

Plastics Consumption Trend: Literature Review

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Abstract:

The article conducts an overview of research related to the consumption trend of plastic products. There are many products made from plastic, if we use them effectively and do not overdo this product, it will bring great benefits to the economy. However, in the current context, plastic products are overused, causing environmental pollution. We conduct a general overview of consumption trends of plastic products in Vietnam and Southeast Asia.

Keywords: Consumption trend of plastic products, Vietnam and Southeast Asia.

1. Introduction

This Over the past 50 years, plastic has undergone significant changes as a material, and its use has become ubiquitous in our modern society (Ryan, 2015). Innovations in the plastics industry have resulted in low-cost, durable and multi-purpose plastics; There are countless applications of their end use. They range from medical and agricultural equipment to construction materials and food packaging. Since the 1950s, plastic has been produced at a faster rate than most other materials, and in 2015 alone, about 141 million tons of plastic waste was produced, including plastic waste from products and packaging (UN Environment, 2018). The high use of plastic products and poor management of “scrap” have made plastic the main source of marine pollution worldwide. Once the plastic particles enter the marine environment, the wind and currents will spread to the other side of the ocean (UN Environment, 2019). Marine plastic pollution (MPP) is a shocking issue given its large and complex size, and the increasing consumption of plastic in both developed and developing countries, has a general negative impact on ecosystems and human health.

The MPP has received more attention in recent years. High-profile statements such as the G7 Leaders' Statement 2018 put the issue of marine plastic pollution in the limelight and helped to put this issue on the international agenda (G7, 2018).

German scientists (Schmidt; Krauth, Wagner, 2017) have studied and pointed out that eight rivers in Asia are among the top ten sources of marine plastic pollution in the world. Another study found that four rivers in Indonesia are among the 20 most polluted in the world in terms of tons of poorly managed plastic waste (Natureal Communications, 2017). Of the 4.4 million to 12.7 million tons of terrestrial plastic waste that eventually flows into the ocean, 83% come from 20 countries (Lohr, Savelli, Beunen, Kalz, Lagos, Belleghem, 2017). Among these countries, China, Indonesia, the Philippines, Vietnam and Sri Lanka are the five with the most serious plastic pollution. There are many sources of marine waste, from commercial and recreational vessels to onshore sources such as street waste and manufacturing waste (Haward, 2018). All of this shows that it is important to research what measures need to be taken to address the MPP problem in Asia.

2. Literature review

2.1. Overview of plastic sector

The value chain of the plastic industry from fossil raw materials to the final plastic products consists of two segments: upstream and downstream. Crude oil is the raw material for the most diverse output structure while natural gas is the advantageous material when producing PE. Each type of input material will produce a different output composition structure. The product from natural gas is about 80%, Ethylene is a direct derivative of PolyEthylene, so PE production areas from natural gas often have advantages in production costs (Plastics Europe, 2018).

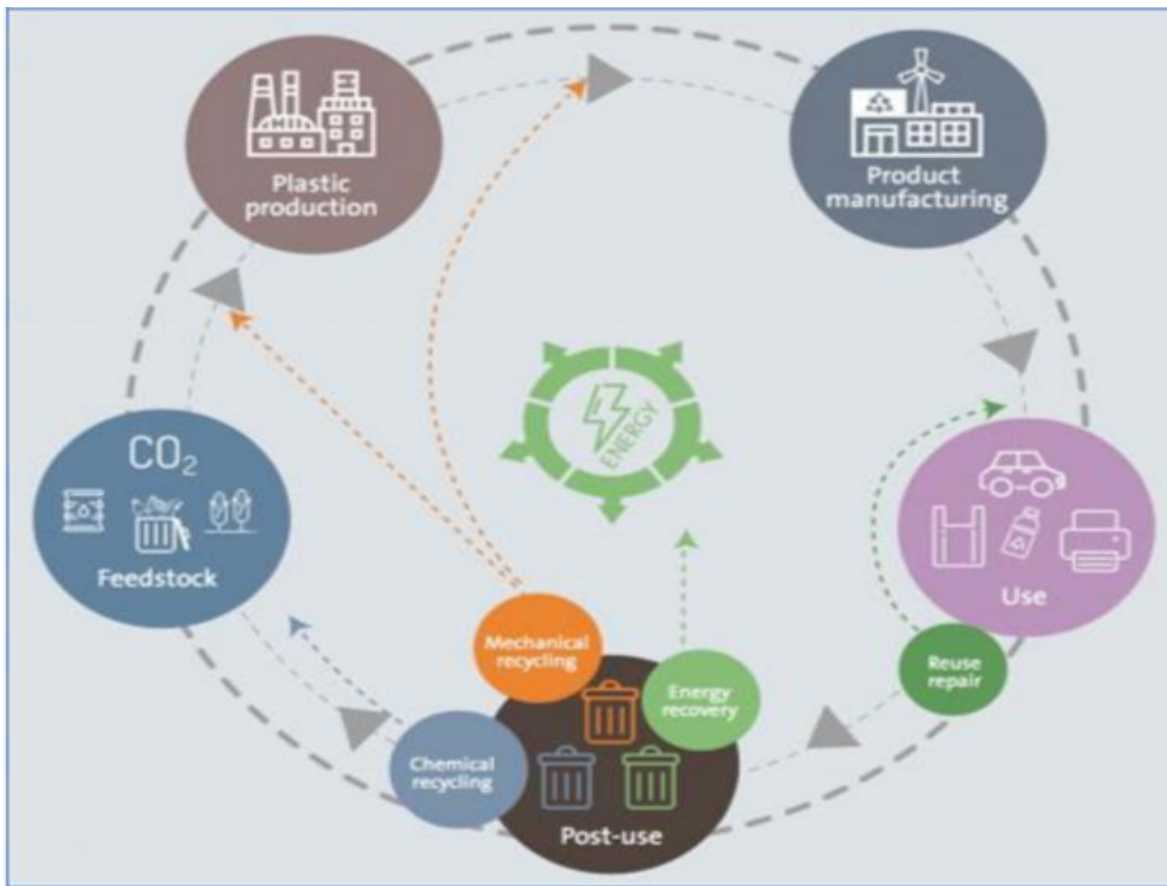


FIGURE 1. PLASTICS LIFE CYCLE SOURCE: PLASTICS EUROPE

According to Figure 1, more than 90% of raw plastic is produced from fossil fuels (oil or natural gas). The polymers are synthesized by large petrochemical companies such as ExxonMobil, Sinopec and Total. The plastic is then sold to plastic manufacturers for making objects, primarily by spraying, blow molding or thermoforming, and assembled or sold directly by the brand owners.

The price of plastic material output will depend on supply and demand of the world market and production costs. In the global plastic raw material market, there are many suppliers and the consumer market is also the world market, so the price of plastic raw materials output will depend on the supply and demand of the market. In addition, because the cost of raw materials accounts for 70% of the cost of producing plastic materials, the fluctuations of fossil raw materials such as crude oil, natural gas or coal will also affect the prices of plastic material type.

The downstream segment of the plastic industry is the process of plastic materials used by manufacturers to form plastic products. The downstream segment of the plastic industry uses plastic granules as input, through physical transformation and shaping of materials to create plastic products. The downstream segment of the plastic industry is divided into 4 main segments corresponding to 4 output products: packaging plastic, construction plastic, civil plastic and engineering plastic. Each small segment of the downstream segment has different input and output characteristics.

Asia countries

China is the region with the largest production of plastic materials in the world. Advantage of input materials such as natural gas for West Asia or coal with China, make the petrochemical industry in these areas extremely

developed and plays a very important role in the value chain of the Asia plastic industry. In the period of 2012 - 2017, the production of plastic materials in Asia increased continuously while production in developed regions entered the saturation stage.

Asia demand for plastic materials is expected to grow slowly from 2017. According to Nexant's prediction, demand for plastic materials only grows an average of 3.8% per year in the period of 2017-2025. Plastic manufacturing has only grown at an average rate of 4% over the past 20 years. So China and Asia are the main growth drivers of the global plastic industry. The growth rate of demand for plastic materials from China and the rest of Asia are forecasted to be 4.95% and 4.57%, respectively, higher than the world average. The reason is, Asia is the region with high economic growth and plastic consumption per capita is still low compared to the world average. In addition, the Middle East is also a region with high growth in demand for plastic materials with a growth rate of 4.46% for the period of 2017 – 2025 (Plastics Europe, 2018).

China is also the world's largest producer of plastic materials but also leads the world in importing plastic materials. The reason for this is that China is the region with the largest amount of plastic material consumed in the world. According to EuroMap estimates, the amount of plastic materials produced in China meets 80% of domestic raw material demand while the remaining 20% depends on imports. Saudi Arabia is other major exporters of plastic materials due to their cost advantage. Saudi Arabia is one of the world's two largest countries with annual reserves and reserves of natural gas. According to statistics from BP, natural gas reserves in the Saudi Arabia are 8.6 trillion cubic meters, accounting for about 4% of global natural gas reserves. Saudi Arabia production in 2017 was 734.5 billion cubic meters, accounting for 20% of global natural gas production and Saudi Arabia was 111.4 billion cubic meters, accounting for about 3% of the world's output. The advantage of natural gas makes Saudi Arabia became one of regions with advantages in manufacturing and exporting plastic materials, especially PE, in Asia and the world market (Plastics Europe, 2018).

Plastic sector in Vietnam

In Vietnam, According to Virac (2018), plastic industry is one of the industries with relatively fast growth compared to the economy in general. In the period from 2012 to 2017, Vietnam's plastic industry grew on average 11.6% a year faster than the world plastic industry's 3.9% growth and faster than the average GDP growth of about 6.2% of Vietnam in the same period. The output of Vietnam's plastic industry is applied in many different fields from consumer, trade to construction, assembly and is divided into four main areas: plastic packaging products, civil plastic, construction plastic and engineering plastic.

The scale of the plastic industry in 2017 is estimated at US \$ 15 billion, equivalent to about 6.7% of Vietnam's GDP in 2017. Of which, the largest proportion is the packaging and construction plastic segment. In addition to serving domestic demand, Vietnam's plastic industry is currently available in more than 160 countries around the world with an estimated export turnover of US \$ 2.5 billion in 2017, up 14.3%. Compared to 2016 and accounting for 1.2% of Vietnam's total export turnover in 2017. Within the scope of this report, we will focus on the two largest segments in the output structure of the plastic industry, the plastic packaging segment and construction plastic.

In 2017, Vietnam's plastic industry consumed about 5.9 million tons of plastic raw materials, equivalent to the average plastic consumption per capita at 63 kg / person / year. This rate of Vietnam in 1990 was only 3.8 kg / person / year; Thus, between 1990 and 2017, Vietnam's plastic consumption per capita grew by an average of 10.6% per year.

Vietnam's primary plastic materials still depend heavily on imported raw materials. In the period of 2018-2021, petrochemical projects that have been put into operation will significantly improve Vietnam's primary plastic raw material production capacity. However, with the current size and growth rate of the downstream of the plastic industry, the supply of plastic materials is still insufficient to meet domestic demand.

Growth in plastics industry is expected to maintain at an average rate of 6.5% in the period of 2019 - 2023. The two largest segments of Vietnam's plastic industry value structure are plastic packaging and construction plastic. Construction is expected to be the main growth engine of the industry (Virac, 2018).

Plastic material prices maintained a downward trend in the short term and were more stable in the medium term. In the short term, prices of raw materials such as PE, PP and PVC are tending to decrease in the same period. In the medium term, prices of plastic raw materials are expected to be more stable due to the global supply and demand of plastic raw materials.

2.2. Plastics product consumption

The plastic industry has now entered a saturated phase with the growth rate of production output and consumption gradually decreasing to around 4% from 2013 - 2017. Plastic consumption index per capita of regions such as NAFTA or Japan are all higher than the average of 200-300% compared to the world average of 45kg / person / year with an average growth rate of about 3% / year. Plastic production and demand in Asia have been steadily increasing since 1950 and there has been no sign of decline due to the benefits of plastic (Meidl, 2018).

However, the plastic and packaging industry is booming in other countries in Asia - including China - because of rising incomes and consumption, which boosts demand across the region. In addition, population growth, urbanization and lifestyle changes will boost demand for plastic packaging even further.

China has led the region in increasing plastic production over the past six decades and accounts for more than 20% of global plastic production. Southeast Asia accounts for 20% of global production. Thus China and Southeast Asia alone account for 40% of global plastic production.

Of the 10 members of the Association of Southeast Asian Nations (ASEAN), plastic and plastic products brought the region nearly \$ 40 billion in export revenue in 2013.

Plastic material production structure is trending to shift to Asia and especially China. The reason is that the plastic industry in two regions, Europe and North America, has entered the saturation phase with a high rate of plastic consumption per capita. Meanwhile, Asia is a region with low plastic consumption per capita and a high growth rate of plastic demand.

Asia and China are expected to be areas with fast growth in demand for plastic products in the future. The growth potential of demand for plastic products in Asia is huge when the economic growth rate of countries in the region is high and the economic structure is also shifting to industries. Many industries use plastic products such as automotive and electrical - electronics industries.

Environmentally friendly factors are gradually becoming an essential criterion in the consumption trend of developed markets' products. Therefore, converting production into good biodegradable plastic products is an inevitable trend of the global plastic industry.

2.3. Plastic product consumption trend in Asia

2.3.1 Overview of plastic product consumption trend and main applications in Asia

Overview of plastic product consumption trend

According APME (2019) Asia and China are expected to be areas with fast growth in demand for plastic products in the future. Asia has a low plastic consumption per capita compared to other regions and the world average. Therefore, the growth potential of demand for plastic products in Asia is huge when the economic growth rate of countries in Asia is high and the economic structure is changing and transit into industries that use a lot of plastic products such as the automotive and electrical - electronics industries.

Figure 3 shows that plastic consumption per capita of typical Asian countries such as Korea and China is much lower than that of Europe or the US despite having a strong growth in the years from 2009 to 2019. , even China's plastic consumption per capita is only 1/4 of Belgium and 1/3 of the US.

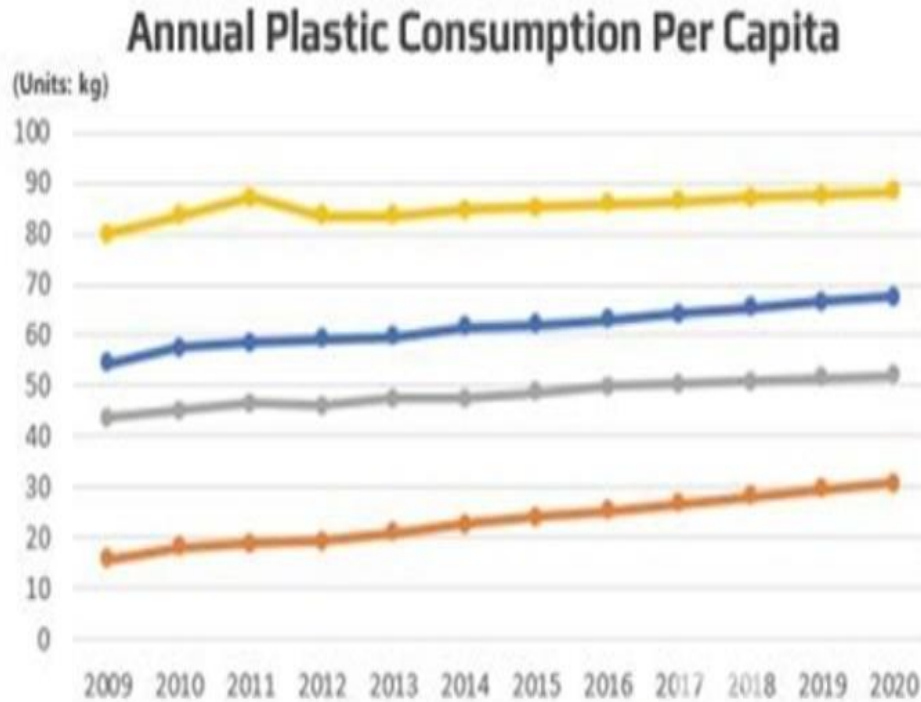


FIGURE 2. ANNUAL PLASTIC CONSUMPTION PER CAPITA (KG)

Source: Association of Plastics Manufacturers in Europe (APME) Economics Review

By 2030, Asia may account for more than half of world consumption. Population growth, increasing demand and overall economic progress have led to the abuse and abuse of resources and the explosion of solid waste, especially disposable plastic. According to a 2015 study, although ASEAN member states have low per capita plastic consumption, they account for six of the top 20 countries ranked by the size of the mis-treated plastic waste (Pat, 2020).

Packaging is the main product accounting for most of the demand for plastic, accounting for 40% of the world's demand. Consumer and household products (such as appliances, toys, plastic cutlery and furniture) occupy the next most important segment, closely followed by the construction and construction sectors. Accordingly, plastic production is shifting to Asia. In 2013, the region produced 45.6% of global plastics product, China alone has produced nearly a quarter of the world's plastic and surpassed Europe's in plastics since 2010. With population and growth of manufacturing industries, Asia has recently witnessed a strong growth in plastic production and consumption (Gaelle, 2015).

The booming packaging and plastic industry in Asia is being fueled by rising incomes and increased consumption, which will increase the demand for plastics across the region. In fact, Asia's consumption is still lower than the world average in 2015 and far below the developed regions in the world such as the US or Europe. China has led the region in increasing plastic production over the past six decades to account for over 20% of global plastic production. Southeast Asia accounts for 20% of global production, of which Vietnam has achieved an average growth of 18% in the plastics industry, with a large share of exports.

A growth rate in plastic production also leads to increasing plastic consumption in Asia. Thailand is the regional leader in plastic consumption per capita at 40 kg, Malaysia reports 35 kg per person and Indonesia is 17 kg per year. This level of consumption is still very low compared to the world average (Engoo, 2017).

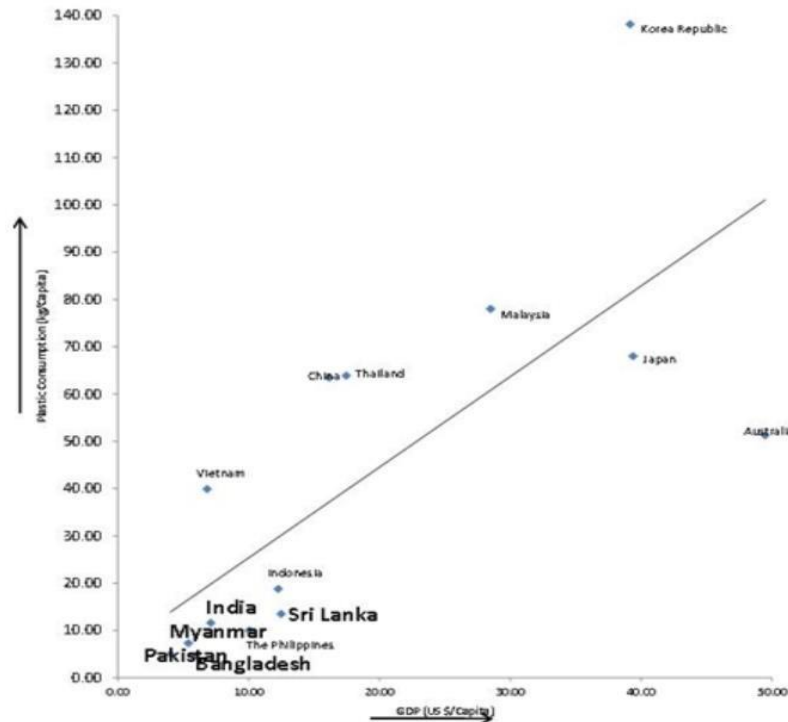


FIGURE 3. PLASTIC CONSUMPTION (PER CAPITA) IS POSITIVELY CORRELATED WITH GDP GROWTH RATES

Source: UNCRD 2019

In Figure 3, plastic consumption (per capita) is positively correlated with regional and regional GDP growth rates (Choudhury .et al, 2019). In which, south and southeast of Asia play a leading role in growth and determine the plastic consumption trend of the whole Asia. Based on the picture above, Korea Republic, Japan, China, Thailand and Malaysia have a clear correlation between plastic consumption and GDP, and these are also countries with high per capita demand. Thus, along with the high GDP growth rate of the region, especially Southeast Asia, the actual plastic consumption trend will continue to grow in the coming years.

In addition, the main trend of plastic consumption is the increasing trend of plastic consumption in the packaging field, which accounts for 40-50% of total plastic consumption. This trend is also consistent with the region's rapid economic development.

Consumption of plastic by value grows slightly faster than total plastics when ICP (Polypropylene Impact Copolymer) triples. Although conductive plastic is a small market, ICP is an emerging market, but it is very promising and tends to grow strongly in the near future. ICP is one of several new solutions for mass-produced or specific devices such as transparent electronics, transparent conductive films and PV (Michel, 2013).

In short, the Asia plastic industry and especially ASEAN is expected to expand greatly both domestically and internationally in the coming years and potentially bring important opportunities for foreign investors. In addition, twelve countries including the United States, Australia, Vietnam, Malaysia, Japan and Canada have adopted the Trans-Pacific Trade Agreement (TPP). Under TPP, trade rules between member countries will be liberalized to enhance economic relations. With the development of ASEAN countries, consumer base, expanding import and export plastic market and expanding foreign trade power, ASEAN plastic industry offers foreign investors an important opportunity to penetrate the Asian plastic market. In particular, Thailand focused on developing the bioplastics industry that promises to offer foreign investors greater opportunities in the ASEAN plastic market. In recent years, the Thai government of Thailand has continued to

promote environmentally friendly plastic manufacturing companies and paid great attention to reducing plastic waste in the region and the Thailand bioplastics market is relatively new and open to foreign investors, providing more access to foreign investors while the remaining countries mainly focus on manufacturing domestically produced plastics (Dezan, 2015).

Main application plastic products in Asia

According to a report by Grand View Research (2019), Asian markets will continue to consume more strongly in products in the construction industry and auto mobiles with the most global growth. In which China and India are leading countries in the consumption of plastic products, especially with plastic products using materials that are easy to design and flexible. Construction plastic is popular with pipe products and door designs.

In addition, in Asia, the use of plastic bags has become more and more widespread, including food and beverage products, personal care products, family care products, and electronic devices.

3. Increasing demand for eco-friendly plastic product trend

Facing the problem overload of plastic waste, countries around the world are gradually pushing to limit the use of plastic packaging and especially disposable packaging to minimize the amount of plastic waste released into the environment. The main measures are to ban part or all of the use of packaging, and economic measures related to taxes or fines. The consumption of many plastic packaging products such as the EU, US, and China in order to limit the use of disposable plastic packaging will greatly affect the global plastic packaging segment. In the trend of consuming eco-friendly products, biodegradable plastic products are preferred products to replace traditional plastic products. Total production capacity of global biodegradable plastic materials in 2018 reached 2.1 million tons / year, of which biodegradable plastic accounted for 1.2 million tons and bioplastics accounted for 0.9 tons. According to the European Bioplastics forecast, total production capacity of biodegradable plastic materials in 2023 is estimated at 2.6 million tons / year, equivalent to an average growth of 4.4% a year in the period of 2018-2023.

The downward trend in the consumption of disposable plastic products because many countries issued a ban on use, the world gradually shifted to consumption of green, environmentally friendly packaging products.

The trend of shifting to eco-friendly plastic products is gradually becoming an essential criterion in the consumption trends of developed markets. Therefore, converting production into products with good biodegradability is an inevitable trend of the global plastic industry. Along with above trend, global plastic material production structure is trending to shift to Asia and especially China (Grand View Research, 2019).

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