source: Frost & Sullivan

8.6 MARKET DRIVERS OF SOUTHEAST ASIA’S PLASTIC PACKAGING MARKET

Following trends are expected to drive the growth of plastic packaging market over the next few years:

Thriving Economy and consistent growth in food & beverage and FMCG sector:

The ASEAN economy is expected to grow at between 7.0% and 8.0% over the next three to five years. This will result in ample size of disposable income and thus having a very positive effect on sectors such as F&B, which is among the largest consumers of plastics packaging in the country. The packaged food sector in Vietnam alone accounted for approximately USD 10.1 billion in 2018 which used close to 4.5

Million MT of plastics. Both these end use sectors are estimated to grow between 7.0% to 9.0% over the next five to seven years, signalling a strong demand for plastic packaging products

Changes in lifestyle due to demographic shifts:

Similar to paper packaging market, the shifts in demographics in Southeast Asia, primarily the rising younger, more educated and affluent population has driven rapid changes in consumer preferences. The population in Southeast Asia have shifted towards on-the-go food and beverages due to busier lifestyles. Bottled water and non-alcoholic beverages such as coffee, tea, and dairy based drinks are expected to increase in popularity in major ASEAN economies such as Indonesia and Thailand along with ready-to-eat meals and snacks in small, flexible packages.

Flourishing E-commerce trade in the region:

ASEAN is among the region with fastest growing E-commerce markets, driving the demand for secondary and logistic packaging. This presents a very strong opportunity for the growth of plastics used in the packaging of various types of goods ranging from electronics, FMCG, household items and others.

The E-commerce market across the region has seen significant growth over the last three to four years as it has made the life of consumers easier. The unique selling point (USP) of E-commerce companies is convenience and quick delivery, which has led to a large population of consumers purchasing products ranging from daily groceries to clothing to electronics on these platforms. The convenience factor is often complemented with attractive discounts which entices buyers to shop more on E-commerce platforms.

The E-commerce packaging market as a whole is expected to grow at a CAGR of 14.5% by value between 2019 and 2024 across the four countries. Plastics is one of the preferred packaging options for E-commerce players, as it enables them to save space during transportation, thereby saving cost and the durability of plastics also ensures product safety.

The increasing mobile phone penetration rate coupled with the high degree of social media usage has also increased the awareness of people regarding the advantages of E-commerce platforms and their products.

Finally, the usage of E-commerce cuts across social strata and income classes which gives these companies a wide audience and customer base.

Movement of production sites out of China:

MNCs are relocating their supply chains in anticipation of the US China trade war to ASEAN countries, taking advantage of the region's high growth potential. Thailand, Vietnam and Indonesia will be seeing an influx in manufacturing, particularly in the electronics, clothing, food, and personal care sectors.

High Value to Cost Ratio: The versatility of plastics packaging across various end use segments, combined with their lower cost, provides a high value to cost ratio, which is key to price sensitive consumers in Southeast Asia. This higher value to cost ratio is one of the key advantages that plastic packaging has over paper packaging.

Cultural Factors:

Plastics and plastics packaging are an inseparable part of day to day life for consumers across Southeast Asia. The flexibility that plastics can be moulded into multiple SKUs gives consumers a wider range of product sizes to choose from. In countries such as the Philippines, the reliance on FMCG products in small sachets is high. A 'sachet economy' exists in the country, where products such as soaps, shampoos, sauces and others are in high demand in the form of sachets. This stems from the low cost of these products which suits consumers in the lower middle class and lower income classes. The cheap cost of plastics and its ability to be made into multiple sizes are some of the key reasons explaining such trend.

Wide Range of Applications:

Plastic packaging can survive extreme environments and do not easily degrade in hot or cold weather, and thereby preserving the contents inside the packaging. This makes it a preferred choice of material for products ranging from F&B, FMCG, Industrial and other end use applications. The flexibility of plastics packaging combined with its mechanical strength and resistance ensures minimum damage to the product inside the pack. This has also helped reduce wastage during transportation.

Other Drivers for Plastic Packaging:

Plastics is a lot more durable and resilient as compared to paper. The increased mechanical strength of plastics provides a higher degree of product safety. At the same time manufacturing of plastic requires lesser resources (water and energy) as compared to paper and other materials. The lower resource requirement also makes the cost of plastic packaging cheaper as compared to paper packaging. A large percentage of the population across Southeast Asia is price sensitive and F&B / FMCG companies cannot pass on increased packaging costs to customers.

8.7 MARKET CONSTRAINTS OF SOUTHEAST ASIA'S PLASTIC PACKAGING MARKET

Pollution in the form of ocean plastics is a key concern across Southeast Asia, and countries such as Vietnam and Philippines are facing challenges in combatting this menace. This particular trait of plastics, specifically single use plastics has put a significant amount of pressure on government agencies to curb and restrict the usage of single use plastics. This 'unsustainable tag' associated with these types of

plastics is challenging, as plastics are cheaper as compared to paper packaging solutions. The conundrum however stems from the durability and flexibility of plastics, which makes it an ideal choice of material for various end use industries. A lack of strong recycling infrastructure coupled with recycling policy is also affecting the plastics packaging market in the region.

Alternative materials to packaging such as products made from corn starch are being researched on to understand their versatility across various end use products. However, the most obvious alternative to plastics packaging is paper packaging. Paper is considered to be environmentally friendly and is also relatively flexible. In addition, a strong paper packaging eco-system exists in the region, which implies that supply chains and other requirements are in place to cater to the requirements of end use industries. However, paper does have its limitations with respect to moisture and oxygen barrier properties, and can substitute plastics in a few end use applications and not all.

Lastly, one of the key challenges affecting the plastic packaging industry is the growing awareness among consumers regarding its 'unsustainable' tag. Consumers are wary of purchasing single use plastic packaging products and in some cases make a conscious effort to avoid such products. However, the trend is limited to a small section of the population, as the majority of the consumers in Southeast Asia are price sensitive and rely on goods packaged in plastics.

However, a strong push from plastic suppliers, packaging companies, end users and consumers for a robust requirement of recycling facilities, waste management systems and infrastructure for a circular economy has prompted governments across Southeast Asia to frame policies that will support the plastics and plastics packaging industry. While the efficient implementation of these policies is to be seen, the regulatory framework is the first step towards making plastic packaging a more sustainable and environmentally friendly solution.

Furthermore, plastic packaging companies such as SCG Packaging are taking the lead in implementing circular economy practices and policies in their plastics division. Positive steps such as this, if taken by all plastic packaging companies in the region, will make plastics a more eco-friendly solution.

8.8 OVERALL ADVANTAGES OF PLASTICS IN PACKAGING VERSUS OTHER MATERIALS

In general, plastics packaging enjoys the below advantages compared with other materials:

- From a functionality point of view, plastics have high oxygen and moisture barrier properties, which enable longer shelf life of products and lower wastage
- Highly Flexible - allows manufacturers to customize its shape, size and style as per their customers' requirements.
- Plastic packaging can survive extreme environments and don't easily degrade in hot and cold

temperatures, thus preserving the integrity of the product inside it.

- Help avoid losses due to wastage of inventory and also helps bring about consistency in product delivery, thus increasing brand value.
- Plastic packaging is highly economical and can be used by all industries irrespective of their scale of operations. The cost-effectiveness of plastic food packaging is especially beneficial to small-scale product manufacturers as it allows access to standardised packaging options in spite of lower budgets.
- The durability offered by plastic packaging also allows manufacturers to print eye-catching, high-quality custom designs, and thereby increase product visibility in a retail setting.
- Plastic bags are easily recyclable and require lesser energy to produce in comparison to the other packaging alternatives available. According to a study conducted by United States EPA, plastic bags use 40% less energy to produce and generate 80% less solid waste than paper.
- Plastic packaging is inexpensive. Due to its light weight, plastic saves over alternatives when it comes to shipping and transportation costs.
- However, challenges with single use plastics and the proper disposal of these plastics continues to be a cause of concern in the region, owing to consumer behavior of littering, improper waste disposal and poor waste collection systems provided by municipal authorities.

While plastics have several advantages in the packaging segment, consumer behavior towards disposal of plastics is poor not favorable across the region. Consumers throw away plastics in the same dustbins or dumps that are used for paper and glass products, which lead to improper recycling of plastics. Even in areas / apartments / public places / airports, where clearly designated dustbins and disposal areas are placed for plastic, paper and others, consumers tend to dump the plastic into the nearest bin, irrespective of the labelling. This improper disposal of plastic ultimately leads to improper recycling and in turn dumping of plastics in oceans and other water bodies.

This issue is also compounded by the lack of efficient waste management systems or awareness campaigns across the regions.

8.9 ENTRY BARRIER OF SOUTHEAST ASIA'S PLASTIC PACKAGING MARKET

New companies interested in entering the plastic packaging market in the region will face a medium degree of competitiveness. The market is currently fragmented with several players vying for market share through lower priced products. The focus on pricing automatically reduces supplier power and places a significant degree of power and influence in the hands of the buyers – the end use companies. The buyers are also under pressure to reduce packaging costs and cannot pass on any price increases to end consumers especially in the commodity F&B and FMCG sectors.

While the threat of substitutes exists especially in the form of paper, glass, metals and other new materials, the inherent properties of plastics in packaging, namely durability, flexibility, barrier properties and mechanical strength make it difficult to displace plastics completely. An additional advantage for plastics is its lower cost as compared to paper.

Small and medium plastic packaging companies, especially domestic players catering to domestic requirements, could enter the packaging segment across Southeast Asia. However, these companies may not be able to match the economies of scale of larger companies nor will they be able to meet volume requirements and quality requirements of large end users.

At the same time, end users such as F&B and FMCG companies expect plastic packaging suppliers to provide innovative pack designs, lightweight plastic materials, added functionality in the packaging (such as antimicrobial or slip coatings inside packs) as well as higher-quality printability and label adhesion, all of which require extensive R&D and innovation, which can be undertaken by only a few selected plastic packaging companies in the region. Such requirement on innovation adds another challenge for small and medium companies to enter the market as well.

End users also place conditions on plastic packaging suppliers regarding Sustainability Certifications or certificates to show the origin of materials, which again should be from suppliers that have been certified for sustainability practices. Such certifications are provided to companies which follow and practice the regulations mentioned under these guidelines, which makes it difficult for new players without any of these certificates to capture a share of the market.

Operational issues such as the unionization of labour exist in some countries in Southeast Asia, which could potentially lead to manpower challenges and in turn a lower productivity rate per head. These operational issues could also severely damage the profitability and margins of medium and small sized plastic packaging companies.

8.10 PLASTIC PACKAGING MARKET SHARE ANALYSIS

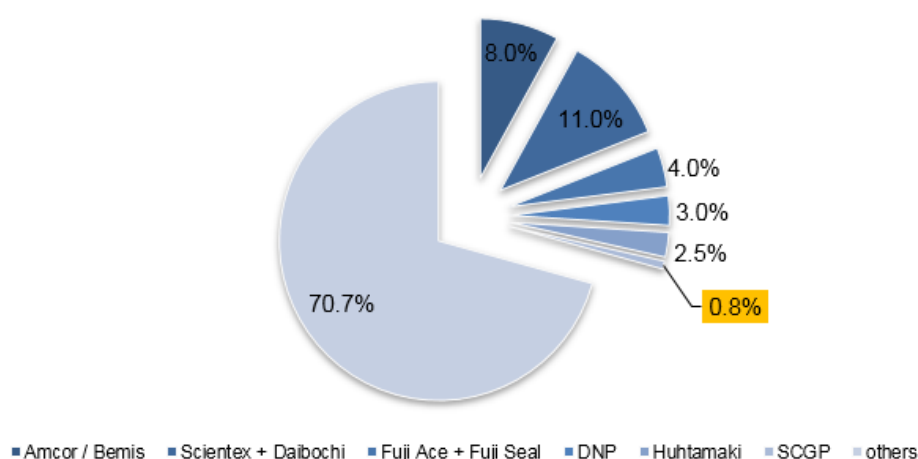
The plastics packaging market across the region is highly fragmented and it can be inferred that the top 6 players have a combined market share of approximately 29.3%. The relatively small market shares of the companies also stems from the many small and medium packaging companies that exist across the region, catering to small and medium end users.

SCG Packaging has a relatively small 0.8% of the total market share, by sales revenue, for plastics packaging across Southeast Asia, making it the sixth largest player across the four focus countries. Within the company, plastics packaging accounts for a total of just 6% of its packaging portfolio, which showcases the company's focus on paper packaging instead of plastic. However, SCG Packaging has a

relatively strong presence in specific countries such as Vietnam and Thailand for plastics packaging with a market share of 7% to 7.5% and 5% to 6% respectively. Also, it has some major clients such as Mondelez, Reckitt Benckiser, Dettol and Durex across the region.

However, SCG Packaging’s brand name and reputation in the Performance & Polymer Packaging segment, makes it the strongest regional (company from ASEAN) player. The other key players in plastics packaging are international companies, with headquarters outside the ASEAN region. In addition, despite of its relatively small plastics packaging business, SCG Packaging plans to grow its plastics packaging portfolio through inorganic expansion and M&A activities in the near future.

Chart 8-17: Southeast Asia Plastic Packaging Market Share, 2018, by Sales Revenue, USD Billion



Source: Frost & Sullivan

8.11 COMPETITIVE ANALYSIS OF SOUTHEAST ASIA’S PLASTIC PACKAGING MARKET

In ASEAN markets aside Thailand, the plastic packaging market is fragmented with a number of local as well as regional participants operating in the market. The increasing number of participants has transformed the market to competitive in nature. The larger participants are diverting to strategies such as acquisition and partnership to establish their significant presence and expand their customer base in the market.

Customer preferences in terms of packaging designs and trends is consistently changing, the competition in the market is expected to rise. Henceforth, the need for product and technological innovation to meet the consumer demands raises the bar of competition among the industry participants. At the same time, end users such as F&B and FMCG companies expect plastic packaging suppliers to provide innovative pack designs, lightweight plastic materials, added functionality in the packaging (such

as antimicrobial or slip coatings inside packs) as well as higher quality printability and label adhesion, all of which require extensive R&D and innovation, which can be undertaken by a select few plastic packaging companies in the region. This requirement of innovation, adds another challenge for small and medium companies to enter the market as well.

End users also place conditions on plastic packaging suppliers regarding Sustainability Certifications or certificates to show the origin of materials, which again should be from suppliers that have been certified for sustainability practices. Such certifications are provided to companies which follow and practice the regulations mentioned under these guidelines, which makes it difficult for new players without any of these certificates to capture a share of the market.

To sustain growth momentum, manufacturers may be focused on plastic packaging for pharmaceuticals due to the region's increasing healthcare expenditure and thriving medical tourism, particularly Thailand.

The thriving E-commerce trade in the region may provide opportunity in term of plastic waste management. The E-commerce market has a direct impact on the plastic waste generation. Bubble wrap is made of PP, while the packing tapes used to secure the goods and cartons/boxes are made of either PVC or PP. Many E-commerce sites do not regulate the labelling and recycling of their packaging materials and that enforcement of recycling activities is arbitrary. In consequence, these plastic elements either end up in dumps or landfills without going through the stream of recycling.

8.12 OVERALL POLICY AND REGULATIONS OF SOUTHEAST ASIA'S PLASTIC PACKAGING MARKET

Policies and Regulations: 《Push towards plastic waste reduction》

Main Content and Emphasis:

- There exist government initiatives and roadmap to reduce plastic waste at nationwide level for Thailand and Indonesia.
 - Thailand: Plastic cap seal for water bottle, degradable plastic bags and plastic particles with less than 1mm in dimension to be banned from use in by 2019 and all plastic waste to be renewable by the end of 2020s.
 - Indonesia: Proposal to rump up corporate' responsibility in plastic waste reduction. The new regulatory framework aims at motivating FMCG firms, packaging manufacturers and retailers to seek packaging redesign, material replacement, and implementation of sustainable waste management practices.
 - Local/regional government own initiative: Bali government seek to reduce marine plastic waste by 70% by June 2020.
- Ban on multiple types of single-use plastic packaging such as carrier bags, cups, straws and styrofoam food containers.

Policies and Regulations: 《Food safety awareness》

Main Content and Emphasis:

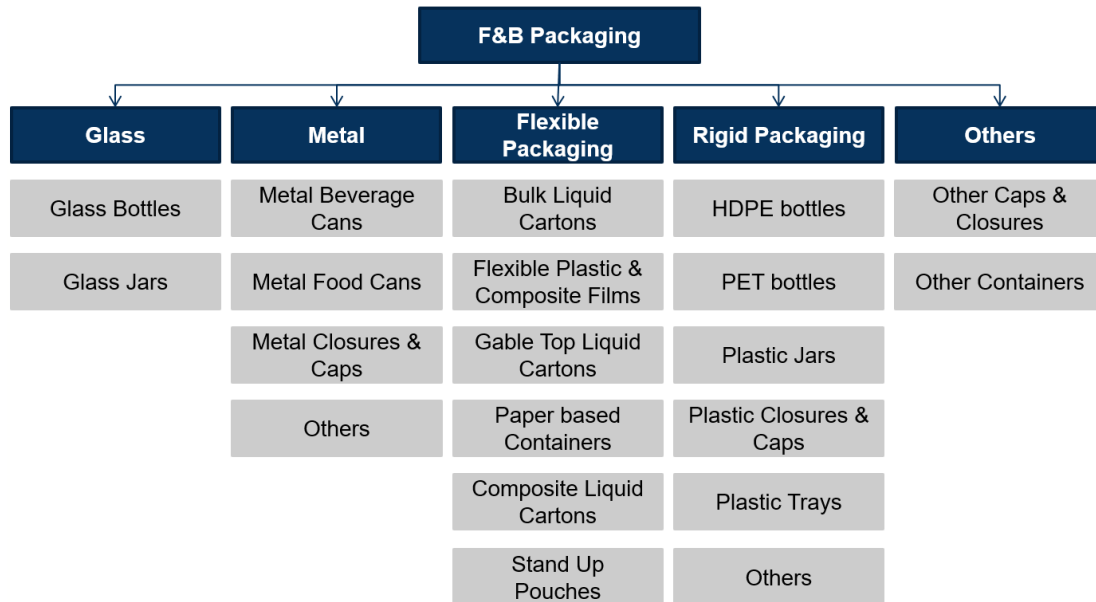
- There exist regulations to uphold hygiene and sanitation of food-packaging across Thailand, Vietnam and the Philippines.
 - Thailand seeks to comply with the international packaging guidelines set by ISO regarding food safety.
 - Vietnam opts to limit impurities in food contact packaging made of synthetic resin or polymer whilst also specifying fines and penalties.
 - Philippines emphasize on ensuring the absence of poisonous or deleterious substance in food by determining appropriate quality control to ensure that food-packaging materials are safe and suitable.

9. ANALYSIS OF SOUTHEAST ASIA'S FOOD PACKAGING MARKET

9.1 SEGMENTATION OF FOOD & BEVERAGE PACKAGING MARKET

Food & Beverage packaging market can be split into below categories:

Figure 9-1



Source: Frost & Sullivan

9.2 PROPERTY REQUIREMENTS OF FOOD & BEVERAGE PACKAGING

Due to the higher standards and specific needs, property required for food & beverage packaging include: provide an excellent barrier to oxygen, water vapour and carbon dioxide so as to retain product freshness; ease of processing on high speed packaging lines; ability to withstand sterilization and high associated temperatures; not interacting with the contents of the packaging; requiring low processing energy and containing recycled materials; low mass and non-breakability for efficient transport; convenience for consumers who want packages that are portable and can be easily opened; sustainable packaging materials

9.3 FOOD & BEVERAGE PACKAGING

Specific food & beverage packaging requirements depend on different types of the offerings:

9.3.1 Bakery & Cereal

Bakery products include a wide range of products. Packaging requirements depend on factors affecting product shelf life, such as fat content, sugar content, and moisture content

Soft Baked Goods

Soft, baked products can go stale and for many products, packaging cannot delay this process significantly.

Some products (e.g., bread), with low fat content and short shelf life, are often sold without packaging.

Perforated polypropylene bags are used to prevent crisp breads from becoming soft.

Soft breads with humectants require a water vapor barrier to preserve their softness, resulting in the use of polyethylene bags. Packaging with water vapor barriers are also used for biscuits, crackers, and mass-produced cakes.

Sweet Baked Goods

Sweet baked goods have a greater fat and sugar content, which help prevent staling.

Grease can be a concern and hence, packaging should be greaseproof and prevent crushing.

Physical damage is also a consideration. Therefore, packaging typically includes paper trays, boxes, and cartons to prevent crushing.

Cereal

Cereal has low water content and often high sugar content. Therefore, shelf life is not a major concern.

While paperboard with waxed paper or bioplastic pouch is commonly used for the packaging of cereals, PE-coated paper is growing in popularity.

Baked at Home

Frozen products that can be baked at home (e.g., pizza) are growing in popularity. These products need packaging that can survive the freezing and reheating processes.

Foil laminate is often used for these products.

9.3.2 Meat Products

Purpose

Preserving perishable foods such as meat and bacon that are prone to lipid oxidation, which leads to Spoilage.

High levels of oxygen maintain the bright red color of meat.

Carbon dioxide prevents the growth of spoilage organisms.

Inhibiting the growth of microorganisms such as bacteria, yeasts, and molds, all of which can adversely affect the quality of the food, both in sight and odor.

Methods

Modified atmosphere packaging (MAP).

Gas-flushed controlled atmosphere packaging (CAP).

Each product type as an ideal atmosphere.

The gases used are oxygen, carbon dioxide, and nitrogen.

Packaging Requirements

Plastic lids must be able to create an airtight seal with the container.

Both the container and the lid must be impermeable to air to ensure that the required atmosphere is maintained.

Packaging must not transfer any chemicals to the meat.

Lightweight packaging is preferred.

Highly chemical-resistant and sufficiently gas-impermeable plastics are preferred.

9.3.3 Fish & Seafood Products

Compared to meat, fish and seafood are sold fresh more often. However, when packaging is used, it is similar to that used for meat products and must ensure a controlled atmosphere.

Fresh Fish on Ice

Fish not sold on the docks were traditionally transported on ice to retailers.

Chilling is important to slow bacterial growth.

Consumers prefer fresh fish over packaged fish due to spoilage and possible health concerns.

Controlled Atmosphere Changed Habits

Different gas ratios can ensure a shelf life that is long enough to enable the shipping of packaged fish.

For white fish, scampi, and scallops, the ratio is 40% CO₂, 30% O₂, and 30% N₂.

For fatty fish and salmon and trout, oxygen is excluded and the gas is 60% N₂.

Frozen Fish

Packaging for frozen fish typically comprises flexible plastic packaging that can endure cold storage temperatures. Fish are usually vacuum-sealed to preclude the need for a controlled atmosphere.

9.3.4 Fruits & Vegetables

Packaging for fresh fruits and vegetables is largely designed for convenience and not as a barrier.

Fresh Fruits & Vegetables

Fresh produce is sensitive to the environment (for instance, damage due to exposure to heat or cold).

Chilling can be cost-prohibitive due to the bulkiness and low price of the produce, but it is still done when required.

Higher levels of oxygen and carbon dioxide can also facilitate food spoilage.

Role of Packaging

Appropriate packaging can preserve the freshness of fruits and vegetables and extend their shelf life (for instance, by keeping potatoes in the dark).

Packaging is usually not used as a barrier, but for convenience during transit.

Most vegetables are sold loose, with only one-third being pre-packed.

Repackaging by retailers polyethylene bags is common to create specific predetermined weights.

Packaging also protects fruits and vegetables from physical damage. This type of packaging enables safe transport of tomatoes, softer apples, and exotic fruits.

Typical Packaging materials

For protection, molded expanded polystyrene (EPS) foams are used.

EPS boxes have largely replaced wooden boxes for transporting delicate fruits.

Low-density polyethylene films are used for vegetable handipacks as these are inexpensive.

9.3.5 Frozen & Refrigerated Food

Packaging for frozen foods must be chemically resistant to the various coolants used for freezing. For frozen meals, packaging must also be able to withstand high temperatures. Polyethylene is commonly used for the packaging of such products.

Packaging Uses

Food products are often frozen to retain all their natural nutrients without large concentrations of preservatives or additives. Packaging must aid in preserving product freshness.

Frozen meals are gaining popularity due to the busy lifestyles of today's consumers.

Microwaves are used to reheat the food within the same packaging.

Packaging Requirements

The packaging material used for frozen meals must be able to withstand both low and high temperatures. Moreover, it must not deteriorate during reheating, as that can damage the quality of the food.

Plastics are a good barrier to water vapor and help retain the moisture content of frozen foods. They are also effective against bacterial growth, which is important for refrigerated foods.

Chemical resistance and inertness are other important properties. Coolants such as liquid carbon dioxide must not affect the packaging.

9.3.6 Ice Cream

While the packaging requirements for ice cream are similar to those of other frozen foods, use of other form factors (e.g. cartons) is more common.

Ice Cream Requirements

Ice cream is packaged typically in a semi-frozen state and then frozen often at temperatures as low as -35°C.

Ice cream packaging must be resilient to the coolants.

Packaging formats for ice cream include cartons and tubs.

Suitable materials include paper laminates or solid plastics made of polyethylene, polypropylene, or polystyrene.

Other Product Form Factors

Ice cream products are also available as bars, sandwiches, and in other form factors.

Flexible materials are increasingly being used for these products.

Packaging materials such as paper laminates or films are typically used.

9.3.7 Milk, Cream & Yoghurt

Packaging for other dairy products depends on their state and fat content. Plastic packaging is increasingly being used for all products.

Milk Product Requirements

Milk is a good culture for microorganisms as it is high in moisture, has a near-neutral pH, and contains nutrients to support bacterial growth.

Pasteurization is done to kill all pathogens and eliminate all yeasts, molds, and most vegetative cells of bacteria.

However, milk has a short shelf life, as it is not fully sterilized.

Packaging must extend the product shelf life, be able to withstand the high pasteurization temperatures, and have sufficient impermeability.

High-density polyethylene (HDPE) is commonly used due to its low cost and ease of use in blow molding.

Cream

Akin to milk, cream is susceptible to pathogens; however, it has a higher fat content.

This increases the risk of oxidation, making oxygen impermeability a greater priority.

The packaging materials typically used include polystyrene or polypropylene tubs with heat-sealed coated polyethylene/aluminum laminate covers.

In the developing world, glass bottles and cartons are also used.

Yoghurt

The packaging of yogurt is similar to that of cream, despite the former having a much lower fat content.

Both individually packaged products and multipacks are common.

Akin to cream, polystyrene or polypropylene is used with PE/Al laminate covers for yogurt packaging.

9.3.8 Cheese

While packaging specifications for cheese vary depending on the product type, the common requirement is that of oxygen removal to prevent mold growth.

Common Requirements

Oxygen exclusion is necessary to avoid mold growth and the onset of rancidity.

Moisture content must be maintained to preserve texture, creating the need for a water vapor barrier.

Protection from physical damage is needed. However, the degree of protection depends on the type of cheese.

Typical Packaging

Sliced processed cheese is typically packed under carbon dioxide into interleaved cellophane.

Film wrapping for bulk cheese is done using vacuum and heat sealing. Vacuum sealing removes oxygen and the heat melts the surface layer of cheese for a better bond.

Cottage cheese is typically packaged into waxed paperboard or polystyrene tubs.

Cream cheese is typically wrapped in aluminum foil laminates.

9.3.9 Butter & Margarine

Increasing demand for spreadable butter has led to the greater use of plastic tubs.

Margarine Packaging Requirements

Margarine tubs have strong barrier properties to preserve product quality.

The packaging must be resealable and capable of withstanding frequent use.

Thermoformed, chlorine-free plastic is commonly used.

Changing Consumer Interests for Butter

Traditionally, butter is wrapped using aluminum foil laminated to vegetable parchment or greaseproof paper.

Demand for spreadable butter has led to the rapid growth of soft margarines and butter sold in plastic tubs.

These tubs must have high barrier properties to preserve the product quality over its long shelf life.

9.3.10 Fats & Oils

Improvements in oil packaging have been focused on reducing processing costs and packaging weight, while maintaining high resistance to grease and oil.

Requirements

High chemical resistance (including oil and grease).

High processability.

Opacity for certain oils.

Shift Towards PET

Frying and edible oils were traditionally packed in glass bottles.

Glass bottles were initially replaced with polyvinyl chloride (PVC), as the latter had a higher chemical resistance.

With improved properties and additives, polyethylene terephthalate (PET) and polyolefins have recently started replacing PVC.

9.3.11 Preserved Foods

All types of packaging are used for preserved foods. Preferences for certain types of packaging depend on consumer convenience and the type of food.

Glass

Food products such as jam and pickles were traditionally packaged in glass jars.

Glass jars still account for a large share of preserved food packaging.

Rigid Plastics

Rigid plastics (e.g. polystyrene) are used for thermoforming to create small, individual portions.

Polystyrene is not used for larger volumes, as the hot filling of the increased volume leads to temperatures above the glass transition of polystyrene, causing distortion.

Flexible Packaging

Flexible packaging (e.g. pouches) can also be used for individual portions.

This is possible because if the food is packed under aseptic conditions, packaging demands can be met with relatively unsophisticated materials.

Metal Cans

Canned foods can gain the taste of the can when the metal become oxidized.

Inner coatings of plastic have been used to prevent this oxidation.

9.3.12 Snacks & Confectionery

Snacks and confectionery packaging has high-level requirements to preserve flavors and provide a flashy appearance to capture consumer interest.

Flashy Appearance

Impulse buying is prevalent among customers, which makes attractive packaging an important purchase decision influencer for snacks and confectioneries.

Metallized or pearlized surfaces are often used to create an attention-grabbing image.

Gold-blocking or embossing is also common.

Maintaining Flavour Profile

Snacks and confectioneries have strong flavors and/or aromas, which can be sensitive and easily tainted.

The packaging material must act as a good barrier to moisture, oxygen, and light.

Minimizing Costs

As these are small products, the proportion of costs associated with packaging is high.

This is largely due to the need for a flashy appearance.

High processability is also required to maximize throughput.

Polyethylene is commonly used, as it is a low-cost material and provides a high-quality appearance.

9.3.13 Beverage Packaging

Plastic especially PET, is used extensively in beverage packaging because of its strength and light weight. Glass is used when a better barrier is necessary.

Lightweighting

Traditionally, glass and metal cans were used to bottle beverages.

Over time, the industry has largely moved to plastic packaging, specifically polyethylene terephthalate bottles and polypropylene caps.

This move has mostly be driven by the desire to reduce packaging weight and improve durability. PET is shatterproof, strong, lightweight, and non-reactive.

Specific Product Requirements

Carbonated beverages require packaging that is strong enough to maintain the carbonation pressure. While many plastics do not have this strength, PET does.

Alcoholic beverages require greater oxygen barrier properties than PET. Thus, to maintain the taste of these beverages, glass or aluminum is used. PET is used in special outdoor settings when bottling is done on-site (for instance, at music festivals).

Recent trends focus on improving the accessibility of healthy drinks and improving sustainability

Recent Trends

Extending the shelf life of fruit and vegetable juices

Health-conscious consumers are demanding healthier choices in beverages—primarily fresh, healthy juices.

With added oxygen barrier properties or coatings, PET is being used to sustain the freshness and extend the shelf life of such products.

Sustainability

Growing concerns on environmental sustainability have strengthened the demand for recyclable packaging.

Use of PET, glass, or aluminum is preferred over less recyclable options such as pouches and cartons.

Convenience

Lightweight, portable beverages provide greater convenience to consumers compared to those in heavier containers.

This is especially relevant when consumers have to carry the containers to a recycling bin.

Consumers prefer PET and aluminum containers.

This has led to an increased use of cans for alcoholic beverages.

Examples of New Products

New product development is focused on capturing the recent market trends such as:

Aluminum foil / PVC shrink wrap for use with aluminum cans: This assuages concerns over the cleanliness of aluminum cans.

Recyclable black plastic containers that can be detected with the near-infrared sorting mechanism
Typically, black plastics are not sorted properly during recycling due to the black pigments.

Fully recyclable pouches that use only one type of plastic (PE) rather than aluminum laminates.

9.3.14 Beverage Packaging-Coffee

In coffee packaging, preserving the taste and aroma is the priority. This, coupled with lightweighting, has driven the move away from steel cans.

Preserving Smell & Taste

Aluminum sachets are used to preserve the aroma of coffee. The plastic coating is needed to ensure that the aroma does not permeate to the environment.

In addition to barrier properties, the move away from steel cans is driven by the significant reduction in weight that it enables.

Instant Coffee

Traditionally, instant coffee has been packaged in glass jars.

Although glass is still used to some extent, plastics are currently used more frequently.

Transparent polypropylene jars and other polymer substitutes are also becoming increasingly common.

The reduction in weight is substantial, as glass packaging can be more than 30 times the weight of plastic packaging.

9.4 TECHNOLOGIES ENABLING & IMPROVING FOOD SAFETY

9.4.1 Interconnected Value Chain Networks Being Established

Globalization and the growing export and import of food across nations has increased the need for food tracking and safety, especially in an industry, where there are varying regulations national enforcement. This has translated into increasing demand for enabling technologies that can track and share product and production information across regions and value chain in a cost effective manner.

Increasing volumes of data related to food safety (e.g., foodborne outbreaks, molecular epidemiology etc.) are being constantly generated by stakeholders, including government, industrial, and academic organizations necessitates innovative enabling technologies, especially related to digital and communication technologies to provide actionable insights, biosensors, computer chips, and microarray systems.

Increasing competition and expansion of F&B categories, especially in the retail market place, steady market growth highly supported by growing incomes in emerging economies, rising demand for freedom food and enhanced health through nutrition are influencing the need for effective and safe food production, processing, safety and tracking technologies.

Need for large volumes of food and agriculture product to meet the ever-rising demand of the growing population has created the need for next generation technologies for digital data management, rapid detection methods used for isolation, early detection, profiling and listing of pathogens and their metabolites in food production, safety and diagnostics.

9.4.2 Collaborative Efforts from Value Chain Stakeholders

Point-of-care food safety devices can be used across the value chain of food industry starting from food production plant to ensure timely intervention in case of contamination during operations to reduce wastages, in retail chain to make sure food is safe for consumption. And now with growing health awareness amongst general population, consumers can use these point of care detection device to check the safety of restaurant foods, packaged foods, or catered foods.

AI (Artificial Intelligence) is on the verge of leading food industry to a major technological revolution. Companies in the future are most likely to be utilizing AI for food production and address the global problem of food shortages in the future. AI has broader application impact in the food industry, such as from supply of raw material to stocking of crops (and delivery) to consumption of food products to product grading and risk prediction, amongst others.

Successful implementation of AI demands considerable technology readiness not only within the organization, but also for associated stakeholders. Also, practical application of the technology, combined with cost, performance and user acceptance continue to pose challenges in the wider adoption of AI.

Blockchain implementation will strengthen food safety infrastructure considerably. It serves as an ideal approach to food safety management in curtailing the problem of food contamination at the root by tracking the supply chain. With Blockchain, incidents of frauds will be easier to investigate due to the availability of a database related to the food items production and supply chain.

9.4.3 AI Will Enable Accurate Predictions on Food Quality

Pros

AI improves operational efficiency through real-time tracking of inventory, i.e., by having inventory bins that can automatically indicate when food products need to be replenished, and trigger materials to be retrieved.

AI enables remote monitoring of conditions to ensure safety and improve quality of the final product. It allows to perform real-time stock control based on weather conditions. Smart interactive labels can be used that shows conditions of the products as it reaches the final point of sale.

Combining data around weather conditions, temperature, and route congestions/traffic, AI will enable accurate predictions around the time to be taken to deliver goods and also predict the impact of above factors on food quality.

Cons

Regulatory challenges pertinent to AI are a major challenge hindering wide scale adoption of the technology. AI advancements are noted to be at an accelerated pace, making it difficult for associated policies and regulations to catch up.

There is varying level of preparedness across the industry ecosystem for adoption of newer technologies. Successful implementation of AI demands considerable technology readiness not only within the organization, but also for associated stakeholders. Lack of domain experts to train and maintain such systems hinders adoption.

AI requires highly complex infrastructural capabilities at both the hardware and software levels. The intelligent algorithms require high processing capabilities in order to be able to process large data sets in real time.

9.4.4 Rising Adoption of AI in Food Services Sector

AI is on the verge of leading food industry to a major technological revolution. AI has made inroads in the food sector with broader application impact across supply of raw material to stocking of crops (and delivery) to consumption of food products, to name a few. Some of the key application areas include

Product Grading

With the use of image recognition techniques, AI can enable automated quality analysis of food products based on color, size, and shape, and serve as a reliable approach for determining quality in real time, without manual intervention. This can also be extended on farms to identify any crop diseases or pest infestation in the crops.

Risk Prediction

AI can enable pre-emptive alerts to farmers to indicate in advance the risk of a pest attack based on weather conditions and stage of the crop, prior to sowing of seeds.

Virtual Assistants

In the food industry, several restaurants are noted to be integrating AI to improve customer ordering experience by enabling customers to place orders and make payments to self-ordering kiosks. Further,

developers are creating apps based on AI that provides recommendations to users based on their gourmet habits.

9.4.5 Point of Contact (PoC) Food Safety Devices

Consumers

With the growing awareness, consumers expect that food they purchase and consume are of high quality.

Such PoC detection devices can help consumers check their restaurant foods, packaged foods, or catered foods.

These devices can also be extended to check for particular allergens such as gluten or peanuts.

Food Producers

In food production plants, especially in food processing industry, poor food safety can put consumers at the risk of illness. On spot testing can provide rapid intervention.

Such timely intervention during production operations can reduce pathogen contamination related losses in the food industry and prevent wasting an entire batch of finished products.

Retailers

According to the legal requirements of food safety, every food business needs to follow certain procedures such as cleaning, sorting, grading, fumigation to ensure that the safety of the food is maintained. PoC food safety devices can ensure food safety, prevent illnesses. They can also prevent cross contamination.

9.4.6 Interactive Packaging for End Consumers

Intelligent packaging systems provide the user with real time information on the condition of the food. The information provided must be reliable and correct. Intelligent components of the packaging system do not release their constituents into the food but just provide consumer ease of access to information about the food that is to be consumed. The intelligent component is generally positioned on the outer surface of the package and is separated from the food by a functional barrier.

Spoilage Detectors

An ideal indicator of the quality of packaged foods would indicate real spoilage or lack of freshness of the product instead of just temperature abuse or package leaks. In this way, the starting quality of the product would be taken into account as well as all “supply chain” mistakes.

Time Temperature Indicators

Time-temperature indicators provide information on whether a threshold temperature of the food packaging exceeds the storage requirements and also the indicators estimate the amount of time a food product has spent above the threshold temperature. That is, the data is collected from the moment the food is packed until consumption and is available to the consumer.

Toxin Indicators

Challenges with toxin indicators are that pathogenic microorganisms generally and only exist in or on a food product at very low concentrations and are not homogeneously distributed throughout the whole food. For this reason, it is not very likely that a marker for a toxin is present at high levels; thus, a detector or sensor has to be extremely sensitive and completely in contact with the food.

Gas Concentration Indicators

The gas composition in the package changes gradually as a result of the microbial activity in the food product, the nature of the package, or the environmental conditions. The change in gas concentration can also be due to respiration of fresh produce or gas transmission through the packaging material due to package leaks, and may cause the food inside the package to damage.

9.5 IMPACT OF MEGATRENDS ON F&B PACKAGING

Sustainable Products

There is increased customer demand for recyclable and eco-friendly products. As sustainability is a key in product development, this mega trend is expected to have long-lasting effects on manufacturing and product innovation. Companies including Bemis, Amcor, and Sonoco are working closely with customers to create innovative, sustainable products.

Technology Changes

Manufacturing technology and products are fast being replaced by newer versions, and market participants have to adapt to changing technologies to maintain their market position. For example,

Ampac has developed a butterfly pack (unit-dosage packaging) which allows convenient release of products. This product has an innovative format and the potential to change market trends.

Demographic Changes

Urban population growth and high expendable income have increased dependency on processed and pre-cooked meals. In addition, people are seeking better and safer packaging.

9.6 ROLE OF STAKEHOLDERS

The demand and growth on sustainable packaging is continued and is more likely to increase as it is being driven by the government, regulations and by the demands of retail customers.

Government

- Proliferation of regulation and policy measures (such as taxation).
- Move from weight to carbon focus.

FMCG and Retailers

- Focused on weight reduction but no common goals or definitions.
- Driving cost-reducing or cost-neutral solutions.
- Sometimes willing to pay a premium if brand-enhancing.

Packaging Companies

- Reacting to retailer demands.
- Leaders are investing in R&D and new products to develop solutions.
- Have historically been slow to engage in the wider debate around sustainable packaging.

End Customers

- Demanding more sustainable solutions.
- Unwilling to pay a premium for sustainable products unless it is part of brand message.
- Increasingly aware of 'wasteful' packaging.

9.7 REQUIREMENTS OF BRANDS

The requirements of brands can be listed as follows:

- Product Quality: no contamination, adherence to specifications according to country regulations.
- Packaging delivery: on time delivery of products, no line stoppages or delays.
- Zero or minimal product defects. Prevents issues such as product return from brand as well as end users.
- Price-adherence to contract prices. Price should reduce in accordance to raw material price reduction.
- Printability & Design quality should be excellent, colour consistency and glossy finishing.
- Collaboration between packaging companies and brands, for new designs, innovative release mechanisms, new molds and colours.
- R&D collaboration between brands and packaging companies for increasing shelf life, lighter packaging, and coated packaging.

9.8 MARKET DRIVERS OF SOUTHEAST ASIA IN FOOD & BEVERAGE PACKAGING

9.8.1 Overall Food & Beverage Packaging

Robust Growth of the F&B industry

- The F&B industry across the region comprising of fresh food, packaged food, retail F&B, full service restaurants and quick service restaurants is expected to show strong growth over the next five to seven years owing to higher disposable incomes in the region coupled with an increasing appetite for new types of F&B from other parts of the world.
- The F&B industry across Southeast Asia is expected to grow between 6% to 7% CAGR between 2019 and 2024, thereby signaling strong potential for packaging players in the region.

On the Go F&B Requirements

- More and more consumers are opting for 'on-the-go' F&B options, owing to hectic lifestyles, long hours of commute as well as taking advantage of the ease of availability of these products.
- The Southeast Asia region is also one of the most urbanized regions in the world, and this implies that consumers have less time to cook and prepare meals, and are willing to purchase on-the-go food & beverages, even for their families.
- This implies that the packaging for on-the-go food & beverage products must be lightweight, easy to carry, easy to use and easy to throw.

Growth of Food Delivery Companies

- The rise and growth of food delivery apps and companies in the region has been phenomenal over the last four to five years. Companies such as Food Panda, Grab Food, Deliveroo and Go-Jek are some of the most popular food delivery companies across the region.
- The market size for food delivery in the region was estimated to be USD 2 billion in 2018 and is expected to grow to USD 8 billion by 2025.
- The quadrupling of the market will have a significantly positive impact on the F&B packaging market across Southeast Asia.

Growth of Cloud Kitchens

- Cloud kitchen is a term to describe restaurants with no retail, geared to only deliver food. The elimination of customer seating, air conditioning and lighting slashes rent costs and bills and also reduces the need to employ serving staff. All these reductions earn for itself the better economies of scale, while catering to consumer preference.
- Cloud kitchens are gaining momentum in Southeast Asia. Grain from Singapore and Dahmakan, a Malaysia-based food company, both use this business model.

Increasing Demand for Food and Fruit Exports from Southeast Asia

- The demand for agricultural products from Southeast Asia has soared in recent years, particularly from China.
- By 2018, China is the top trading partner for agricultural products from Philippines, Cambodia, and Thailand. In 2018, Thailand's export to China of fruits alone reached a value of USD 2.02 billion.

Consumer attention to food safety:

- Increased consumer awareness regarding food safety in the region, which includes preservation of food quality inside the packaging as well as prevention of fake products entering the market, has ensured that food packaging companies not only pay attention to using high quality packaging materials, but also using innovative labelling systems to inform the customer about the genuineness of the product inside

9.8.2 Food & Beverage Packaging – Paper

Plastic Pollution in the region

- Southeast Asia as a region is one of the world's worst polluters of plastic, and countries such as Philippines and Vietnam have the dubious distinction of being ranked in the top 5 plastic polluters of the world. A large part of this is due to the plastic used in F&B packaging which is not properly collected & recycled.
- This is one of the key reasons for paper packaging to have better growth prospects for F&B uses in the future.

Sustainable Packaging

- Paper packaging falls under the category of sustainable packaging which is a trend that compliments the adverse effects of plastic pollution.
- Paper packaging does not have the same disastrous effect on the environment as plastic, owing to its ability to biodegrade when disposed.

9.8.3 Food & Beverage Packaging – Non-Paper

Increased safety in plastic packaging

- Legislation across Southeast Asia, especially in countries such as Vietnam and Thailand, have helped improve the safety around plastic packaging in the F&B sector.
- All plastics used for packaging must conform to the norms set by these regulatory authorities in terms of types of resins and additives used coupled with being BPA free.
- The safety in plastic packaging directly translates to the confidence the consumer has in a packaged F&B product, as the consumer knows that the F&B contents inside are not contaminated by the packaging material.

Recyclability of Glass

- Glass packaging is 100% recyclable and the recycling process can be done multiple times without any loss in purity or material which makes it an ideal choice for a sustainable packaging solution in the F&B industry.
- Recycled glass can also constitute 95% of new glass production which again makes it a champion in the field of sustainability.
- Glass packaging is also highly safe for F&B packaging.

Glass – Ideal for beverages

- Glass is still the preferred packaging material for alcoholic beverages ranging from distilled spirits, wines to beer as well as other non-alcoholic beverages.
- The alcoholic beverages market in Southeast Asia has been growing rapidly. Beer is expected to grow at a CAGR of approximately 5% to 5.5% across the region between 2018 and 2023, with wines and distilled spirits expected to grow at marginally lower rates. The growth augurs well for the glass packaging industry in the region.
- Nonalcoholic beverages such as Juices, Energy Drinks and others also use glass to a large extent.

Metals in beverage cans

- Metal cans are another preferred material for the packaging of various alcoholic and non-alcoholic beverages. With these end use markets expected to show robust growth in the region, metal cans are expected to grow in-line with this trend.
- Beverage cans (alcoholic & non-alcoholic) account for close to 70% of the metal packaging industry.

9.9 MARKET RESTRAINTS OF SOUTHEAST ASIA

9.9.1 Overall Food & Beverage Packaging

Price Sensitivity

- Even though disposable incomes across the region have been on the rise for the last ten years, most people across Southeast Asia are still price sensitive in matters such as F&B.
- While consumers are interested in trying packaged F&B from other countries, imported into Southeast Asia, there is a specific price range beyond which consumers will not purchase the product.
- This price sensitivity has an impact on packaging players as well, as they are required to reduce the price and cost of the packaging material being supplied to the brand.

Complexity of Distribution

- Countries such as Indonesia and Philippines are archipelagos and require a robust distribution system to send the packaged F&B products to all parts. The lack of strong road, rail and air networks can increase the cost of distribution which ultimately cannot be passed on to most customers.

- Packaging material providers are again under pressure to reduce the price of their product in order to off-set the distribution costs to a certain extent.

9.9.2 Food & Beverage Packaging - Paper

Raw Material Availability

- Southeast Asia as a whole is a net importer of raw materials such as wood and paper and is highly susceptible to price fluctuations in the global market, for these raw materials.
- There is also the case of non-availability of these raw materials owing to China's large appetite for paper imports, for its own paper packaging industry.
- These challenges could lead to paper packaging becoming more expensive as compared to plastic, glass, metal and others for the purpose of F&B packaging.
- Coupling this issue with the price sensitivity of the consumers in the region, could be a major issue for paper packaging in the future.

Lack of Strong Policy for Paper Production & Recycling

- Most countries across Southeast Asia do not have strong policies around paper recycling. A minimum requirement of recycled paper in new paper is still not fully implemented in the region.
- With paper & pulp availability / pricing being dependent on the economy of China, a great degree of emphasis must be placed on recycling paper in order to keep the cost of paper packaging in check, especially for F&B purposes.

9.9.3 Food & Beverage Packaging – Non-Paper

Heavy Weight & Handling of Glass

- The weight of glass as a packaging material is relatively higher in comparison to plastic and paper packaging. This increase in weight makes it difficult for consumers to carry several F&B made from glass and it also reduces the propensity of consumers to buy glass packaged beverages especially when 'On the Go'.
- Secondly, glass is delicate and brittle which makes it difficult to handle and transport. Adding the higher weight of glass to the brittleness increases the complexity of transporting glass based packaged F&B products, which could also lead to higher logistics costs for the manufacturers, on top of the already high energy cost of producing glass.

Pricing of Metals

- While aluminum and tin prices dropped in 2018, they are expected to rebound in 2019 and grow steadily over the next three to four years. This price increase will have a direct impact on the pricing of metal packaging which will then have to be passed on to the brands and in turn the customers.
- Tight supplies of tin for the packaging industry could also see price spikes for metal packaging companies.

Plastic Pollution

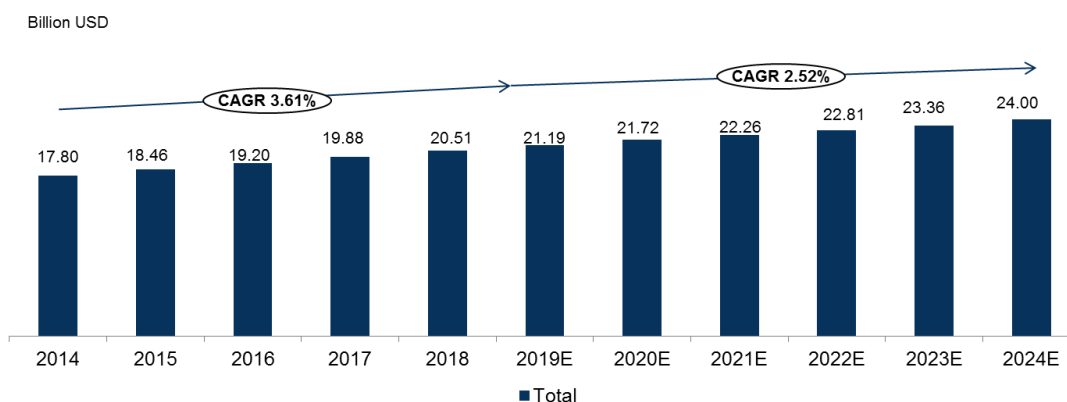
- Plastics, especially single use plastic are the main reasons for hazardous environmental issues that plague Southeast Asia today. The inability of plastics to degrade naturally, coupled with the lack of a strong recycling ecosystem makes them hard to dispose.
- Consumer awareness surrounding the negative impact of plastics is high in the region.

High Energy Costs for Glass Manufacturing

- The energy requirements and the cost associated with it during the manufacturing of glass packaging is high.
- Higher energy prices cannot be passed on to customers and need to be absorbed by the glass manufacturing company.

9.10 FOOD & BEVERAGE PACKAGING IN SOUTHEAST ASIA

Chart 9-1: Total F&B Packaging Revenue, Southeast Asia, 2014-2024E, Billion USD

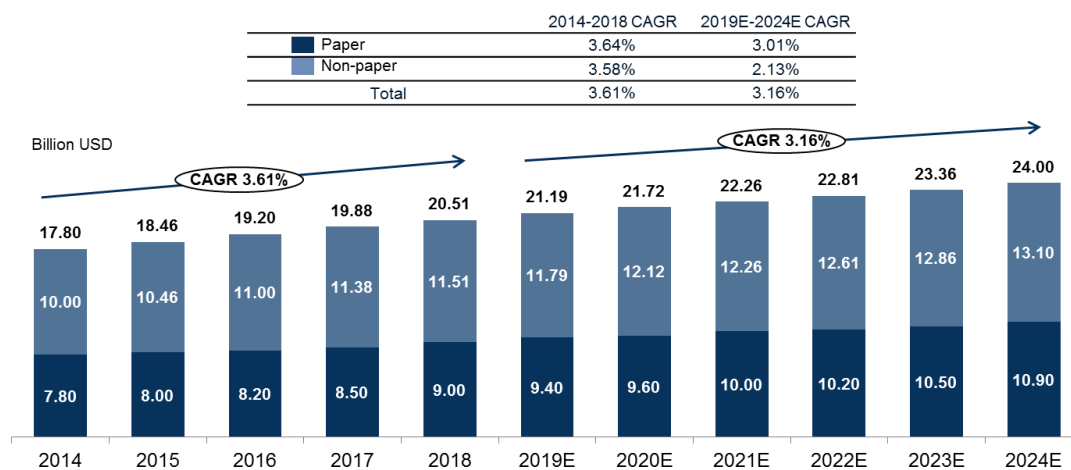


Source: Frost & Sullivan

The packaging market for F&B in Southeast Asia was estimated to be approximately USD 20.5 billion in 2018 and is expected to grow at a CAGR of 2.52% between 2019 and 2024, to reach USD 24.0 billion, which is in line with the growth of F&B in the region.

Flexible packaging solutions are the preferred materials for F&B packaging as compared to rigid materials owing to their lighter weight and ease of handling and carrying, for F&B companies and end users alike.

Chart 9-2: Total F&B Packaging Revenue, Paper vs Non Paper, Southeast Asia, 2014-2024E, Billion USD



Source: Frost & Sullivan

Paper Packaging on average accounts for close to 44% of all packaging used in the F&B industry and is slated to reach approximately USD 10.9 billion by 2024.

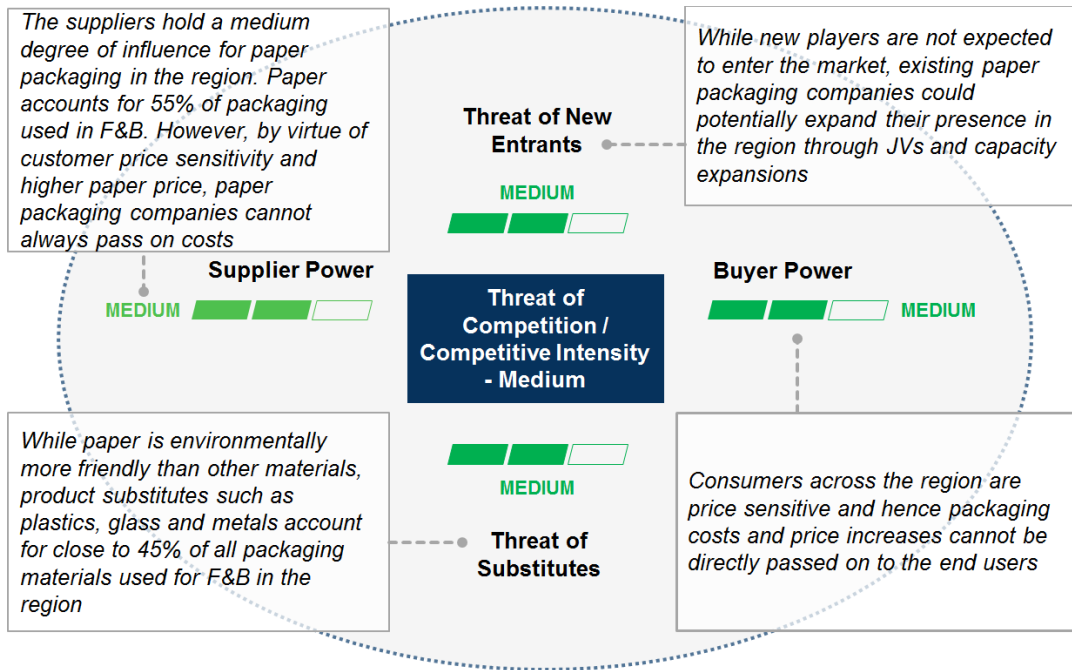
Non Paper packaging which includes Plastics, Glass, Metal and other substrates accounts for approximately 47% of the materials used in the F&B packaging industry in the region, and is anticipated to reach approximately USD 13.10 billion by 2024

9.11 BARRIERS TO ENTRY IN SOUTHEAST ASIA – F&B PACKAGING

The barriers to entry for food & beverage packaging can be segmented into Paper and Non-Paper:

9.11.1 F&B Packaging - Paper

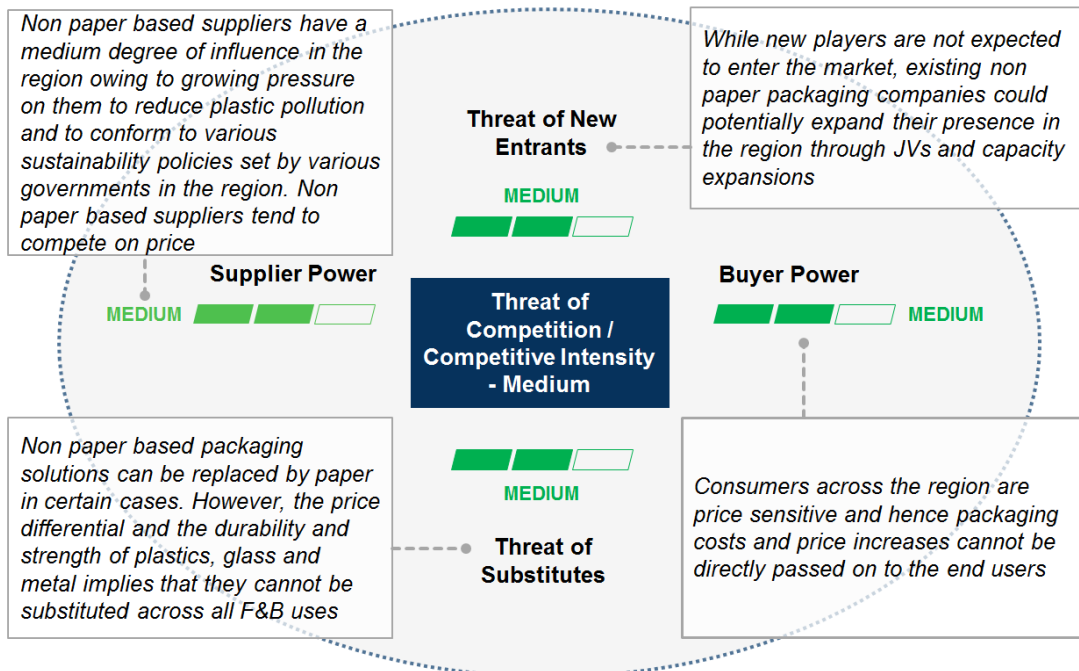
Figure 9-2



Source: Frost & Sullivan

9.11.2 F&B Packaging - Non-paper

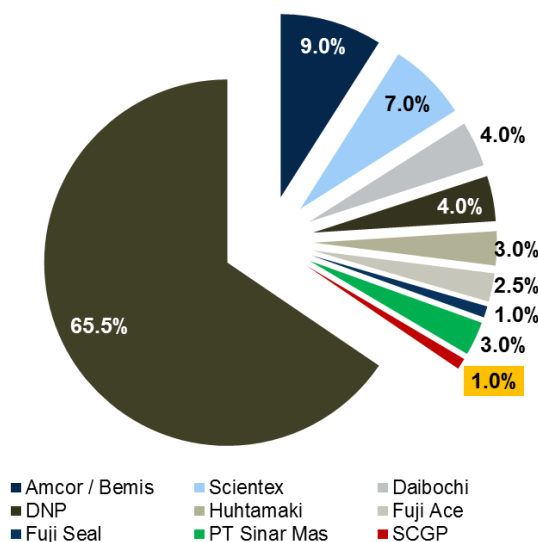
Figure 9-3



Source: Frost & Sullivan

9.12 MARKET SHARE ANALYSIS – SOUTHEAST ASIA

Chart 9-3: Southeast Asia Food Packaging Market Share, 2018, by value, Billion USD (%)



Source: Frost & Sullivan

SCG Packaging’s presence in food packaging across the region is relatively small, with approximately 1% competitive share. However, it intends to place a great degree of emphasis in improving its ability to serve the food packaging industry and in due course of time the medical devices industry.

The food packaging market in Southeast Asia is highly fragmented with the top 8-10 companies accounting for a combined market share of approximately 35%, which showcases a relatively good degree of competitiveness. However, such fragmented nature is also testament to the number of F&B companies operating in the region. The F&B packaging industry is highly dependent on factors such as food safety grade packaging, on time delivery, coated packaging solutions, pricing of packaging solutions, and ability of packaging to prolong shelf life.

For plastics packaging, a large part of its business focuses on consumer goods. For paper packaging, a similar focus on F&B is also being placed.

9.13 POLICY AND REGULATIONS OF SOUTHEAST ASIA’S PAPER AND NON PAPER-BASED FOOD PACKAGING MARKET

9.13.1 Policy and Regulation of Packaging Market in Southeast Asia

Policies and Regulations: 《Plastic Waste Management Road Map 2018-2030 Thailand》

Execution Year: 2018 – 2030

Issuing Department: Ministry of Natural Resources and Environment

Main Content and Emphasis:

- The Thai Cabinet has agreed for the roadmap to serve as the framework for plastic waste management policies.
- The roadmap aims to reduce plastic waste and replace them with environmentally friendly materials. The proposed policies will be implemented in several stages, as follows:
 - 2019: Banning of plastic cap seals in water bottles, OXO-degradable plastics, and plastic microbeads.
 - 2022: Banning of plastic bags with <36 microns in thickness, styrofoam food boxes, plastic straws, and single-use plastic cups.
 - 2027: Ensure that 100% of plastic waste will be reusable.

Policies and Regulations: 《Ban on Single Use Plastics – Bali Indonesia》

Execution Year: June 2019

Issuing Department: Governor of Bali

Main Content and Emphasis:

- Aimed at reducing marine plastic waste by 70% within a year, the ban will apply to plastic carrier bags, styrofoam containers, and straws.
- The policy applies to all participants, including producers, suppliers, distributors, and business operators.
- Non-compliance will result in administrative sanctions, such as non-renewal of business permits.

Policies and Regulations: 《Food Safety Act of 2013 Philippines》

Execution Year: 2013

Issuing Department: Food & Drug Administration, National Food Authority and Dept of Health

Main Content and Emphasis:

- Under the Food Safety Act of 2013, food in containers with any poisonous or deleterious substance is considered adulterated.

- With respect to food packaging, the Food Safety Act of 2013 specifies that DOH is responsible for ensuring the safety of all food processing and product packaging activities.
- For example, the Revised Guidelines on Current Good Manufacturing Practice in Manufacturing, Packing, Repacking, or Holding Food (Administrative Order No. 153), issued May 7, 2004, states, "There shall be appropriate quality control operations procedures to ensure that food is suitable for human consumption and that food-packaging materials are safe and suitable."

Policies and Regulations: 《QCVN 12-1:2017/BYT Technical Regulation on Food contact plastics made from 13 types of synthetic resin or polymer》

Execution Year: 2017

Issuing Department: Ministry of Health (Legislation on Food Safety – FSL)

Main Content and Emphasis:

- According to the FSL, food packages, containers, and equipment in direct contact with food must register an Announcement on Conformity with Technical Regulations and Food Safety Regulations with MOH before being circulated on the market.
- The law is provided to limit the levels of impurities in packaging as well as specific emissions of chemicals such as formaldehyde, heavy metals, potassium permanganate etc that are allowed in specified heating/chemical soaking conditions.

Policies and Regulations: 《Vietnam Food Administration’s (VFA) Decree on the Provision on Civil Penalties for Food Safety Violations [(115/2018/ND-CP)]》

Execution Year: Oct 2018

Issuing Department: Vietnam Food Administration

Main Content and Emphasis:

- This decree “specifies various fines, including those for the production of unsafe food contact packaging, implements and containers.”
- Compared to the previous Decree 178/2013/ND-CP that is being replaced now, fines for certain actions have increased by 3.5 times.
- A fine of up to 7 times the value of the goods will also be levied.
- In addition to fines, “products deemed unsafe may also be recalled, confiscated, or destroyed.

10. OVERVIEW OF THE COMPANY'S COMPETITIVE LANDSCAPE

10.1 COMPETITIVE ADVANTAGES OF THE COMPANY

Below are six advantages from different perspectives:

Complete packaging solution provider

SCG Packaging's operation cover arrays of solutions, from both product and business angles. It manufactures product packaging solutions from primary level including industrial bag and FybroZeal and Fest food safety packaging down to ancillary level such as mailing bag, label and sticker. SCG Packaging offers assortment of business solutions including design & printing services, end-to-end services for E-commerce and marketing exhibition solutions.

Solid footprint and market lead in ASEAN markets

With Malaysia being the only other large packaging market apart from the four focus countries in Southeast Asia, it implies that SCG Packaging is the largest packaging paper producer across ASEAN. On the other hand, the combined containerboard and corrugated container sales volume of SCG Packaging is the largest across Thailand, Indonesia, Vietnam and the Philippines. Considering the sizes of the major competitors in Malaysia, it similarly implies that SCG Packaging is also the largest player in containerboard and corrugated containers combined. This places SCG Packaging as the number one packaging company in terms of market share for containerboards across ASEAN and the number one market share holder for corrugated containers in the region as well. It has a wide regional coverage of converting plants for both paper and plastic-based packaging.

Circular Economy

Extensive paper and plastic waste collection network via drop-point stations in collaboration with modern trade channel and via recycling stations. Biodegradable and resource-reducing technologies in products: Green carton, light-weight paper and PP woven.

Definitive growth strategy

SCG Packaging seeks to shift towards diversified packaging solution provider for both paper & paperboard and plastic packaging in order to attain better performance. It is also exploring opportunities in various thriving segments, including food & beverage packaging and e-commerce packaging

Self-reliance on raw materials supply allows for better profitability

The completion of Long son petrochemical refinery project in 2023 would enable SCG Packaging chemical to start commercial operation for plastic resins manufacturing and domestically supply PP, HDPE and LLDPE for SCG Packaging operation in Vietnam where domestic demand of raw material far-outpace the local supply capacity. This development will help mitigate the raw material supply bottleneck and profitability for flexible plastic packaging production for SCG Packaging owned Batico. Majority of players in Vietnamese plastic packaging industry remain largely depended upon plastic resin imports and subject to price fluctuation of raw material imports.

In a similar vein, SCG Packaging is one of the few companies in Southeast Asia to have a direct access to wood. SCG Packaging also has a wide network of recycling stations from which to procure recovered paper. This integration ensures the Company to remain relatively insulated from the volatility of raw material prices.

Well positioned to take advantage of E-commerce growth in the region

In addition to fully integrated pulp and paper production, SCG Packaging also operates 22 box plants across Thailand, Vietnam and Indonesia. The large capacity and wide presence has placed SCG Packaging as one of the most prolific producer of corrugated box in the region, with an output of approximately 800,000 metric tons in 2018. SCG Packaging is perfectly positioned to take advantage of the robust growth in E-commerce. In particular, its wide range of SKUs can meet the surge in demand that occurs during promotional periods.

10.2 CHALLENGES FOR THE COMPANY

Three challenges considered from competition, labor and exportation are displayed as follows:

Intense competition

Other ASEAN markets, particularly Vietnam and Indonesia are relatively more fragmented than in Thailand where SCG Packaging commands dominant position in the market. Pricing and technical limitation such as printing quality are to be addressed in order to narrow the gap with local competitors in Vietnam and Indonesia.

Labor issues

High cost of productivity per head is observed, as well as high turnover rate among employees in ASEAN footholds so less skill and expertise development.

Reeled Export Outlook

Two largest export-oriented ASEAN economies, particularly Thailand will continue to have cloudy prospect for the export sector well into 2021 owing to the strengthening of the Thai Baht against the US Dollar. This will put drag on demand for multiple packaging products including wooden/plastic container pallet, carton boxes and protective film.

10.3 SWOT ANALYSIS OF SCG PACKAGING

Strengths

- Number one packaging solutions provider across Southeast Asia.
- Strong business value chain integration (recovered paper/wood to paper production to box production).
- Wide market access & wide product portfolio, including the only dissolving pulp producer in Thailand.
- Strong customer relations.
- Excellent brand reputation.
- Strong manufacturing capabilities.
- Strong management & people capabilities.

Weaknesses

- Organizational Complexity.
- Flexibility of Production.
- Limited capacity expansion options especially in Thailand.
- Environmental challenges associated with paper manufacturing facilities.

Opportunities

- In a strong position to capture part of the growth of packaging solutions in Southeast Asia (market expected to grow at a CAGR of 5% over the next four to five years).
- Companies relocating manufacturing to Southeast Asia from China.
- Opportunities from Circular Economy trends.

Threats

- Current over-supply scenario of paper packaging products in Southeast Asia, especially in Thailand, Vietnam and Malaysia.
- Key Raw Materials risk from stricter waste import policies across Asia.

10.3.1 Thailand

Strengths

- Highly integrated business in Thailand.
- Company has 16 Box plants in the country with over 2,000 customers, including the biggest FMCG & Industrial Brands.
- Wide range of packaging solutions including Green / Eco Friendly products.
- Strong financial health.
- Strong relationships with stakeholders across value chain.
- Strong management & wide knowledge base.

Weaknesses

- High fixed costs.
- Low degree of flexibility to change.
- Lack / Shortage of skilled labour.

Opportunities

- Rapid growth of E-commerce market in Thailand.
- Growing awareness of trends such as Sustainable packaging solutions.
- Profit margins strong across value chain.
- Producers are looking for options outside China. Thailand could be an ideal location and could be a major export destination.

Threats

- Fluctuations of raw material costs (paper & pulp) owing to trade disputes and shortage of availability.

10.3.2 Indonesia

Strengths

- Strong reputation and brand image in the market.
- Strong relationships with regional customers.
- Ability to transfer technology knowledge from Thailand to Indonesia.
- Ability to gain access to local market through partners.
- Competitive pricing and service levels.

- Higher bargaining power owing to leveraging of economies of scale.

Weaknesses

- Company still operates a few manual machines.
- Some machines do not meet customer requirements especially in offset printing.
- Higher cost of paper owing to smaller order sizes.

Opportunities

- Indonesia has a large population with a growing economy and growing disposable incomes.
- F&B, FMCG and other product categories are expected to show strong future growth.
- World's 10th largest economy in terms of purchasing parity.
- Large footwear market.
- Government supports new investments.
- Rapidly growing E-commerce market.

Threats

- Logistics & Transportation costs are high.
- Strong presence of labour unions.
- Higher cost of productivity on a per person basis.

10.3.3 Vietnam

Strengths

- Strong relationship with the local government.
- High degree of bargaining power owing to the company's size and reputation. Valid for medium and large end users as well.

Weaknesses

- Higher pricing of CIP by SCG Packaging in Vietnam which makes them uncompetitive.
- Lower printing quality as compared to certain local suppliers.

Opportunities

- Vietnam is becoming a hot-spot for manufacturers wanting to move out of China. High influx of foreign investments into the country.

- The FMCG market in urban areas across Vietnam is expected to show strong growth potential over the next few years.
- Growing adoption of E-commerce and internet penetration.
- Integrated petrochemical complex in Long Son where SCG Packaging has a plant could be leveraged for Vietnam.

Threats

- Well established industry with several competitors.
- High rate of attrition from labour force.
- Prevalence of unskilled labour.
- Lack of transparency.

10.3.4 Philippines

Strengths

- Largest market share for paper packaging in the country.
- Only company to be fully vertically integrated in Philippines.
- Ability to forge relationships and strong potential for JVs and M&As.

Weaknesses

- Competitive pricing could be a weakness for SCG Packaging in the Philippines.

Opportunities

- The Philippines is one of the fastest growing economies in the region and SCG Packaging is well poised to take advantage of this growth.
- The fight against plastic pollution could enable SCG Packaging's paper packaging business to make further in-roads into sectors such as FMCG and F&B as well as industrial.

Threats

- The market is highly fragmented with the smaller players providing cheaper paper packaging solutions (at the expense of high quality).
- The price sensitive Philippines market could opt for these cheaper solutions.

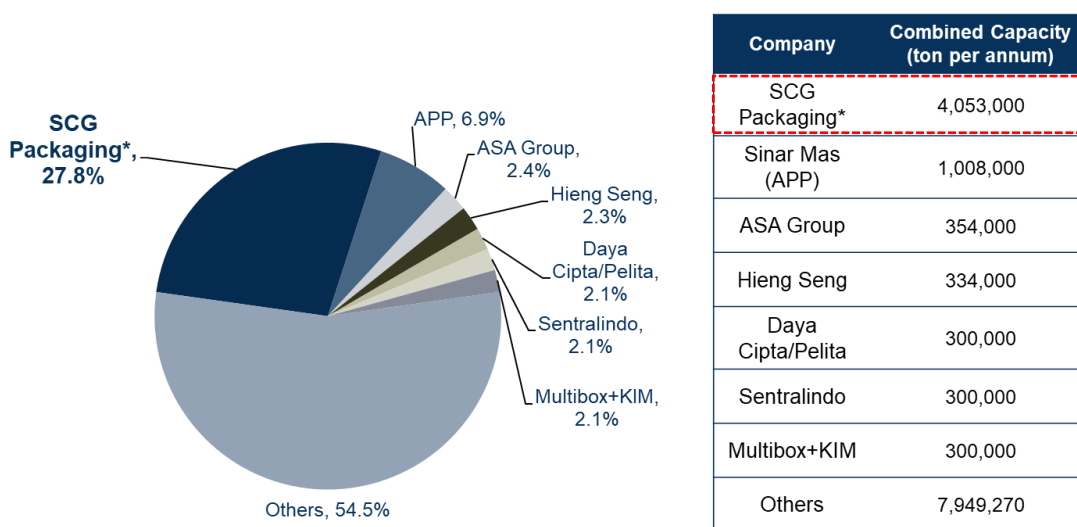
10.4 COMPETITIVE ADVANTAGES OF PAPER SCG PACKAGING

Apart from having the largest production capacity across Thailand, Indonesia, Vietnam and the Philippines, SCG Packaging’s packaging paper capacity is also much larger than the largest company in Malaysia, namely GS Paper & Packaging Group, which has a total capacity of 0.3 million MT as compared to 4.1 million MT for SCG Packaging. The paper packaging market in Malaysia is also highly fragmented. The six largest paper & paper packaging companies in Malaysia have a combined capacity of 1.2 million MT which is significantly smaller than SCG Packaging’s capacity.

With Malaysia being the only other large packaging market apart from the four focus countries in Southeast Asia, it implies that SCG Packaging is the largest packaging paper producer across ASEAN.

On the other hand, the combined containerboard and corrugated container sales volume of SCG Packaging is the largest across Thailand, Indonesia, Vietnam and the Philippines. Considering the sizes of the major competitors in Malaysia, it similarly implies that SCG Packaging is also the largest player in containerboard and corrugated containers combined. This places SCG Packaging as the number one packaging company in terms of market share for containerboards across ASEAN and the number one market share holder for corrugated containers in the region as well.

Chart 10-1: Capacity Share by Volume in Thailand, Indonesia, Vietnam and Philippines, Paper Packaging, 2019 (Actual), million MT



Note: Includes additional capacity from acquisition of Fajar.

Source: IMF, Frost & Sullivan

Among the top 10 market players in the focused countries, SCG Packaging is the most vertically integrated company and holds the largest market share. As a result, SCG Packaging is the largest integrated packaging solution provider in ASEAN, in terms of sales volume in 2018.

Table 10-1: Paper Packaging – Market Share in Thailand, Indonesia, Vietnam and Philippines, 2018

	Company	Country (Headquarters)	Market Share (%)	Overall Integration
1	SCG Packaging	Thailand	34%	Full Vertical Integration
2	Sinar Mas (APP)	Indonesia	11%	Full Vertical Integration
3	Panjapol Paper Industry	Thailand	5%	Low Vertical Integration
4	Pakerin	Indonesia	3%	Semi Integrated
5	Pelita	Indonesia	3%	Low Vertical Integration
6	Nine Dragon	Vietnam	3%	Semi Integrated
7	Lee & Man	Vietnam	3%	Semi Integrated
8	Elite Kraft & Mahachai	Thailand	2%	Semi Integrated
9	United Paper	Thailand	2%	Semi Integrated
10	Asia Kraft Paper	Thailand	2%	Semi Integrated

Source: Frost & Sullivan

10.4.1 Paper Packaging - Thailand, 2018

SCG Packaging is the only fully vertically integrated paper packaging company in Thailand and also has the highest market share in the country in the containerboard segment.

Table 10-2

Company	Market Share – Containerboard	Market Share – Corrugated Box	Upstream (Access to Raw Materials)	Midstream (Pulp & Paper Manufacturing)	Downstream (Paper Packaging Solutions)	Overall Integration
SCG Packaging	47.6%	33.9%	Yes	Yes	Yes	Full Vertical Integration
Panjapol Paper Industry	15.2%	7.5%	No	Yes	No	Low Vertical Integration
Elite Kraft & Mahachai	7.2%	<1.0%	No	Yes	Yes	Semi Integrated
United Paper	6.6%	5.6%	No	Yes	Yes	Semi Integrated
Asia Kraft Paper	6.2%	Not a participant	No	Yes	Yes	Semi Integrated

Source: Frost & Sullivan

10.4.2 Paper Packaging - Indonesia, 2018

SCG Packaging & PT Sinar Mas are the only two Fully Vertically Integrated Paper Packaging companies in Indonesia and account for a combined market share of approximately 59%.

Table 10-3

Company	Market Share – Containerboard	Market Share – Corrugated Box	Upstream (Access to Raw Materials)	Midstream (Pulp & Paper Manufacturing)	Downstream (Paper Packaging Solutions)	Overall Integration
SCG Packaging	28%	3.9%	Yes *	Yes	Yes	Full Vertical Integration
Sinar Mas Group	31%	26.3%	Yes	Yes	Yes	Full Vertical Integration
Pelita	9%	6.0%	No	No	Yes	Low Vertical Integration
Pakerin	9%	Not a participant	No	Yes	Yes	Semi Integrated
Meka Box	6%	<1.5%	No	Yes	Yes	Semi Integrated
Buana Megah	3%	Not a participant	No	Yes	Yes	Semi Integrated

Note: SCG Packaging does not have plantations in Indonesia. It will leverage its regional supply network as a source of raw material.

Source: Frost & Sullivan

10.4.3 Paper Packaging – Vietnam, 2018

SCG Packaging is the only fully vertically integrated paper & paper packaging company in Vietnam and has the highest market share in the containerboard segment within the country.

Table 10-4

Company	Market Share - Containerboard	Market Share – Corrugated Box	Upstream (Access to Raw Materials)	Midstream (Pulp & Paper Manufacturing)	Downstream (Paper Packaging Solutions)	Overall Integration
SCG Packaging	25%	7.2%	Yes*	Yes	Yes	Full Vertical Integration
Lee & Man	13%	Not a participant	No	Yes	Yes	Semi Integrated
Nine Dragon	13%	Not a participant	No	Yes	Yes	Semi Integrated
Thuan An	5%	Not a participant	No	No	Yes	Low Vertical Integration
Saigon	5%	Not a participant	No	Yes	Yes	Semi Integrated

Note: SCG Packaging has an extensive RCP collection network in Vietnam and can also leverage SCG Packaging regional supply network as a source of raw material.

Source: Frost & Sullivan

10.4.4 Paper Packaging - Philippines, 2018

Although SCG Packaging is not fully integrated in Philippines, its ability to secure raw materials through its regional affiliates has enabled it to capture largest market share in the containerboard segment in the country.

Table 10-5

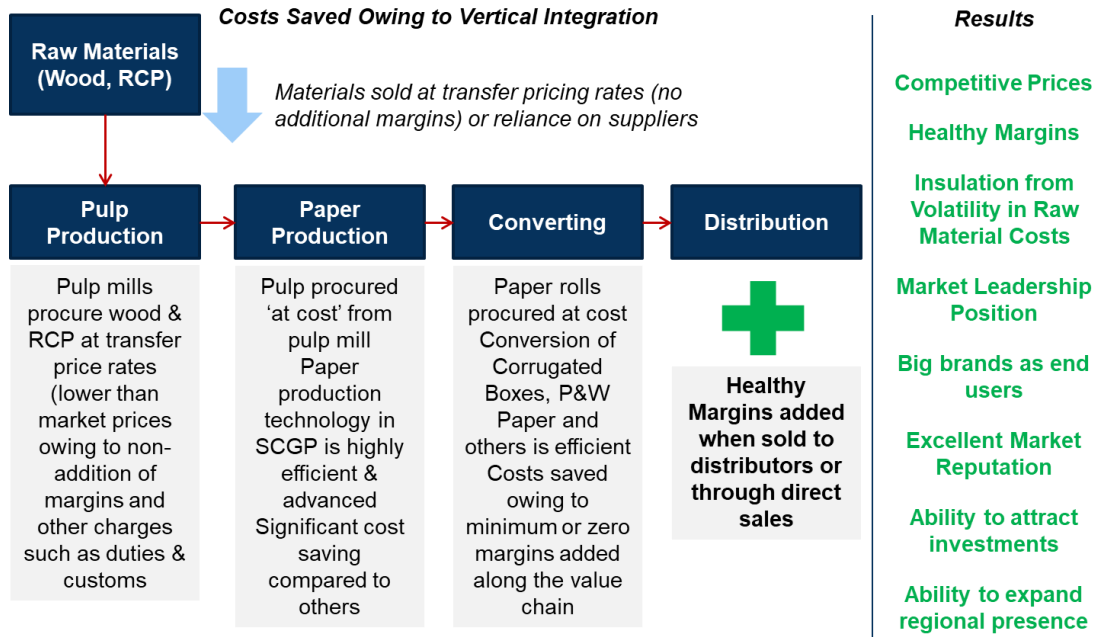
Company	Market Share – Containerboard	Upstream (Access to Raw Materials)	Midstream (Pulp & Paper Manufacturing)	Downstream (Paper Packaging Solutions)	Overall Integration
SCG Packaging	25%	Yes	Yes*	No	Semi Integrated
Multiply Paper Ventures	7%	No	No	Yes	Low Vertical Integration
Bataan Paper	6%	No	No	Yes	Low Vertical Integration
CMI	4%	No	No	Yes	Low Vertical Integration
Batangas Paper	4%	No	No	Yes	Low Vertical Integration

Note: SCG Packaging has an extensive RCP collection network in Philippines and can also leverage SCG Packaging regional supply network as a source of raw material.

Source: Frost & Sullivan

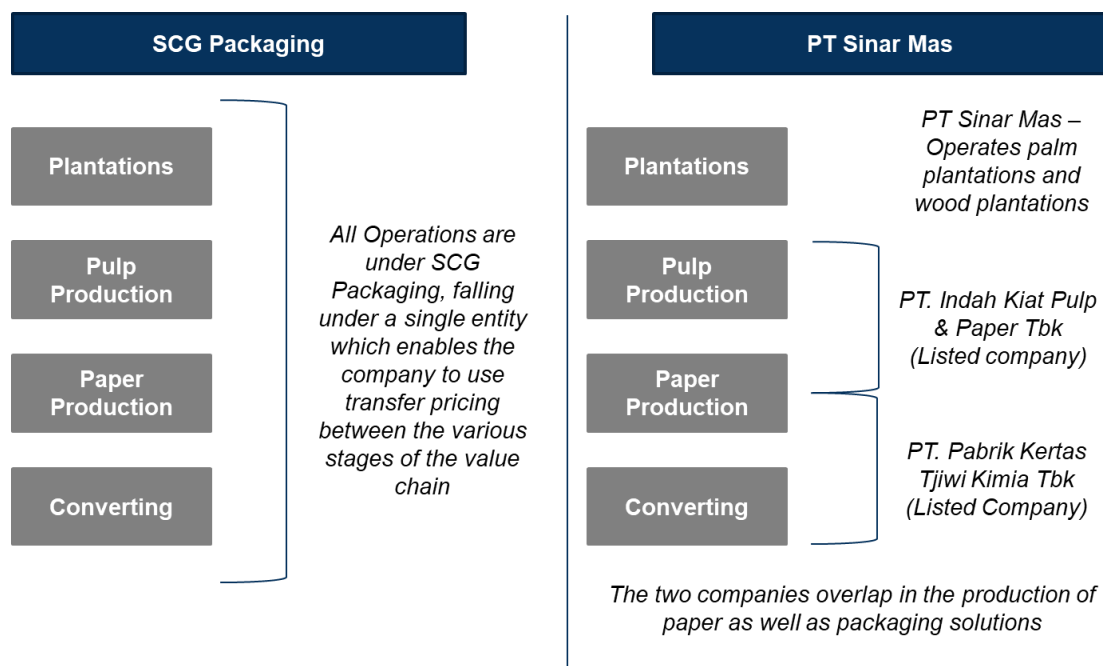
10.5 COST ADVANTAGES FROM VERTICAL INTEGRATION IN PAPER SCG PACKAGING

Figure 10-1



10.6 SCG PACKAGING & PT SINAR MAS – DIFFERENCES IN VERTICAL INTEGRATION

Figure 10-2



SCG Packaging

Since all the various parts of the value chain fall under the purview of SCG Packaging, the ability to employ competitive pricing between the entities is possible and leads to significant costs savings. These cost savings can then be translated into better pricing and healthy margins as well. SCG Packaging should be able to leverage this USP in order to continue its number one position across the region as a complete packaging solutions provider.

PT Sinar Mas

In the case of PT Sinar Mas, each entity in the value chain is a separate company, with a separate P&L and are listed. This implies that there is always a requirement to show profitability in each company in order to re-inforce shareholder confidence. The ability to use competitive pricing across the various entities is possible, but is limited owing to profitability pressure.

10.7 SCG PACKAGING OVERALL MARKET POSITION

Distinct Cost Advantage

Cost advantage enables the company to have competitive pricing and margins. Competitive pricing within units gives the company a major cost advantage.

Regional Number One market share in paper

Number 1 paper packaging player in Thailand, Philippines and Vietnam, and number 2 in Indonesia.

Plastics Packaging + Paper Packaging Provider

One of the only companies to have both paper and plastic packaging solutions.

Strong ability to forge JVs to increase presence in market

Market expansion ability through local partners and distributors.

Acquired Visy Thailand – Asia Pacific’s leader in high barrier rigid food packaging.

Ability to form JVs across the region to increase market footprint.

Advanced production technology

State of the art production technology for both paper and plastic packaging across the region.

Only Fully Vertically Integrated Packaging Company in Southeast Asia

Integrated from recovered paper & wood to paper packaging as well as polymers to plastic packaging.

10.8 SCG PACKAGING COMPETITIVE ANALYSIS

PAPER PACKAGING

Among the top 10 market players across Thailand, Indonesia, Vietnam and the Philippines, SCG Packaging is the leading comprehensive packaging solutions provider and the most vertically integrated company and holds the largest market share in terms of production capacity, sales volume and sales revenues for containerboards, in 2018. Owing to its vertical integration in the fiber-based packaging value chain, SCG Packaging enjoys significant cost advantages. , including at the pulp production stage, the paper production stage and the conversion of corrugated containers contribute to the competitiveness of its selling prices.

In terms of production capacity of paper & paper packaging, SCG Packaging is the largest with a total capacity of 4.0 million MT, which is much higher than Sinar Mas (APP) whose capacity is 1 million MT is considered to be the second biggest in the region. The company’s significant production capacity enables it to capture significant market shares across the region, making it the leader in paper-based packaging industry, as the largest packaging paper producer and the largest containerboard and corrugated container producer in ASEAN, based on sales volume in 2018. The large market shares SCG Packaging has across the region for both containerboards and corrugated containers, makes it the number one paper based packaging company in Southeast Asia.

SCG Packaging also has its own recycling center for paper, which is another added advantage for the company as it has direct in-house access to recycled paper, which is also a key raw material in the manufacturing process of paper packaging, thereby improving its cost advantage.

By virtue of being one of two vertically integrated packaging companies in the region, SCG Packaging has the distinct advantages to leverage its internal supply chain networks (with direct self-owned access to raw materials such as wood and pulp and RCP) and cost structure (in the form of competitive pricing between units) to continue its position as the number one paper packaging solutions provider in the region. In comparison to Sinar Mas (APP), SCG Packaging enjoys a market share three times greater than its main competitor. SCG Packaging is also the only company has presence in all the four countries – Thailand, Indonesia, Vietnam and Philippines whereas most of the other players are present in a single country only.

SCG Packaging also has its own wood plantations in Thailand which provide woodchips and pulp to the downstream processing plants in the country. It is also one of the few major Southeast Asian fiber-based packaging provider with direct access upstream supply of wood. The company also has the ability to leverage its supply chain network to provide raw materials to its plants in Vietnam, Indonesia and Philippines. Since the entire operations is encompassed within the confines of SCG Packaging as an entity, competitive pricing advantages exist, which is lower than open market prices.

In addition to its wood plantations, the company also has an extensive network of RCP collection centers across Thailand, Vietnam and the Philippines, where RCP is a key raw material in the manufacturing process as well. The ability to efficiently collect and use RCP in these countries enables SCG Packaging to further safeguard its raw material supply requirements.

Owing to its unique position, SCG Packaging is able to provide competitive prices for its paper production and is able to weather the volatility of raw material costs in the region. The advanced manufacturing and processing technology also enables the company to save costs via greater efficiency; all of which leads to healthier margins, a larger pool of big brands and a significant market share across the region.

PLASTIC PACKAGING

Out of the top 10 market players in Southeast Asia's paper packaging market, SCG Packaging is the only diversified packaging provider offering both paper-based and plastic-based packaging. While the company does not enjoy the same level of market share across the region as compared to its paper packaging business, SCG Packaging remains one of the few companies to provide both paper and plastic packaging solutions. In addition, in the highly fragmented plastic packaging market in Southeast Asia, SCG Packaging is the sixth largest by sales revenue and the only regional brand. It is also the only 'local / regional' company (headquartered in ASEAN) to feature in the top 6-7 market players for plastic packaging and making it the number one 'local' brand in this segment. Its competitors are international MNCs with headquarters outside ASEAN.

The plastic packaging landscape across the region is highly fragmented, highly depending on product pricing and has a significant number of small & medium domestic players – all of which contribute to the

competitiveness of the industry. SCG Packaging has the advantage of being a key supplier of plastic packaging products to some of the biggest brands in the region and has the ability to expand its footprint and in turn its market share through organic and inorganic expansions.

Customer preference in terms of packaging designs and trends is constantly ever-changing, and the competition in the market is expected to rise. Hence, the need for product and technological innovation to meet the consumer demands raises the bar of competition among the industry participants.

While end use segments such as F&B, FMCG and Industrial Goods may be saturated in terms of plastic packaging requirements, areas such as healthcare are considered to be the 'Next Big Thing' for plastic packaging manufacturers. Healthcare packaging could be an area of innovation for SCG Packaging owing to its ability to formulate and develop new plastic packages that fit the requirements of the healthcare and medical devices industry in the region.

SCG Packaging – Key Competitive Advantages

SCG Packaging is one of the few companies that has both paper and plastic packaging solutions, which gives it the ability to cater to a wide range of end use industries such as F&B, FMCG, Industrial and others, and a wide range of customers. This enables SCG Packaging to insulate itself from business shocks when a particular end use industry is undergoing a slowdown or drop in business. This form of risk diversification puts SCG Packaging in a strong position to continue its leadership role in the paper packaging business and expand its foothold in the plastic packaging business. It is also the only diversified packaging company that has operations across the major packaging markets in the region, namely – Thailand, Indonesia, Vietnam, The Philippines and Malaysia.

The company's brand name and reputation also enables it to attract large customers from the ASEAN region across various end use segments. The company's adherence to product quality, on time delivery and provision of technical services also gives it a distinct advantage over its competitors, a few of whom predominantly rely on pricing for market share gains. The ability of SCG Packaging to provide bundled packaging solutions (paper and plastic) enables the company to be a key supplier to a wider range of customers (who require both paper and plastic packaging), and also helps foster long term customer relationships. SCG Packaging is also perfectly positioned to take advantage of the robust growth in E-commerce, especially that its wide range of SKUs can meet the surge in demand that occurs during promotion periods.

SCG Packaging's focus on inorganic expansion or expansion through M&A and JV activities also helps the company to move quickly into various markets (end use segments and geographies) and establish itself as a key player for packaging solutions. One example is SCG Packaging's acquisition of Visy Packaging in Thailand, which is a leader in high barrier rigid food packaging in Asia Pacific.

In conclusion, SCG Packaging has all the right requirements to make it a leading packaging player in the region, namely – vertical integration in paper for cost advantages, presence in the five key countries (namely, Thailand, Indonesia, Vietnam, the Philippines and Malaysia) across Southeast Asia, leadership

position for paper packaging in the region, ability to expand quickly through M&A and JVs, a highly reputable brand name and a strong set of customers.

OUTLOOK AND PROSPECTS OF SCG PACKAGING

Frost & Sullivan believes that SCG Packaging, being one of the leading packaging companies in the region, is well positioned to take advantage of the growth in the packaging market expected in the coming years. With segments such as FMCG and F&B expected to grow at between 6% to 9% and 7% to 8% respectively between 2019 and 2024, the company is well placed to grow its packaging business in line with these end use industries. As of 2018, SCG Packaging has approximately 34% market share in paper packaging across Thailand, Indonesia, Vietnam and Philippines, which makes it the largest paper packaging company in the region. The company has market shares of 47.6% in containerboard and 33.9% in corrugated containers in Thailand, 28.0% in containerboard and 3.9% in corrugated containers in Indonesia, 25.0% in containerboard and 7.2% in corrugated containers in Vietnam and 25.0% in containerboard in the Philippines. The company's market shares in both containerboards and corrugated containers make it the leading paper packaging company in the region. The company's large production capacity of paper and paper packaging is significantly larger than all the other players in the region, which enables it to grow its market share across Southeast Asia. SCG Packaging's competitor with the second largest production capacity of paper & paper packaging is approximately 4 times smaller than SCG Packaging.

For plastic packaging, as of 2018, SCG Packaging has a regional market share of 0.8% by sales revenue across the region, and is among the top six plastic packaging companies in Southeast Asia. However, it is the only company which is based (headquartered) in ASEAN when compared to the other players in the plastics packaging segment. This also makes it the number one local brand in the region.

SCG Packaging's internal strategy of product portfolio expansion, new product development and emphasis on manufacturing technology for paper and plastic packaging augurs well for the long term health and profitability of the company.

With a significant amount of emphasis placed on Circular Economy, SCG Packaging has its own recycling centers as well as collection centers for RCP, which showcases SCG Packaging's focus on sustainability and providing solutions that play a crucial part in protecting the environment. It is also one of the few companies in the packaging segment across the region, to have a high degree of importance and focus placed on Circular Economy.

SCG Packaging's strategy to expand its regional footprint in both paper and plastic packaging through organic and inorganic growth, signifies the company's drive to towards being a market leader for packaging solutions across various end use industries.

11. APPENDIX: INSIGHTS INTO GLOBAL CIRCULAR ECONOMY FOR PLASTICS

11.1 INSIGHTS INTO THE GLOBAL CIRCULAR ECONOMY

Revenue

Market is estimated to be \$13.08 billion in 2018 and is expected to grow at a CAGR of 9.1%.

Volume

Volume generated for 2018 is 106.3 million metric tonnes and is expected to increase to 186.8 in 2030. The recycling rates will improve 54.7% in 2030 compared to 28.6% in 2018.

Geography

China's waste ban has created numerous opportunities in countries that were exporting their plastic waste. Producers, consumer and recyclers are working together to enhance recyclability of packaging plastic. Europe is going the circular economy way in dealing with packaging plastic waste by establishing a "zero landfill" of plastic waste by 2030.

Technology Innovation

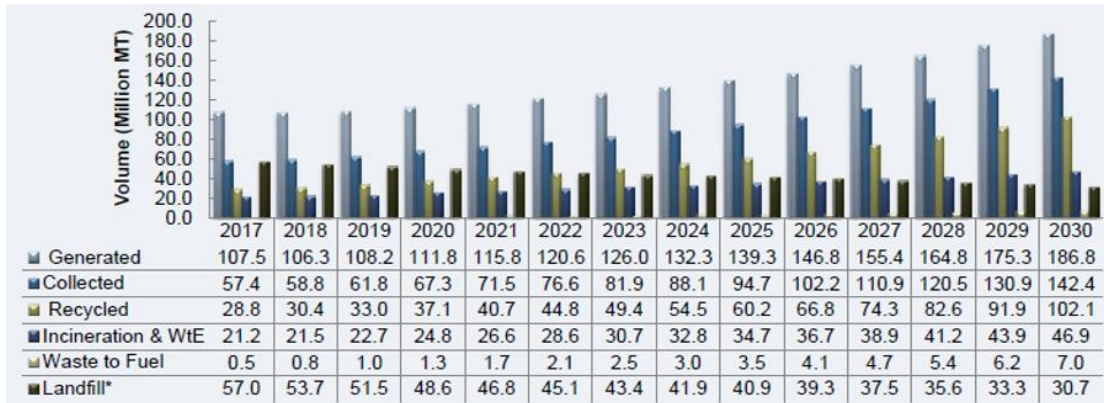
Waste to Fuel is an innovative solution to curb packaging plastic. Plastics which cannot be recycled can be converted to fuel. Waste to Energy (WtE) through incineration is gaining traction in many countries that are cunng out of space for landfills.

Types of Plastic Waste

PET, HDPE, LDPE, PVC and PP recycling rated will increase to 66.8%, 57%, 36%, 48%, 47.1% respectively in 2010. Banning of single-use plastics in many countries is a result of UN and other organizations stressing on rise of plastic packaging waste in oceans.

11.2 FUTURE OF PLASTIC PACKAGING RECYCLING MARKET

Chart 11-1: Plastic Packaging Recycling Market, Volume Forecast by Waste Management Type, Global, 2017-2030



Note: Landfill—includes organized landfill as well as illegal dumping. All figures are rounded. The base year is 2018.

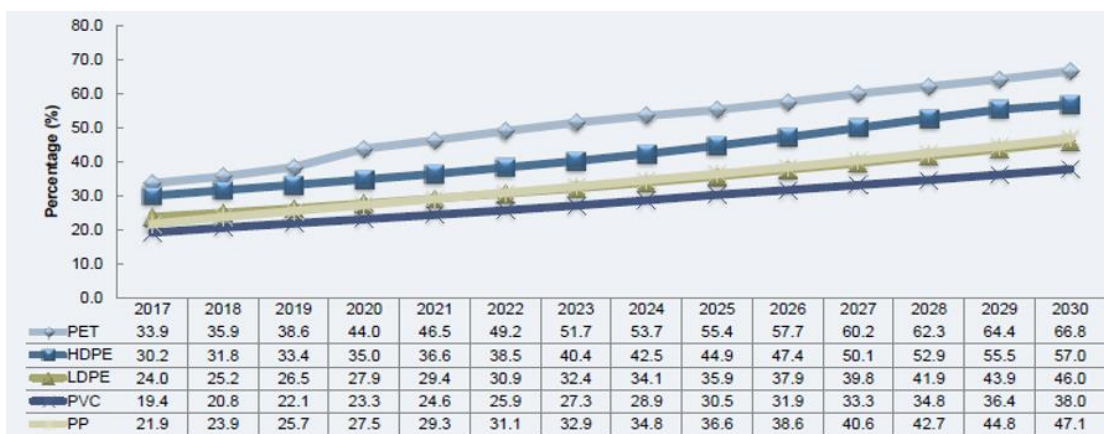
Source: Frost & Sullivan

Collection is set to increase at the rate of 76.2% in 2030, compared to 55.3% in 2018. The volume of plastic packaging is set to increase by 80.5 million tonnes in 2030.

Recycling is set to increase at the rate of 54.7% in 2030, compared to 28.6% in 2018 due increased awareness, stringent regulations, and industrial collaborations.

11.3 FUTURE OF PLASTIC PACKAGING RECYCLING MARKET GENERATION, COLLECTION AND RECYCLING

Chart 11-2: Plastic Packaging Recycling Market, Percentage of Recycled Plastic by Material Type, Global, 2017-2030



Note: All figures are rounded. The base year is 2018.

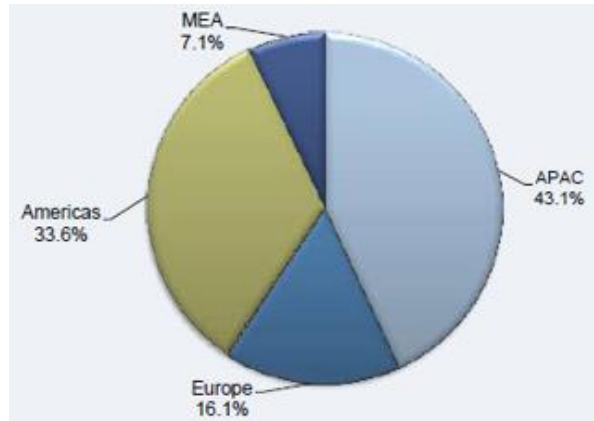
Source: Frost & Sullivan

PET will be the most recycled plastic with a recycling rate of 66.8% whereas PVC will be the least recycled packaging plastic material at the rate of 38%.

The Asia-Pacific (APAC) accounts for almost 45% PE demand in the world however, recycling rates are less compared to Europe and North America.

11.4 FUTURE OF PLASTIC PACKAGING WASTE RECYCLING AND RESOURCE RECOVERY MARKET

Chart 11-3: Plastic Packaging Recycling Market, Percent Share of Volume Generated by Region, Global, 2018



Note: All figures are rounded. The base year is 2018.

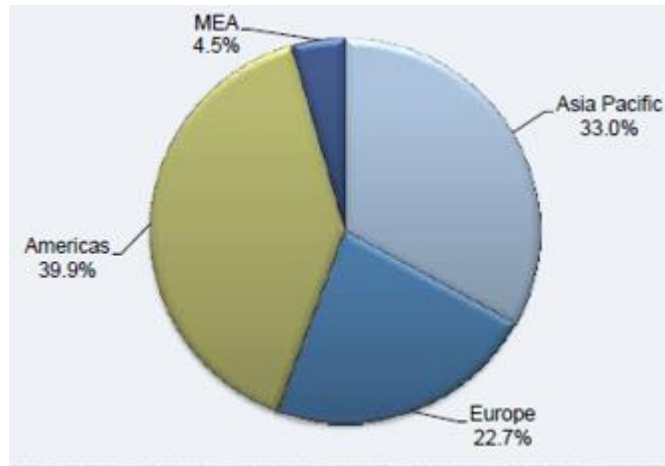
Source: Frost & Sullivan

The APAC generated the highest volumes (43.1%) of packaging plastic waste. Even though the per capita consumption is low compared to the developed regions, dense population contributes to volumes.

The collection rate in developing countries were low compared to that of developed regions like North America and Europe.

Due to weak legislation and lack of infrastructure in many countries in the APACM packaging plastic is heavily mismanaged with poor collection and recycling rates.

Chart 11-4: Plastic Packaging Recycling Market, Percent Share of Volume Collected by Region, Global, 2018



Note: All figures are rounded. The base year is 2018.

Source: Frost & Sullivan

11.5 KEY ELEMENTS CRITICAL FOR THE SUCCESS OF PLASTIC PACKAGING WASTE RECYCLING

Six methods can contribute to the success of the plastic packaging waste recycling.

Figure 11-1: Plastic Packaging Recycling Market, Key Elements for the Success of the Plastic Packaging Waste Recycling, Global, 2018

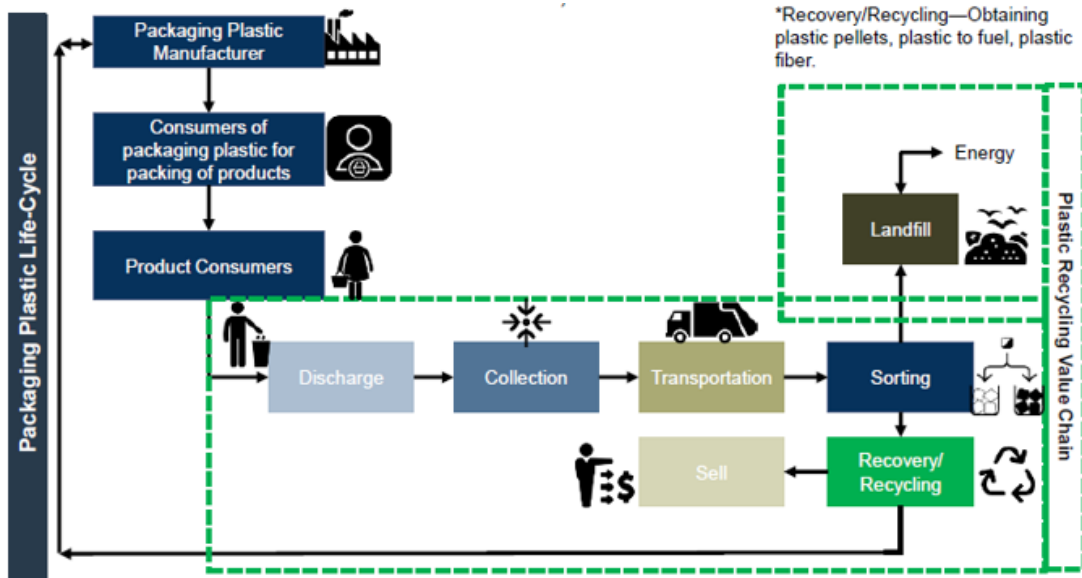


Source: Frost & Sullivan

11.6 VALUE CHAIN OF PACKAGING PLASTIC RECYCLING MARKET

Figure 11-2: Plastic Packaging Recycling Market, Value Chain and Lifecycle of Packaging Plastic Waste, Global, 2018

The packaging plastic life-cycle and plastic recycling value chain are shown below:

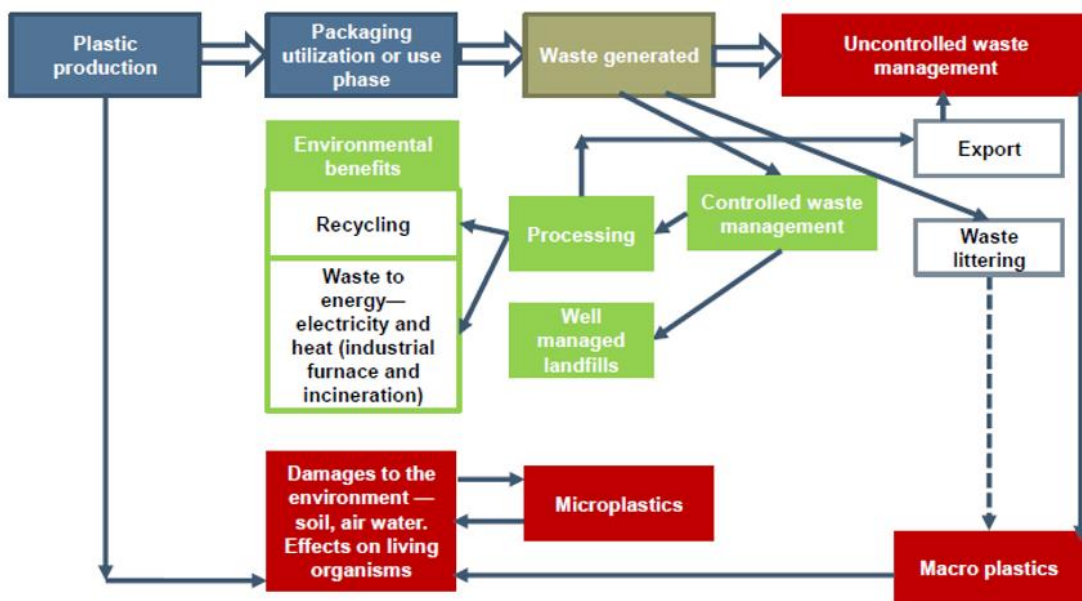


Source: Frost & Sullivan

11.7 PLASTIC PACKAGING WASTE FLOWS

Figure 11-3: Plastic Packaging Recycling Market, Packaging Plastic Waste Flows, Global, 2018

All the process of plastic packaging waste flows can be listed on the following picture:



Source: Waste Management World, Frost & Sullivan

11.8 APAC VOLUME FORECAST FOR PLASTIC PACKAGING WASTE MANAGEMENT BY TYPE

Chart 11-5: Plastic Packaging Recycling Market, Volume Forecast for Plastic Packaging Waste Management by Type, APAC, 2017-2030



Note: Landfill—includes organized landfill and illegal dumping. All figures are rounded. The base year is 2018.

Source: Frost & Sullivan

11.9 COMPETITIVE ANALYSIS

Table 11-1: Plastic Packaging Recycling Market, Volume Recycled Domestic and Imported, APAC, 2017-2030

Year	Top Companies in Packaging Plastic Waste Management
2018	Veolia Asia, Suez Asia Holdings, Cleanaway, TAKEEI Corporation, Kubota Environmental Services, Remondis Australia. Teijin Engineering Ltd., Tomoe Engineering Co., Ltd, Sino-American Jinan Xin Deen Technology Develop Co., Ltd. China Recycling Development Co., Ltd, Metawater, Audop, Beston, GMS Plastic Machinery Pvt., Ltd., Banyan Nation, Polytrade Recycling,

Source: Frost & Sullivan

Suez and Veolia are global leaders in waste management with a strong presence in Asia as well.

Cleanaway Waste Management Limited is an Australia-based multinational that offers market-leading sustainable solutions for packaging waste management. Its one bin packaging waste solution is ideal for businesses that produce different kinds of packaging waste, like paper, plastic wrappers, polystyrene, and cardboard.

Gamma Meccanica's Indian partner is GMS Plastic Machinery Pvt. Ltd., which supplies recycling equipment to plastic packaging OEMS located mainly in Asia. Other significant players include Audop, Teijin Engineering Ltd., Banyan Nation, etc.

Banyan Nation is an Indian company with a proprietary technology that cleans plastic by removing inks, coatings, contaminants etc., using environmentally friendly solvents and detergents in order to supply almost 100% virgin quality recycled plastic granules.