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THE DEVELOPMENT OF THE PLASTICS INDUSTRY/
IN /MALAYSIA/

by

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The Present Status of the Malaysian Plastics Industry

Introduction

The Malaysian Plastics Industry began in a very modest way in 1952 with a handful of companies using hand operated equipment to turn out simple parts. It has progressed very significantly in the past two decades to what is now a very active part of the Malaysian Manufacturing Industry. There are some 240 companies involved in the processing of plastics, generating a turnover of some M\$160 million (US\$66 million) in 1973. The industry has also integrated into local manufacture of plastics raw material which has helped eased the current difficult raw material supply situation.

Raw material manufacture

Manufacture of plastics raw material commenced in 1973 with the start-up of a suspension PVC plant. Currently there are two plants manufacturing suspension PVC, with a total annual capacity of about 20,000 metric tonnes. A plant has also been recently set up to manufacture general purpose and impact modified polystyrene. Annual capacity is estimated at 6,600 metric tonnes. All monomer requirements are imported.

Malaysia currently produces some 95,000 barrels a day of low sulphur crude oil. More oil strikes and natural gas has been found off the Malaysian shore. In view of this a Petroleum Development Bill has been established in the country to set up a corporation under the control of the Prime Minister. This corporation, called the Petroleum Nasional Berhad or Petronas, will have exclusive rights for petroleum exploration and exploitation in the country. The Bill also provides Petronas to process petroleum and manufacture of petro-chemicals-products.

A large part of the raw material requirements for the plastics processing plants still need to be imported. The current raw material situation has given the industry a sharp jolt, where virtually overnight raw material which were in apparent abundance and low price at one time are now in short supply and obtainable at substantially increased prices.

The Malaysian Plastics Manufacturers' Association appealed to the Government to consider the setting-up of plastics raw material plants so that the industry can be self-sufficient and be less susceptible to world plastics supply and demand charges. The passing of the Petroleum Development Bill is therefore an encouraging sign for the industry. It is understood that a number of foreign companies have submitted proposals to the government for manufacture of low density polyethylene, high density polyethylene and polypropylene. Consumption of these plastics are expected to increase where it would be possible to have an economic size plant by 1980. The problem appears to be in the manufacture or supply of required feed-stocks to such plants. It is possible that a Naptha cracker would be required to derive feed-stock from natural gas supply. This is an area where UNIDO assistance may be required to advise on which is the best course of action or route to take. The petrochemical industry needs to be developed bearing in mind the country's agricultural requirements (fertilisers, agricultural chemicals) and without affecting the natural rubber industry in the country.

Processing of Plastics

Processing of plastics, that is the conversion of plastics raw materials or pre-fabricated forms into useful products, is the main activity of the plastics industry in Malaysia. Appendix I shows the wide range of technologies that is employed to manufacture a wide range of products. However, tubular film extrusion and injection moulding represent the main technologies used. In recent years more sophisticated and 'new' technologies have been introduced in the country, usually through joint-ventures with foreign companies. Examples of some of these are:-

- Casting of polymethylmethacrylate sheets
- PVC coated and expanded leather cloth and wall paper
- Calendering of plasticised and rigid PVC sheet extrusion
- Decorative laminate production
- Twin-screw extrusion of PVC pipes
- Vinyl-asbestos floor tiles

The plastics products manufactured are mainly aimed at import substitution and replacement of traditional materials (metal, glass, etc.) . Figure I shows the decrease in value of imported conventional or consumer plastics products between 1967 and 1973. There was however some M\$12 million (US\$5 million) worth of 'sophisticated' plastics products being imported. This would indicate an area for future expansion of the industry.

Plastics fabricated products are also being exported to both developed and developing countries throughout the world. Figure II shows the steady increase in export value of plastics products between 1967 to 1972. This excludes those plastics products exported as part of an equipment, article or container. The products exported are usually those that have high labour content or those that require post-fabrication assembly or decoration. Some examples are multi-coloured printed shopping bags, GRP pleasure boats (up to 50 feet in length), footwear , engineering components, assembled chairs and PVC leathercloth and wall-paper. Such practice is limited to a number of companies which are technically competent and could afford the expense of promoting their products on a world-wide basis. The relatively low labour costs yet efficient and readily trainable labour force puts the industry in a favourable position to exploit export markets. However, the need to import resins at inflated prices could offset this, which all the more puts urgent emphasis on the industry to be self sufficient in raw materials and for the country to exploit its oil deposits. Also, not all companies can afford the expense of promoting their products overseas and the government has now set up special agencies to market and publicise Malaysian products overseas.

Figure III shows the plastics consumption between 1962 to 1973, and gives an indication of the growth rate of the industry. The mean growth rate of the industry has been remarkable 48% per annum. The significant rise between 1970 and 1972 was due to a sudden increase in a number of companies engaged in the processing of plastics.

The industry has until recently concentrated mainly in the production of consumer and relatively 'unsophisticated' products. Such products are relatively easy to produce,

usually requiring little need for strict quality control. The investment for such production processes is also low. The raw materials employed are also easy to process. Plastics like polyolefins (LDPE, HDPE, PP), polystyrenes and plasticised PVC hence offers little or no processing difficulties. Production and process control techniques are also seldom employed or required for such products.

The market for consumer plastics products has now virtually reached saturation and the industry must look into production of more sophisticated products, such as technical or engineering products which are required to meet tight specifications or serve a technical function. With increasing industrialisation and standard of living in this country, demand for such products will increase. Example of where such demand is now being placed on the industry is the current influx of foreign manufacturing companies setting up plants to manufacture products for export. Such companies require technical mouldings such as parts for air conditioners, portable radios, tape-recorders, television sets, calculators and electronic products. Such parts often require high quality and precise mouldings, thus requiring both skilful mould design and manufacture. Also high performance plastics (e.g. acetals, polycarbonate, nylons, PPO etc.) are often specified placing the need for more precise and consistent control of moulding conditions. The increased use of plastics for more sophisticated packaging requirements would require the need for production of plastics laminates. Industrial and heavy duty packaging, such as packaging of one ton pallet of rubber bales for export, are on the increase placing more stringent demands on the industry. Plastics for out-door applications such as in agriculture and buildings require to be suitably formulated and produced so that useful length of product life can be achieved.

In order that the industry can cope and expand into the above areas and also to be more competitive in export markets, it must increase in technical sophistication. The majority of the companies are small by comparison with those in developed countries, and can ill afford to employ technically qualified personnel or invest in research and development work. Realising such a difficulty and the necessity to upgrade the technological level of the industry, the Malaysian Plastics Manufacturers' Association (MPMA) made a public appeal in 1970 for technical assistance. The University of Malaya responded

to this appeal as there were some existing polymer technology equipment at the Department of Chemical Engineering (then known as Chemical Technology Department). An initial effort to survey and service the technical requirements of the industry was made in late 1971. The response, although poor in the initial stages, is now extremely encouraging to the point of overloading both the staff and facilities at the University. The department has only a small budget for teaching purposes and could not expand in staff and facilities to cope with the influx of enquiries and development work required by the industry.

Currently the areas where technical assistance is being offered to the industry from the university are:-

- Provision and explanation of technical data on plastics
- Analysis and testing of plastics materials, compounds and products
- Trouble shooting of processing problems at factories
- Compounding of plastics to achieve desired processing and application properties
- Product and application development

From such work with the industry, two long term research projects that has the prospects of increasing utilisation of plastics in this country, was established at the University. One involves the development of plastics application in agriculture in this country. This is done jointly with the Malaysian Agricultural Research and Development Institute (MARDI). The other project involves the study of the weathering properties of plastics under tropical conditions. This is done jointly with the Overseas Division of the Building Research Station of United Kingdom, with the collaboration of plastics manufacturers from Britain and Malaysia.

The importance of upgrading the skills of the process workers of the industry was also identified. Recently a programme to train process workers for the plastics industry was initiated with collaborated efforts of the Ministry of Culture, Youth and Sports, MPMA and the University.

In 1972 a review was made on the Malaysian Plastics Processing industry by UNIDO Plastics Consultant Mr. A.D. Clarke. One of the recommendations made in the review was the urgent need to expand the technical services offered to the industry. A proposal to establish a Plastics Technology Centre to do this was made by UNIDO and submitted to the Malaysian Government.

- 7 -

This proposal is currently being reviewed and discussed. Once such a centre is established it would serve as a source where specialised plastics expertise requirements can be identified for subsequent UNIDO assistance.

Conclusion

The current status, future areas for expansion and related problems of the plastics industry in Malaysia are outlined. Areas where UNIDO assistance would be required are indicated. Given the necessary back-up services and a stable supply of raw materials, the prospects of the plastics industry in Malaysia appears bright.

Appendix I

Plastic Processing Technologies Currently Operating in Malaysia

<u>Process</u>	<u>System</u>	<u>Polymer Type Used</u>	<u>Product Type</u>
1. Calendering	4 roll system	PVC	1. Unsupported flexible PVC Sheeting 2. PVC leathercloth (coated fabric)
	2 roll system	PVC	Vinyl asbestos floortiles
2. Casting	Casting	MM	1. Acrylic sheets 2. Roof lights
3. Coating	a. spreading	PVC	1. PVC leathercloth (coated fabric) 2. Expanded vinyl coated fabric 3. Unsupported PVC sheeting 4. Wall coverings
		PE PVC	Metal wire articles (office filing trays, etc.)
	c. Electrostatic	PE	1. Metal wire articles 2. Metal fabricated parts
4. Extrusion	a. Dry blending & Compounding	PVC	1. Prepared compounds in diced form
		PE EVA PS	2. Reprocessing scrap plastics material, into diced compound
		PVC	1. Rigid PVC rectangular cross-sections
	b. Profile sections	PP	2. Rigid PVC feeding troughs
		PS	3. Rigid PVC curtain rails 4. PP strapping tape 5. High impact PS thick sheet for vacuum forming 6. Custom Extruded Profiles
c. Circular sections	PVC PE	1. Rigid PVC pipes for water supplies and electrical conduit 2. Rigid PVC monofilaments and bristles for brooms 3. Flexible PVC monofilament for packaging 4. Flexible PVC hose-pipes and tubing 5. HDPE monofilaments for ropes 6. Biaxially oriented PVC tubing, for bottle security caps 7. PE tubing for drinking straws 8. PVC reinforced suction tubing	

- d. Circular sections PE 1. PE film & PP film
by inflation PP and bags
(blown film) PA 2. PP/PE oriented film
tape for raffia
"Nylon string"
3. PE film sacks
4. PP/PE oriented film
tape for woven sacks
5. Nylon film for
"boil & roast in bag"

- e. Laminating 1. PE Film onto PP woven
cloth for sacks
2. Polyester film to
decorative surfaced
plywood

- f. Coating PVC Electric cables

5. Mixing

- Chemical mixing PU flexible Mattresses, pillows
foam cushions &
kitchenware
PU rigid Insulation, sheets
foam and profiles

6. Moulding

a. Injection:

Types of machines

- 1. Ram PE
- 2. Screw preplasti- PP
- cising EVA
- 3. Inclined screw PS
- & ram PA
- 4. Manual PC
- 5. Semi-automatics PAC
- 6. Fully automatics ABS
- PVC
- struc-
- tural
- foam

Consumer durables

- 1. Housewares, Kitchenwares
- 2. Shoes & sandals, solid
foamed shoe soles
and accessories
- 3. Toys
- 4. Premium gifts for
advertising
- 5. Medicine bottles
and containers
- 6. Lids and caps, combs
and brushes
- 7. Jewellery & other boxes
and containers
- 8. Haberdashery items

Industrial applications

- 1. Switchboard housings
- 2. Fan parts
- 3. Refrigerator parts
- 4. Flush water cisterns
and parts
- 5. Radio and television
and telephone parts
- 6. Casing for calculators
telephones, cameras
tape recorders
- 7. Radiator fans for cars
PVC pipe fittings
- 8. Reflector units &
components for cars &
motorcycles
- 9. Air condition panels
- 10. Electronic parts
- 11. Office equipment chaire

			12. Industrial & motorcycle safety helmets
b.	Thermoset injection	PF UF	9. Electrical components for automotive trade
c.	Blow-moulding screw feed with & without parison control Semi-automatics Fully-automatics	PE PVC	1. Bottles 2. Containers 3. Toys 4. Bouys for fishing nets
d.	Compression Hydraulically operated, high-pressure	MF UF PF PVC	1. Decorative surfaced boards 2. Crockery & kitchen ware 3. Electrical parts 4. Gramophone records
e.	Pressings Low pressure hydraulically operated or screwrams	PS foam	1. Expanded insulation boards 2. Custom moulded parts for packaging 3. Inserts for crash helmets 4. Ceiling tiles
f.	Rotational (casting)	PE	1. Large industrial containers 2. Bouys
g.	Hand lay-up	GRP/ polyester	1. Water tanks 2. Corrugated roof-lights 3. Boats 4. Marker buoys 5. Crash helmets 6. Shop Window dummies
h.	Matched-die moulding	GRP/ polyester	Drying trays for rubber

Supplementary Processes

<u>Process</u>	<u>Type</u>		<u>Product</u>
7. Printing	a. Flexographic	1. PE	Film
	b. Gravure	2. PE, PP & PVC	Film & Sheeting
	c. Screen	3. PE & PVC	Bottles & containers
		4. PVC	Leathercloth
		5. PS	Injection moulded containers
	d. Off-set litho/letterpress	PP	Woven sacks
	e. Hot-foil stamping	PS	Injection moulded containers
8. Weaving	Flat bed looms	PP tape	Fabric sacks
	Circular weaving looms	HDPE tape	

9. Welding/Jointing

a. Direct heat	1. PE & PP film	Bag making
	2. PE film	Shopping bags & handles
	3. PE film	Rainwear
b. Radio frequency (R.F.)	Unsupported PVC Sheeting	Wallets Book covers & stationery items
	c. Sewing	1. PE film
2. PVC leather-cloth		Handbags, travelbags shoes, furniture upholstery
d. Solven	PS	Injection moulded parts

10. Vacuum-forming

a. With & without plug assistance	1. Acrylic sheet	Advertising & display signs drawing instruments Baths & wash basins, fridge linings, bathroom cupboards, drinking cups
	2. PS sheet	
b. With pressure forming		Food containers

11. Planting

a. Electroplating	ABS	Decorative parts - bright metal finish
b. Vacuum metalisation	PS	Decorative parts - bright metal finish

KEY

ABS	ABS	Acrylonitrile-butadienestyrene
	CA	Cellulose acetate
	EVA	Polyethylene-cinyl acetate
	MF	Melamine-formaldelyde
	MM	Methylmethacrylate
	PA	Polyamide
	PC	Polycarbonate
	PE	Polyethylene
	PF	Phenol; formaldehyde
	PP	Polypropylene
	PS	Polystyrene
	PU	Polyurethane
	UF	Urea-formaldehyde
	GRP	Glass-reinforced plastic
	PAC	Polyacetal
	PVC	Polyvinylchloride
	PTFE	Polytetrafluoroethylene

FIG. 1
COMPARISON OF THE
IMPORTS AND PRODUCTION
OF PLASTICS PRODUCTS
FOR THE YEARS
1966 AND 1973

\$11.9 mil
 US\$4.9
 \$ 4.7 mil
 US\$1.9



IMPORT OF CONVENTIONAL
 PLASTIC PRODUCTS

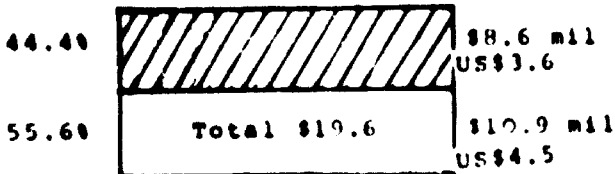
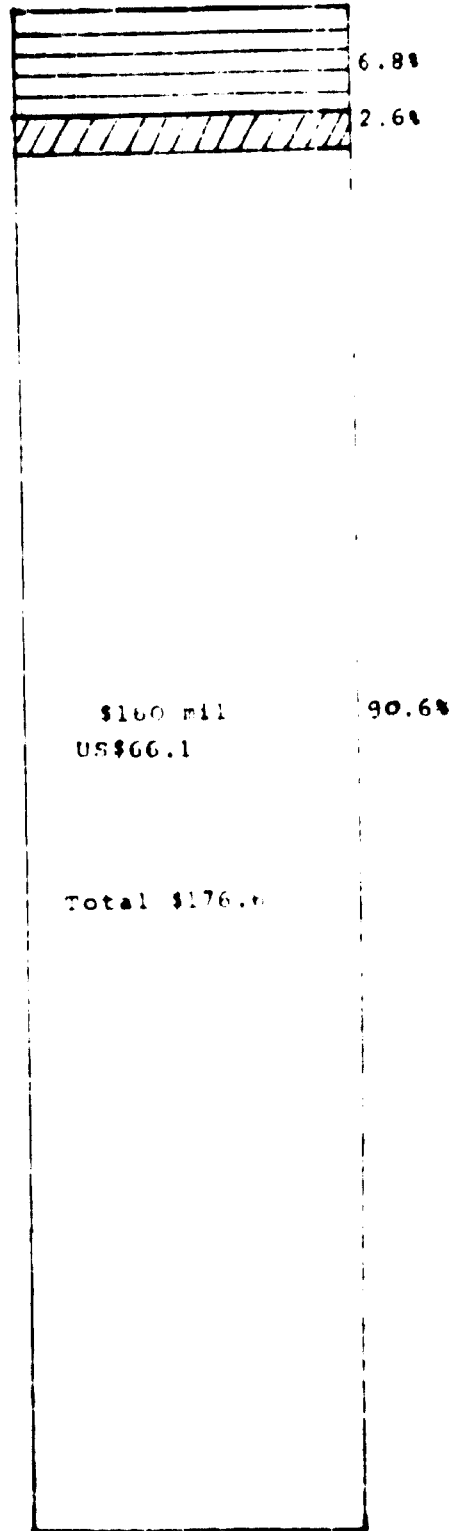


IMPORT OF NEW SOPHISTICATED
 PLASTIC PRODUCTS



DOMESTIC PRODUCTION OF
 PLASTIC PRODUCTS

SOURCE: STATISTICS DEPARTMENT
 KUALA LUMPUR

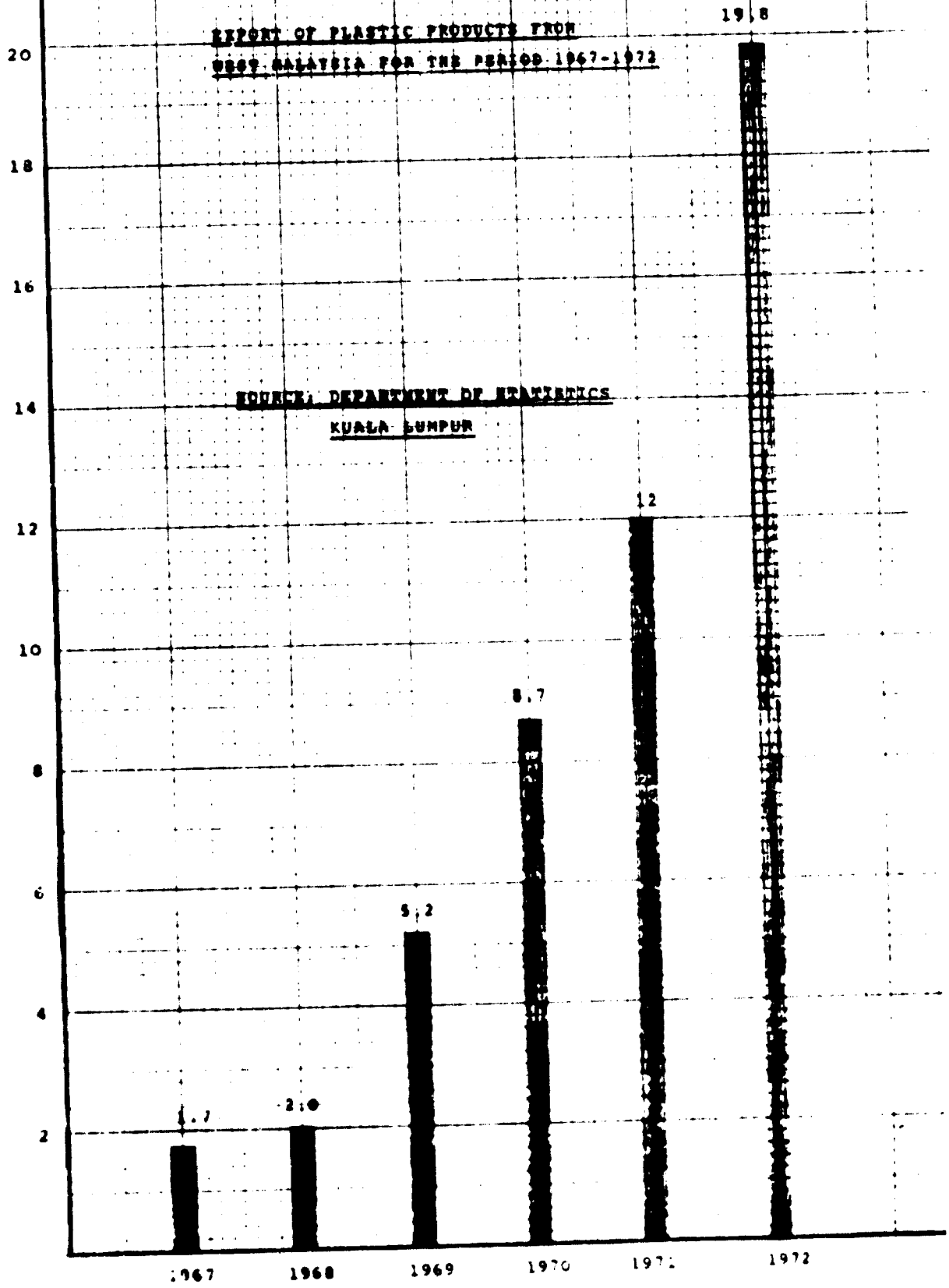


MISSION
DOLLARS

FIG. II

REPORT OF PLASTIC PRODUCTS FROM
WEST MALAYSIA FOR THE PERIOD 1967-1972

SOURCE: DEPARTMENT OF STATISTICS
KUALA LUMPUR



- THOUSAND TONNES

46

50

60

70

80

90

100

110

1,072

4,742

4,658

6,636

8,564

13,992

20,936

29,229

41,151

50,793

73,142

86,748

1962

1963

1964

1965

1966

1968

1969

1970

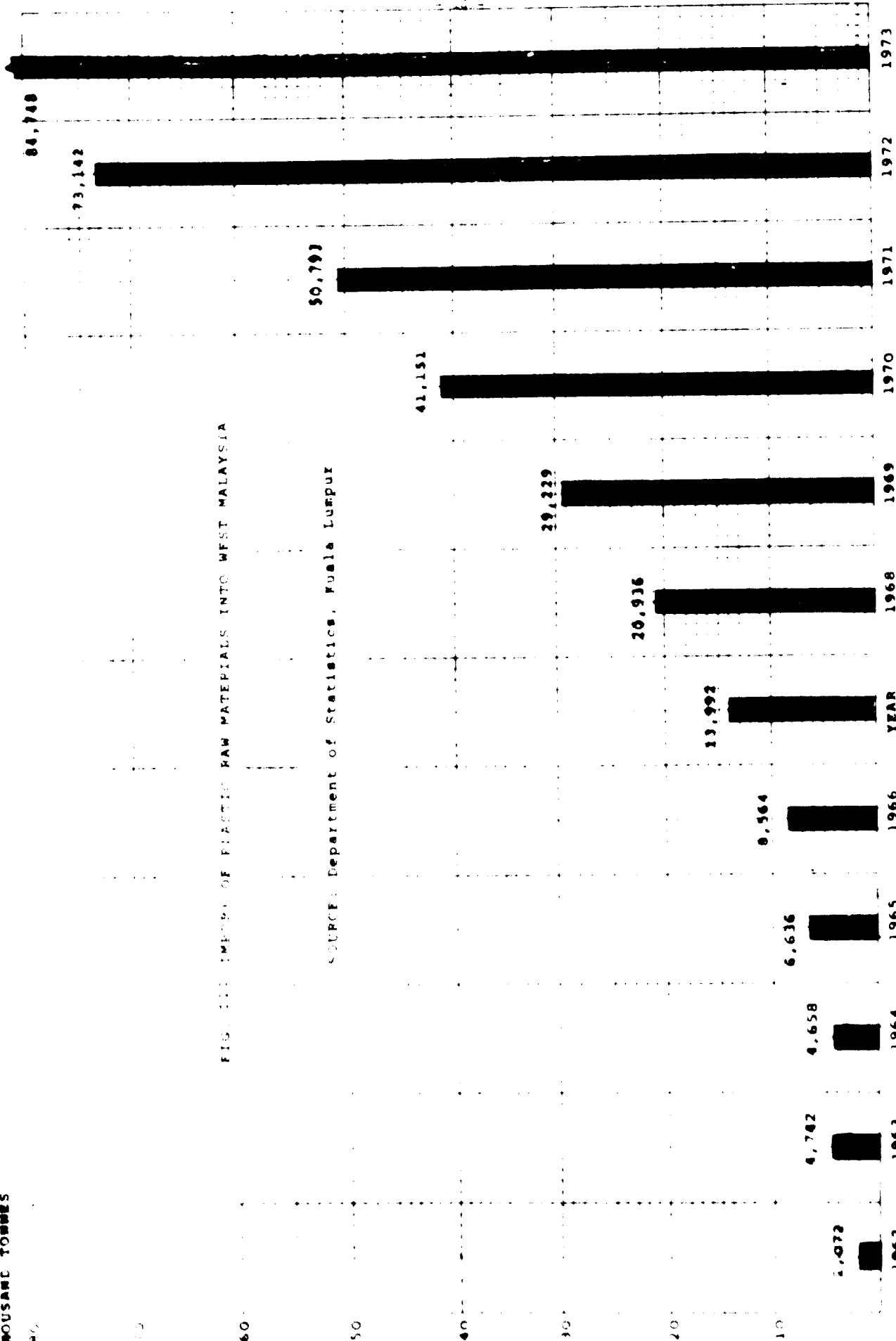
1971

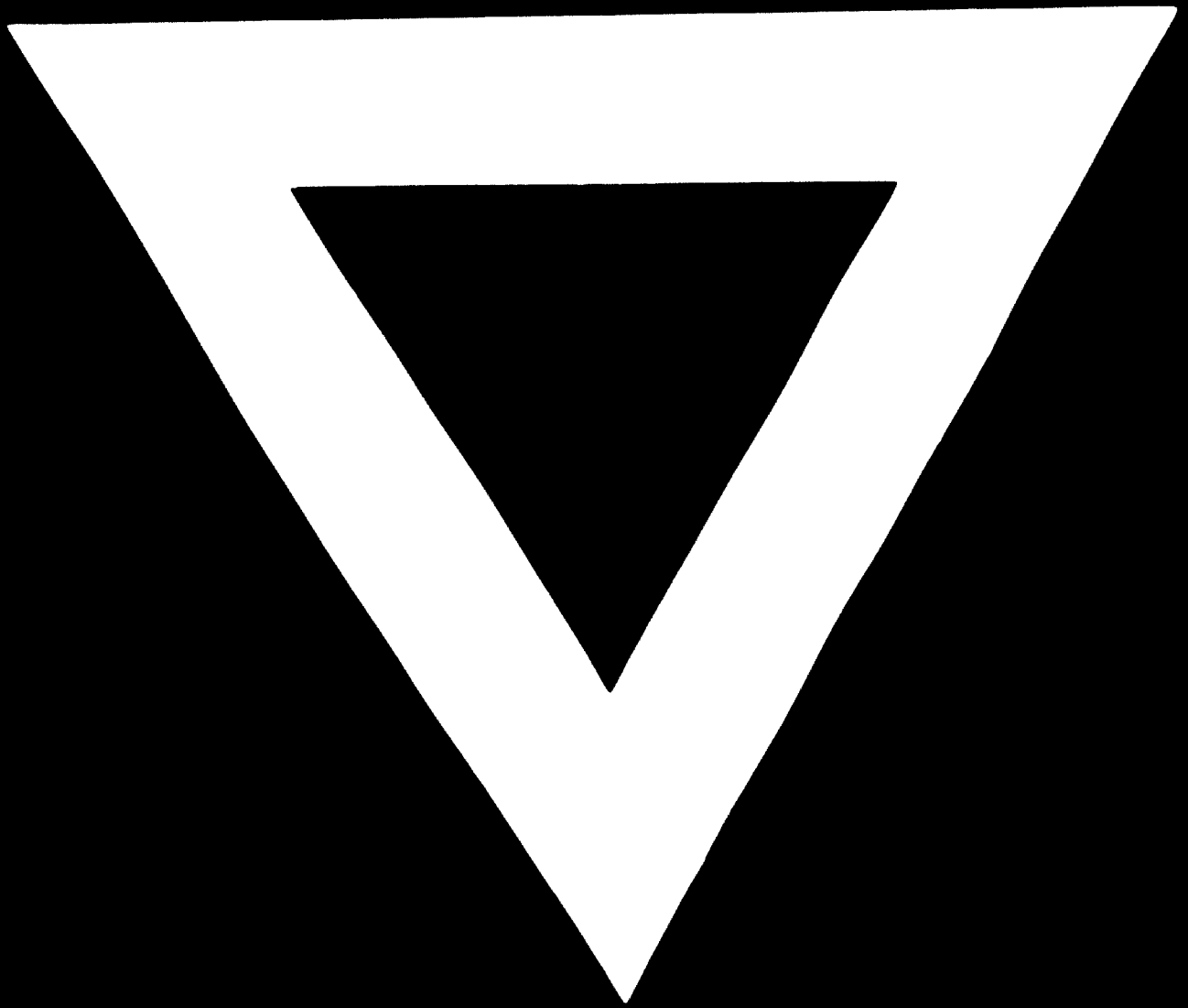
1972

1973

FIG. 111: IMPORT OF PLASTIC RAW MATERIALS INTO WEST MALAYSIA

SOURCE: Department of Statistics, Kuala Lumpur





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