

The Packaging Industry in ASEAN

アセアン諸国の包装産業

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I Introduction

The Asia Pacific region has register the highest and fastest economic growth rate in the world in the past few year (see **Table 1**). This has significantly impact the ASEAN packaging industry. The total packaging market for the ASEAN countries was about US\$6.5 billion. The characteristics of the packaging industry in most of the ASEAN countries are towards high growth rates, a strong domestic-orientation and national/regional markets.

This paper attempts to provide information of members country of ASEAN. As many of these countries do not have detailed data for the packaging industries, most of the data from this paper are extracted from papers written by participants that has taken part or have contributed to the training carried out by the Packaging Centre in Singapore. The paper will cover first packaging R&D in this region, the specific packaging industry, the general trend and conclusion will be address at the end of this paper.

Table 1 Gross national product of countries in ASEAN

Year	1987		1988		1989		1990		1991	
	Currency	% growth								
SINGAPORE S'pore Dollar in Million	42,636	10.20	49,998	17.20	56,844	13.70	63,678	12.02	69,076	8.47
MALAYSIA Ringgit in Million	79,625	11.20	90,861	14.10	102,534	12.84	115,569	12.70	129,541	12.08
INDONESIA Rupiahs in Million	124,817	21.56	142,105	13.85	167,185	17.50	196,919	17.70	227,186	15.40
THAILAND Bahts in Million	1,299,913	14.76	1,559,804	20.00	1,856,476	19.01	2,182,100	17.54	2,509,427	15.00
PHILIPPINES Pesos in Million	685,068	12.50	802,519	17.14	925,161	15.30	1,070,900	15.75	1,244,037	16.20
JAPAN Yen in Thousand Million	348,425	4.10	371,428	6.60	396,197	6.70	424,537	7.15	450,795	6.20

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1. Pressure Factors for the Packaging

Packaging in ASEAN, like the rest of the world, is subjected to a wide array of pressures, especially competitive pressures, environmental pressure and pressures from new regulations. These pressure arise from various factors as follows:

(a) The consumer profile in ASEAN has changed drastically over the years.

ASEAN economic success has brought in more wealth for their people and enhanced their buying power and expectation. More and more Asian consumers are demanding quality and variety, product safety, hygiene and nutrition. Producers are now faced with the challenge of harmonizing modern lifestyle with ethnic preference. With more women entering the workforce changes in lifestyle are inevitable. This leads to different demands for packaging. For example, Asian consumers are willing to pay extra money for convenient packaging which are easy to open and re-close, and can be placed in a microwave oven. Many new packaging design that are already available or will be developed according to the convenience demand. In addition, people are looking for variety of foods which are light, low in calories, quick, or have other desirable characteristic.

(b) Cost remains the most important factor for packaging industry

With the opening up of the borders and better communication and transportation

system, Asian countries have created remarkable market impact in Europe, USA and Middle East. The packaging material cost, logistic cost, have a great impact on those manufacturers who export their products to faraway distance countries. There is an urgent need for every Asian industry to develop an ecological packaging design in logistics to minimize the packaging material cost and logistic cost.

(c) Environmentalism

Environmental pressures aimed at the solid waste problem originally stemmed from two primary concerns (i) the perceived loss of land fill space and (ii) the damage to the ozone layer caused by chlorinated fluoro-carbons (CFC's). Singaporeans generate over 2 million tonnes of solid waste each year. If we separate our household waste, more than 40% consists of paper, plastic textiles, cans and glass which could be reused or recycled.

(d) Law and regulation which affects and will affect the packaging industry

Packaging legislation established in Europe and USA has affected the ASEAN Packaging Industries as ASEAN products transported to these countries must adhere to these legislation. Therefore many ASEAN Industries have been forced to switch from the current packaging design to the new packaging design in terms of the packaging material, labelling, bar coding and structure.

Packaging laws and regulations in the

region are still in the development stage.

2. Current R&D Situation in Singapore and ASEAN

Many research and development project done in ASEAN concentrated mainly on cost reduction and environment friendly packaging. Cost is the most important drive factor of R&D in every industries. Every industry tries hard to minimise their total packaging cost.

Total packaging cost is a combination of the costs for materials, equipment operations, labour and logistics. The packaging cost can also include the cost of product recalls, failure to re-purchase by customers and cost of repackaging. There are two approaches to develop ecological packaging design. One is the concentration on individual packaging. Packaging designs should minimize the amount of consumer packaging as well as transport packaging.

2.1 R&D example of cost reduction for individual packaging

There are numerous R&D examples of effective packaging reduction efforts.

- 1) Glass containers today are typically manufactured with less material than was used even as recently as ten years ago.
- 2) Metal cans, particularly aluminium beverage cans, weigh less than they did in the past.
- 3) Many products which formerly has several layers of packaging now have only one with

metallizing layer.

- 4) Cost effective package for electronics product.

In Mitsubishi they are trying to modify the product to withstand the shock and vibration hazards in the distribution with less damage, the result is in the packaging cost. There are two examples; One is package of an electrical heater and packaging for air conditioner.

From these two examples we can see how it is important for our product designer and packaging designer to be aware that integration of the packaging design into the function design and aesthetic design of the product is important.

Sony Japan has also make many efforts to reduce the packaging for their electronics products.

Another examples of cost reduction is multiple slot packaging design for the hard disk drive. The new technologies developed by SISIR's Packaging Centre cut Sankawa's downtime by 50%.

Multiple slot packaging is commonly used in the local hard disk drive industry. Determining the acceleration value and indentation load deflection of Polyurethane result in extra time and cost. SISIR's Packaging Centre developed the cushion curves for the Sankawa packaging and save at least 15% in material costs.

2.2 R&D example of cost optimization in logistics

The second approach in cost reduction is to overview the entire logistic process to optimize total cost in logistics. SISIR's packaging centre has developed a window based software package COPS (Cost Optimization Packaging System) to help the companies minimise their distribution cost by optimizing space usage as well as packaging materials. The software examines all possible combinations of packing products into their containers and then provides the user with best solution to package the products. COPS then optimizes both cost of packaging materials and logistics cost so that the most cost effective packaging arrangement can be selected. COPS is extremely useful to personnel involved in sales budget estimation, product design as well as logistics planning. COPS is designed to be efficient and user friendly and helps companies achieve greater profit maximisation without compromising packaging material quality and operational efficiency.

2.3 Development of environmentally friendly packaging for electric product

One of the most significant research and development is the transport packaging design using recyclable packaging material i.e. corrugated fibreboard paper instead of using expanded polystyrene form (EPS) because of the environmental pressure.

SISIR's Packaging Centre has developed a corrugated fibreboard cushioning to replace the EPS cushion for video recorders. Based on our experience, we developed a basic table of the modula structure for corrugated board

cushioning and various cushion constructure to protect the video recorder. After evaluation tests, we have identified the most competitive cushion design using corrugated fibreboard cushioning.

It is most important that the proposed packaging using corrugated board cushioning are able to compete with existing packaging in terms of technical requirements and cost savings. For a good cushion design the cushioning must not only possess function for the cushioning purpose but as well as on the purpose of supporting the product. Due to the easy moulding methods, the existing EPS cushioning could easily satisfy both these functions together. Creating a workable new corrugated board cushioning that combines both the function seems more complicated than EPS cushioning. However, the corrugated cushioning design could be divided into 2 parts, the construction part and the cushion design part.

Besides the Egg tray, moulded pulp are enjoying strong growth especially for electronic products with light weight such as Fax machine, video camera etc. Research and development is on its way to evaluate the cushion pads in terms of the cushion dimension and structure as there are no recognised method to design moulded pads.

Overall, it appears that moulded pulp has the potential to replace EPS foam. However moulded pulp as a cushioning material is inappropriate for the packaging of heavy products or products experiencing rough handling.

The shortage of forest in ASEAN is becom-

ing another big environmental issue particularly in China. To have new pallet to partially replace the timber pallet is becoming a need. Pallets made of corrugated fibreboard and honeycomb and plastic have already developed and used in the market.

SISIR's Packaging Centre has developed a one way EPS pallet for a local company. The designed strength of the pallet can sustain up to 1 ton loading. This means that the corrugated pallet is used in one way plastics pallet are mostly used in reuse cases. In Japan, some plastic pallets have been in use for many years. In Thailand, there will be a plastic pallet manufacturer.

Many approaches have been proposed to develop the environment friendly packaging by

- 1) requiring manufactures to "take back" used packaging,
- 2) banning of certain materials, usually plastics,
- 3) requiring that packages be made of only one material,
- 4) minimizing printing on packages,
- 5) requiring packaging to be made of recyclable or recycled material,
- 6) requiring packages to be made of biodegradable material,
- 7) adopting the ERA hierarchy of reduce, reuse, recycle, incinerate, land fill, and
- 8) choosing package designs only after a life cycle analysis of each package type.

Experience has shown that each of these approaches have advantages and disadvantages. Thus research and development are

under way to define "typical" systems which are realistic enough that they can be used as the basis for evaluation of packaging/disposal decision or to define a more restrictive process which can be used.

A new approach to reducing packaging in consumer packaging is to sell refills of concentrates for certain products. For example, concentrated refills are now available for several types of laundry products. Some packing uses gallon plastic bottles for the original package and simple packaging for refill.

With the development of metallizing coating, a lot of solid packaging has been replaced and will be replaced by the flexible packaging.

Lightweighting of all flexible packaging is being promoted as being environmentally responsible, as is the idea of using a single materials whenever possible for a complete pack. If a single material pack is not possible, then the next target is easy separation of constituent element for recycling.

3. Future Packaging R&D in Singapore and ASEAN

3.1 Computer models for shelf-life prediction

An article published in Tappi stated that, "Approximately 50% of the food in third world countries is rendered unusable due to lack of proper packaging. There is an urgent need to help food industries to choose appropriate packaging materials for the food products they produced.

Research and development in SISIR is on the

way to develop a computer model for shelf-life prediction. This computer will provide a means to pretest materials before actual storage testing. In this computer program product, storage parameters, packaging materials are entered independently. The computer will provide a combination of the product and packaging for storage time and cost.

3.2 Source reduction: less waste in the first place

Source reduction (also known as waste reduction, waste minimisation waste prevention) is a term that describes the prevention of waste at its source by using the minimum quantities of materials necessary to achieve a required function.

In essence, source reduction is a form of resource optimisation, i.e., making best use of the resources required to produce the package. Such an approach make sense not only for the environment, but also as a business strategy.

There are many tools available for implementing Source Reduction procedures in package design and development.

Targeted distribution environmental measurement should result in more appropriate validation test of designs so the package can be targeted toward the intended distribution rather than some large, amorphous generic transport system. This is design only for what the package is expected to see.

Damage Boundary Analysis offers the opportunity to more closely match the product's sensitivity to shock input to that damage potential

created by each different type of cushioning material or design, in response to a shock input. Match the cushion design to the product sensitivity profile.

Finite element modelling can be expected some day to allow the product designer to assess each design's sensitivity to various dynamic inputs so that inherent strength can be designed originally into the product rather than rely on package design to supplement the shortcomings of the product.

Verification procedures (such as ISTA, ASTM, ISO) can result in more efficient packages being designed and implemented in much shorter time frames with lower expected failure rates. Relying on performance definitions opens the field of alternatives for the designer to any number of materials and methods for packaging his/her products.

All of these will enable us to realize the true value of Source Reduction opportunities. It can be the driver for technology development, but we have to resist the current Luddite atmosphere that positions packaging as the perfect analogy for our wasteful, disposable society.

3.3 Life cycle analysis (LCA)

As a theory, Life Cycle Analysis (LCA) would seem to be the ideal approach in the selection of the best packaging. An LCA evaluation identifies all inputs and effects involved in the manufacture, use, and disposal of a particular product, from cradle to grave. Alternative systems for handling a container, such as reuse, disposal after a single use, or recycling, can be

specified and analyzed. The factors concerned in LCA are: extraction of raw materials, consumption of energy, emissions to air, emission to water, emission to soil, production of solid waste. The result of an LCA is a vector of information. For example, the amount of electrical energy required to manufacture, use and dispose of a package according to a specified scheme can be estimated and compared to the electrical energy required for several alternative. Unfortunately, the requirements for other forms of energy, the amount of mining required in some other country, the amount of oil or gas that will need to be imported, the level of employment, and many other factors may also be altered. The difficulty comes when these different measures are compared to try to determine the optimal selection. Currently, there is no generally accepted system for making the decision based on the effects on a variety of factors.

In ASEAN Mitsubishi conducted LCA for expanded polystyrene form (EPS) used in their electronics appliance.

4. The need for Packaging R&D in ASEAN

Packaging R&D in ASEAN is a combination of technology transfer and technology innovation. Many packaging industries were challenged and will be challenged by the global market, environment issue and legislation. The packaging industries especially the industries that export the product to different countries,

must carry out R&D project for your own products to continuously create new product and packaging, which can live, survive and persuade in different culture and environment

Last but not least, it is also important for ASEAN packaging industries to take into consideration our own natural resources. For example; the vast forest in Indonesia could bring many environmentally friendly packaging for wine or tube form product. The skin of the banana in Philipines could be reused again for other product and even coconuts in Malaysia could replace the EPS cushioning in the near future.

II Singapore

1. Introduction

Singapore consists of the island of Singapore and some 58 islets within its territorial waters. It is situated approximately 136.8 kilometres north of the Equator. The main island is about 42 kilometres in length and 23 kilometres in breadth, and 580.6 square kilometres in area. It has a coastline of approximately 150.5 kilometres. The total land area, including the islets, is 639.1 square kilometres.

Singapore's immediate neighbours are Malaysia (Peninsular Malaysia, to the north Sabah and Sarawak to the east) and Indonesia to the south. Singapore is linked with Peninsular Malaysia by a 1,056-metre long causeway, which carries a road, a railway and a water pipeline across the Strait of Johor.

1.1 Climate

The main features of Singapore climate are relatively uniform temperature, high humidity and abundant rainfall due to the maritime exposure of the island and its close proximity to the Equator.

The average daily temperature is 26.7°C. The mean maximum temperature of 30.8°C occurs in the afternoon, and the mean minimum of 23.8°C just before dawn. November to January, during the Northeast Monsoon, are generally the cooler months.

Relative humidity often exceeds 90 per cent at night and in the early hours of the morning shortly before sunrise. On dry afternoons, it is usually between 60 per cent and 70 per cent. The average daily relative humidity is 84.4 per cent.

Rain, falling all the year round, is most abundant from November to January, the first half of the Northeast Monsoon. July, during the Southwest Monsoon, records the lowest average rainfall. Much of the rain falls in sudden showers with rainfall of more than 50 millimetres a day occurring about nine times a year. The annual rainfall is 2,359 millimetres.

Thunderstorms are frequent during the inter-monsoon months of April-May and October-November. The highest recorded wind speed during a squall is 144 kilometres an hour.

1.2 Population

The resident population (of Singapore citizens and permanent residents) at June 30, 1994 was estimate at 2,930,000. This represents an

increase of 2 per cent over that of the previous year.

1.3 Economy

The Singapore economy grew by 7.2 per cent during the first quarter of 1995. This was largely due to slower growth in the manufacturing, construction and transport and communications sectors compared to the previous quarter. However, the financial and business services, and commerce sectors grew faster.

The manufacturing sector grew by 7.3 per cent, down from 12 per cent a quarter ago. The major industries recorded mixed performances. Output declined in the petroleum, transport equipment, and paints and pharmaceutical industries by continued to grow in the other key industries. The lower output in the petroleum and pharmaceutical industries were partly due to shutdowns of plants for maintenance.

2. Packaging Industry Status

There are about 200 companies in the packaging industry and the main segment of the industry are, metal, corrugated paper/box and plastic.

2.1 The paper packaging industry

This is a well established industry. There are a total of approximately 60 companies that manufacturer paper, corrugated box and paper, paper bags and paper carton box. In the corrugated box there are 8 large manufacturers

and 10 other smaller manufacturers that have their own corrugator. Most of these companies are part of the Corrugated Box Manufacturers Association.

A total of more than 3 thousand employees were employed by this industry with an output of approximately S\$600 million annually.

2.2 Metal packaging industry

The metal packaging industry produced 2 piece cans, 3 piece cans, drums closure. There are 12 tin plate can manufacturers with one company dominating 80% of the beverage market. One company can produce 2 piece can. Both thin plate and aluminium 2 piece can be produced in Singapore.

All the raw material (both tin plate and aluminium) are imported. There are 11 metal containers and drums manufacturers with 4 major drum manufacturers supply the market.

2.3 Plastic packaging industry

There are more than 80 companies producing plastic sheet, plastic film, plastic bag, styrol foams, plastic bottles and containers. The main player in the plastic industry are usually part of a large group of companies. Most other plastic companies are small and medium size. Due to a large electronic industry present in Singapore, there is a high demand for electronic packaging. More than 30 companies are supplying foamed shock absorbent material.

2.4 Wooden packaging industry

There are about 16 companies supplying

wooden boxes, packaging case and crates and pallets to the industry. There is a strong push recently for standardizing of the pallet size in Singapore.

2.5 Glass industry

There are no glass industry in Singapore. All the glass containers are imported.

III Malaysia

1. Introduction

Malaysia comprises the Peninsular Malaysia, Sabah and Sarawak. Thailand is to the north of Peninsular Malaysia and Singapore is to the south. The Straits of Malacca separate Sumatra of Indonesia from the south western part of Malaysia Peninsula. Sabah and Sarawak is connected to Kalimantan of Indonesia and is separated from Malaysia Peninsula by the South China Sea.

1.1 Climate

Malaysia lies entirely in the equatorial zone. The climate is governed by the regime of the north-east and south-west monsoons which blow alternately during the course of the year. The north-east monsoon blows from approximately mid November till March, and the south-west monsoon between May and September, the periods of change between the two monsoons being marked by heavy rainfall. The period of the south-west monsoon is a drier period for the whole country, particularly for the other states of the west coast of the Penin-

sula, sheltered by the land mass of Sumatra. Being in the tropics the average temperature throughout the year is constantly high 26°C or 80 ° F .

1.2 Population and economy

The total population in 1995 is estimated at 19.95 million and is proposing to have a total population of 70 million in year 2095 (based on growth rate of 3.2). The last few years have seen Malaysian's companies taking more aggressive strategies to market their product. The GDP growth of the last years has been 8-10 % .

2.Packaging Industry Status

The main packaging material used in Malaysia are paper/paper board, metal, glass, plastics and wood. The packaging industries can be divided into:

2.1 The corrugated fibreboard industry

This is a well established industry. There are about 46 corrugated box plants in Peninsular Malaysia. The total capacity of the plants is estimated to be in the range of 833,000 metric tons but production is approximately 321,000 metric tonnes .

2.2 Metal packaging industry

The metal packaging industries can be subdivided into the general line cans, the beverage cans and the steel drums.

The general line cans market is a very frag-

mented market with products ranging from sanitary cans for food items and other consumer product such as aerosol and paint cans with a large variety of sizes and specifications.

The estimated usage of general line cans by the various sector is tabulated as follows: for Confectionery a total of 400 tonnes, for Motor Oil (all sizes) a total of 3,000 tonnes, for Paint a total of 2,300 tonnes, for Edible Oil a total of 1,000 tonnes and for Aerosol a total of 1,000 tonnes .

The estimated demand for soft drinks and beer in 1993 is soft drinks 506 million cans, and beer 360 million cans.

The steel drums in the Malaysia are mainly for packing the following products; including latex, edible Oil, oleochemicals, lubrication Oil, paint, agro-Chemicals, flavours and fragrances, and chemicals.

2.3 Glass

The Malaysia glass container industry mainly cater for the beer, soft drinks, pharmaceutical and chemical goods. The glass bottle has four main types of products; this include returnable glass containers, single trip bottle, jars (wide mouth) and others.

An estimated of about 60-70% of the production is for the domestic market whereas the remaining 30-40% is being exported mainly to East and West Asia.

2.4 Plastics

In Malaysia, about 60-70% of the plastic manufacturers are involves in the packaging Indus-

try. The packaging comes in two forms:

- i) Flexible includes bags, files, sheets and laminated plastics,
- ii) Rigid includes bottles, boxes, crates and drums.

IV Thailand

1. Introduction

Situated in South-East Asia, Thailand has a total land area of some 514,000 square kilometres. It is bordered to the west and north by Myanmar, to the north-east by Laos and to the south-east by Cambodia. Thailand extends southward, along the isthmus of Kra, to the Malay Peninsula, where it borders Malaysia. Thailand extends 1,620 kilometres from north to south and 775 kilometres at its widest from east to west. It has a coastline of 2,400 kilometres. The isthmus, shared with Myanmar, gives Thailand a short coastline on the Indian Ocean, and the country also has a long Pacific coastline on the Gulf of Thailand.

1.1 Climate

Thailand's climate is generally tropical with a high degree of humidity. There are three seasons; hot (March to May), rainy June to October) and cool (November to February). The mean temperature is around 30°C (86°F), varying from 23.7°C to 32.5°C (from 75°F to 91°F).

1.2 Population

The population of Thailand was estimated at around 59.4 million people in 1992. Thailand's

population comprises predominantly the Thai people with about 6.7 million ethnic Chinese. Other ethnic minorities include the Malays, Laotians, Vietnamese, Khmers and hilltribes people.

1.3 Economic Performance

In 1992, Thailand's economy grew 7.2 per cent, marginally lower than the growth rate of 7.9 per cent in 1991. Thailand's gross domestic product (GDP) reached US\$107.3 billion, with a per capita GDP of US\$1,800 in 1992. Thailand's inflation rate was 4.1 per cent while its unemployment rate was around 3 per cent in 1992.

Several factors have supported Thailand's strong economic growth in 1992. These factors included the increase in private consumption arising from personal income tax cuts, higher export, and growth in investment especially in the consumer goods, electronics and petrochemicals industries, and government spending on infrastructure.

2. Packaging Industry Status

Economic developments in Thailand have stimulated the demand for packaging in the past few years. Gross domestic product (GDP) has shown double-digit growth rates between 1985 and 1991. From 1992 to recent years, the growth rate is at 7 to 8 per cent and this growth rate is expected for the next 3 to 5 years. The packaging industry has been growing in importance in Thailand. With more goods exported,

the need for better design to compete in the international market, the growing expectation of consumer with more purchasing power, changing lifestyles, tastes and preference has all resulted in a higher demand for more convenient and sophisticated packaging. The total number of packaging companies is about 1,600. The majority of these companies are small and medium size. The four main segments in the packaging industry are the paper, the plastic, the metal and the glass industry.

2.1 The paper industry

The paper industry companies of about 300 companies. About 70 percent can be considered as small scale manufacturer. The majority of the manufacturers (about 160) produce corrugated boxes. The number of cardboard box manufacturer is approximately 120. Large users of multi-layer bags such as the cement industry and feed mills usually have in-house production facilities. The single layer-bag is mainly used in retail stores.

There are about 12 big manufacturers of corrugated boxes that have corrugator. In 1992, they produced about 660 thousand tons of corrugated board and 560 thousand tons was used for their own production and the remain are sold to other manufacturers. There are about 10 large and medium size cardboard box manufacturers. Their production volume is usually smaller than the large corrugated box manufacturer.

Raw material is supplied by 41 paper mills. About 4 of these mills supply the paper for

cardboard boxes. 3 pulp mills produce short fibre pulp.

2.2 Metal packaging manufacturer

The main product of metal packaging industry is can. Both 2 piece and 3 piece can are manufactured in the industry. Other metal packaging product include drums, tubes, aerosols, caps and foil.

There are two companies that make tin plate, Siam Tin plate Co. Ltd. and Thai Tin plate Manufacturing Co. Ltd. Special alloys and aluminum are imported.

There are about 140 metal packaging manufacturers. Approximately 13 are large can manufacturers. Two manufacturer currently make aluminum beverage can. About 8 larger producer of canned food make their own cans.

2.3 Glass packaging manufacturer

90 percent of the glass packaging are bottles. The remain 10 percent are mainly for jars. Most of the glass manufactured are for the local market.

Glass packaging manufacturing is the oldest of the four packaging manufacturing segments. There are 5 major glass bottle manufacturers with a total capacity of around 750 thousand tons a year.

2.4 The plastic industry

The plastic industry provide a wide range of products. In the flexible form, products include plastic film, bags and woven sacks. In the more rigid form products include foam containers,

plastic bottles and cups.

Plastic packaging manufacturing is the youngest and most rapidly expanding industrial segment. The current number of plastic packaging manufacturers exceeds 1300. About 70 percent are small scale manufacturers, with less than 500 tons of production capacity per year. The 28 larger manufacturers of bags produces bags and envelopes for export (around 65 thousand tones a year). The 12 styrofoam manufacturers have a total capacity of 4,500 tons a year. Many plastic packaging manufacturers produce plastic products for other purposes as well. Manufacturers of styrofoam also make car parts and other insulation material. Manufacturers of shopping bags also produce freezer bags and bags for garbage can and some bottle manufacturers also make plastic plates and toys.

V Indonesia

1. Introduction

Indonesia is the largest country in Southeast Asia, both in population and in area. It is also the largest archipelago in the world, consisting of more than 13,000 islands stretching in a rough crescent for 5,500 kilometres. These islands form a crossroad between two ocean - the Pacific and Indian Ocean, and a bridge between two continents - Asia and Australia.

1.1 Climate

The total land area of the Republic of Indonesia is approximately 1.9 million square kilome-

tres, while total land and sea area is about 9.8 million square kilometres.

Indonesia has a tropical climate, which is greatly influenced by mountains and the sea. The lowlands have high humidity, moderately high temperatures ranging from 20 to 30°C, feeble sands a few kilometres from the sea, and rainfall averaging more that 1,000 million metres a year.

1.2 Population

Indonesian has a population of about 184 million people in 1992, making in the fifth most populated country in the world.

1.3 Economy

The manufacturing sector is playing an increasingly important role in the Indonesia economy. It accounted for 19.5 per cent of the GDP in 1990 as compared to 12 per cent in 1982. The industrialisation strategy adopted by the Indonesia government in the early stages of development was directed towards import substitution and employment creation. Tariffs and non-tariff barriers were erected to protect the domestic industries. This has resulted in a "high cost economy" and lack of international competitiveness suffered by much of Indonesia's manufacturing industry.

Indonesia's manufacturing sector produced a vast range of products. Most consumer goods such as processed foods and beverages, tobacco products, textiles and garments, motor vehicle components and assemblies and electrical appliances are produced by the private sector,

often in joint ventures with foreign companies.

2. Packaging Industry Status

Packaging Industry in Indonesia has grown rapidly in recent years. The rapid growth in agriculture and industry is one important point that cause the rapid growth in packaging industry. Fast expansion of supermarkets, departmental stores and shopping malls is quickly changing the traditional and economic growth, the demand for a better living standards has also brought an increasing demand for packaging.

There are approximately 250 significant packaging manufacturers and about 500 smaller ones in Indonesia. Except for a few food companies which have their own integrated food packaging, generally the packaging industry is separated from the food industry. In addition, most of the food packaging industry are not specialized in food packaging, they also make other kind of packaging. The packaging industry in Indonesia can be divided into five kinds of packaging industries, namely the plastic packaging industry, the paper board packaging industry, glass packaging industry, metal packaging industry and jute packaging industry.

2.1 The plastic packaging industry

About 125 companies are producing plastic packaging with a total annual production capacity of 280,000 tons. This industry can be subdivided into three categories:

i) The flexible packaging industry like lami-

nates, films and bags,

ii) Rigid packaging like bottles, drums and jerry cans,

iii) Woven bags.

2.1.1 The flexible packaging industry

The development of flexible packaging industry in Indonesia began in 1977. Currently, there are 43 companies in the flexible packaging. Out of the 43 companies, 2 companies are foreign investment, 9 companies are domestic investment and 32 companies are Nonfacility or local investment.

For some specialized flexible packaging, the Indonesian still needs to import some finished products and raw material to meet it's needs.

2.1.2 Rigid packaging

The annual capacity for rigid packaging is 90,000 tons, and there are four major producers of rigid plastic packaging.

2.1.3 Woven bags industry

There are approximately 66 manufacturers for woven bags with an annual production of 105,000 tons.

2.2 The paper and paper board industry

Currently there are 70 companies producing corrugated carton box with a total licensed capacity of 596,965 tons annually. Out of the 70 companies, 3 companies are foreign investment, 26 companies are domestic investment and 41 companies are local investment.

Box kraft liner and medium paper which are used as the raw material for the corrugated boxes is 5-7%.

2.3 The glass packaging industry

The main products of glass packaging which are consumed by food packaging industry are bottles. In the last three years, it seems that there is no growth in the bottle industry. The total production is 145,000 tons/year. There are 12 companies producing glass bottle. Not much glass bottles are imported.

In terms of market share, beverages share 65% and other food products such as edible oil, fruits, vegetables share 15% of the market.

2.4 The steel packaging industry

The total annual capacity of steel packaging product is about 150,000 tons and there are approximately 50 companies in this industry. There piece cans represent the major output of the steel packaging industry (80% of the volume).

For 2 piece beverage cans, the total usage of aluminum is estimated at 13,300 tons. There is a trend for more aluminium to be used for various food products such as beverages, seafoods, food trays etc.

VI Philippines

1. Introduction

The Philippines is an archipelago of approximately 7,107 islands scattered over an area of about 300,000 square kilometres. It is bounded by the South China Sea in the west, the Pacific Ocean in the east, the Sulu and Celebes Seas in the south, and the Bashi Channel in the north. Collectively, the islands stretch north-

ward to 241 kilometres south of Taiwan and southward to 14.4 kilometre off Borneo.

1.1 Climate

The country enjoys a year-round tropical climate generally characterise by warm days and cooler evenings. The climate year is divided into three predominant seasons-rainy from July to October, cool and dry from November to February, and hot and dry from March to May. The average temperature is 27°C, with the average humidity at 77 per cent.

The northern part of the archipelago is in the direct path of tropical storms and typhoons, which are prevalent during the rainy season. The southern part has a milder climate and is seldom affected by tropical storms. The average rainfall is 305 centimetres.

1.2 Population

The Philippines has an estimated population of 64.3 million in 1992, primarily of Indo-Malay, Chinese and Spanish descent. The annual population growth rate is about 3 per cent.

The population density is 210 inhabitants per square kilometre, with 13 per cent of the total population living within the Metro Manila area. About 57 per cent of the population live in rural areas.

1.3 Economy

The Philippines economy is organised basically around light industry and agriculture, with the processing of agricultural products accounting for the largest share of the manu-

facturing sector.

The Philippines economy has a number of problems that resulted from mismanagement of the country's resources in the early 1980s. However, the present government under President Fiel V Ramos is geared towards securing economic recovery in the short term and sustainable growth in the long run. A key strategy is to encourage investments and to make Philippines export products more competitive in the world market. Agriculture, including employment-generating domestic and export industries, has also been given more attention.

The Philippines' real Gross National Product (GNP) registered a marginal growth of only 0.04 per cent in 1991. For 1992, the GNP was officially estimated to have grown by 0.6 per cent. However, the country's real Gross Domestic Product (GDP-which excludes income from abroad) registered negative growth of -0.7 per cent and -0.4 per cent in 1991 and 1992 respectively. The poor performance of the economy was due to fiscal tightening by the government, drought problems which hit the agricultural sector and serious deterioration in the power shortfall in the manufacturing sector.

After two years of economic stagnation, some economic analysts expect the Philippines economy to pick up by the end of 1993 with growth of around 1 per cent in 1993. For 1994, the economy is expected to grow by around 3 per cent (data has yet been published).

2. Packaging Industry Status

The Philippines is mainly an agricultural country so its primary products are the farm product. The packaging industry can be divided into four main sectors, they are the paper/paper board having approximately 45% of the packaging market, metal packaging about 20%, glass about 18%, plastic about 15% and other packaging such as bamboo basket, wooden crates... etc, make up the remaining 2 % .

2.1 The paper and paper board industry

Raw material of the paper and paper board manufacturer are largely locally available. Only very few manufacturers choose to import their raw material for higher quality paper.

2.2 The metal industry

Tin can are more widely used in Philippines than aluminium can. Raw materials of metal-based packaging come only from one source. Importation of tin plates is restricted, however, companies whose products are to be exported are allowed to import certain amount of tin p l a t e .

2.3 The glass industry

Glass bottles and jars are still widely used. The largest supplier of glass containers in Philippines is San Miguel Corporation which is also the largest packaging manufactures in the country with also its own packaging manufacturing capability in corrugated, plastic and metal packaging.

2.4 The plastic industry

Plastic packaging has been growing in the Philippines. Polyethylene leads among the other plastic packaging materials in import. Other major plastic resins imported include polypropylene, polystyrene, polycarbonate and some PVC.

Domestic production of synthetic resins has mainly been a secondary source of raw materials for the packaging and plastic industry.

VII Trend of Packaging in ASEAN

The region has diverse cultures and wide ranging economic profiles. In the past few years, the economy of the ASEAN has all grown at a very rapid speed. This growth has both stimulated the growth of the packaging industry as well as created certain challenges for the industry. A summary of tables showing comparison between the ASEAN countries are attached (Table 2 - Table 7).

The consumer profile of the ASEAN countries has changed drastically over the years. Increasing disposable income and opening up of geographical borders have created remarkable market optimism in all economic classes. The consumers now demand quality and variety, product safety, hygiene and nutrition. Three main factors will continue to influence the development trend on packaging in ASEAN.

1. Cost

Table 2 Land size of countries in ASEAN

Country	Land size (sq/km)	Size of country compared to SINGAPORE
SINGAPORE	633	1
MALAYSIA	330,434	522
INDONESIA	1,919,443	3,032
THAILAND	514,000	812
PHILIPPINES	300,000	474
JAPAN	377,815	597

Table 3 Number of packaging companies in ASEAN

Country	Number of packaging companies
SINGAPORE	200+
MALAYSIA	<500>
INDONESIA	750+
THAILAND	1600+
PHILIPPINES	<600>

Table 4 Number of glass companies in ASEAN

Country	Number of glass companies
SINGAPORE	0
MALAYSIA	3+
INDONESIA	12
THAILAND	5
PHILIPPINES	7+

Table 5 Number of plastic packaging companies in ASEAN

Country	Number of plastic packaging companies
SINGAPORE	80+
MALAYSIA	—
INDONESIA	125
THAILAND	1 300+
PHILIPPINES	7+ (Flexible)

Table 6 Number of metal packaging companies in ASEAN

Country	Number of metal packaging companies
SINGAPORE	12
MALAYSIA	11+
INDONESIA	50
THAILAND	13+
PHILIPPINES	17+

Table 7 Number of corrugated / paper packaging companies in ASEAN

Country	Number of corrugated / paper packaging companies
SINGAPORE	60
MALAYSIA	46+ (Corrugated box and carton)
INDONESIA	70 (Corrugated box and carton)
THAILAND	300
PHILIPPINES	—

In spite of increased purchasing power, cost remains the single important factor for selection. Consumers demand quality and appeal in packaging, however, if the packaging cost is too high compared to other available alternative, the consumer usually is not willing to pay for the extra cost.

2. Packaging Appeal

With the improved purchasing power, more choices available, the new distribution networks and international competitions, consumers are becoming more discriminating in selection of products. Packaging design and layout that can appeal to the consumer will continue to win in the competitive market.

3. Environmental Friendly

More and more consumers are concerned with the possible problem of environment waste. Although currently not the main factor affecting development of packaging trend ASEAN, it is definitely a factor that cannot be ignored in tomorrow's packages in this region.

VIII Specific Packaging Trend

Glass and metal packaging will grow but at a slower rate. Plastic packaging showed a up trend and will continue to challenge glass and metal packaging. Paper packaging will continue to grow in their localized region. Recently, due to a continued increase in the price of raw material for paper, it had hamper the growth of certain paper industry.

More and more plastic film and container are seen in the market and the growth of plastic continue to be good. Pressure will be on reducing the wastage of packaging materials. More recycling and reused packaging will be expected. Pressure will also be on packaging manufacturers to reduce the amount of packaging material used for packaging.

Reference

- 1) Various country paper prepared by countries participants on packaging industries status of their own countries
- 2) Investment opportunities study for packaging manufacturing in Thailand
- 3) Singapore fact and pictures
- 4) Economic Survey-Trade and Development Board, Singapore
(Received 5 December 1995)