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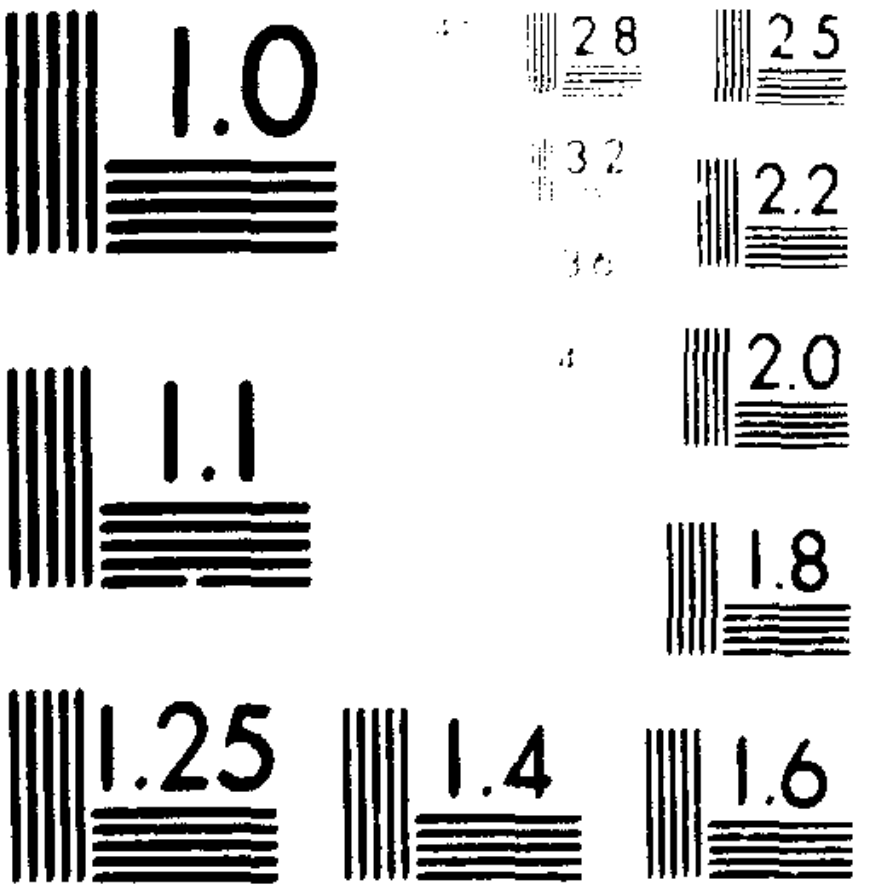
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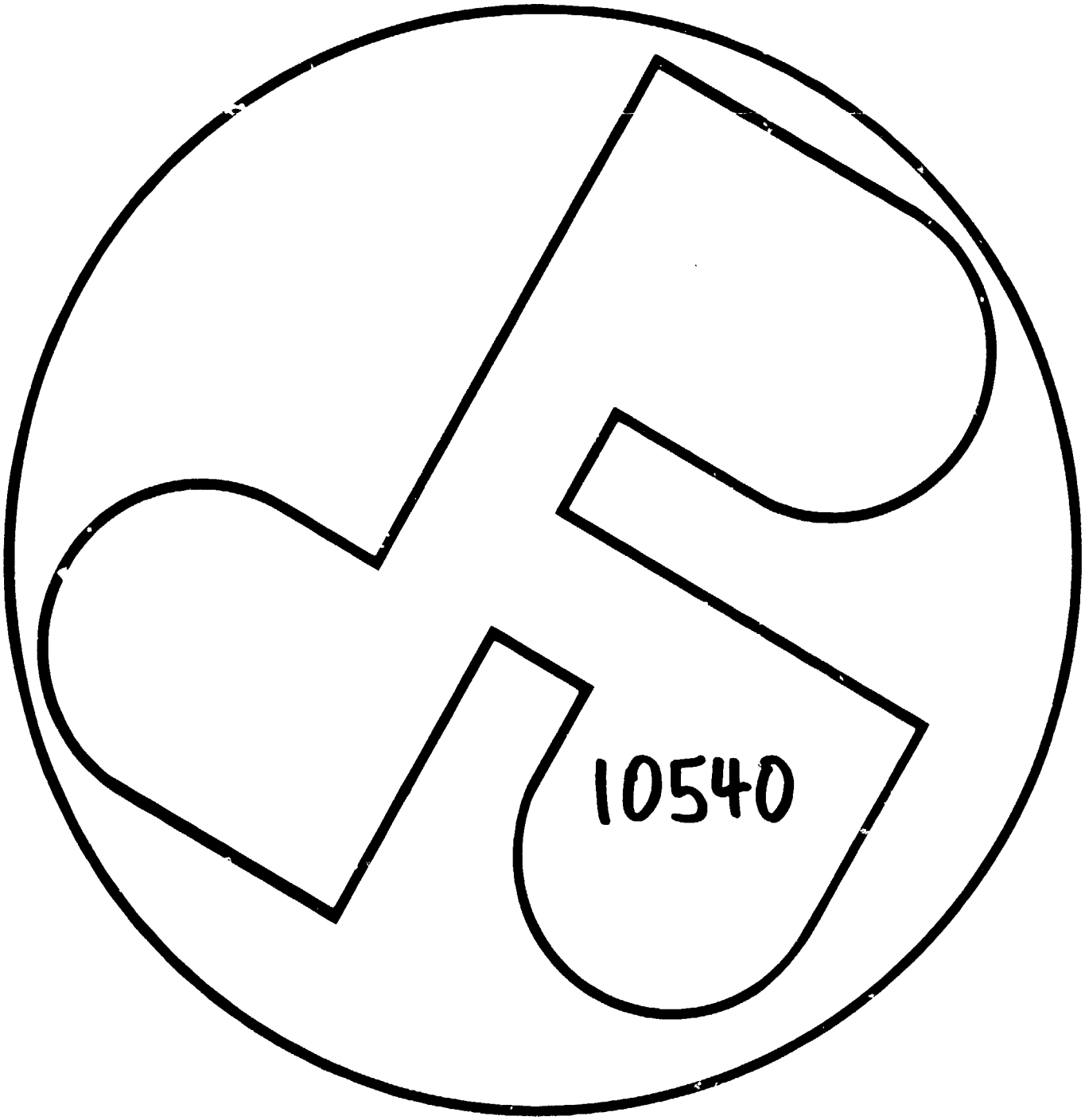

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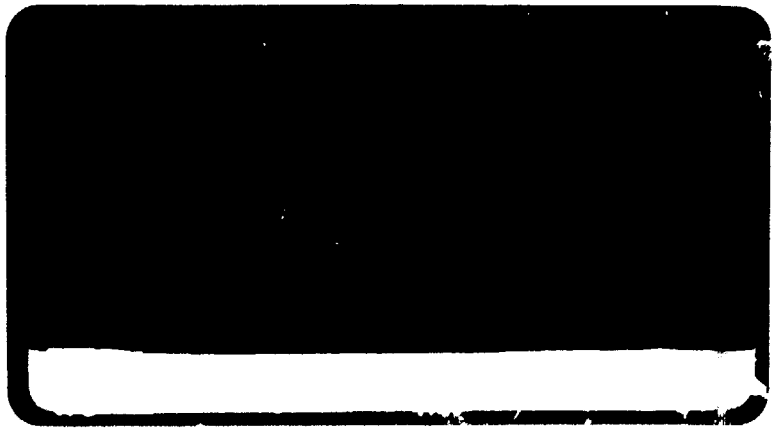

A SHORT- AND MEDIUM-TERM FORECAST FOR THE CONSUMPTION OF PACKAGING IN THE UNITED MEXICAN STATES ,

FINAL REPORT: APRIL 1981

CONTRACT NUMBER 80/111DR

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A SHORT- AND MEDIUM-TERM FORECAST FOR THE CONSUMPTION OF PACKAGING IN THE UNITED MEXICAN STATES

FINAL REPORT DP/MEX/78/011

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EXECUTIVE AGENCY FOR THE UNITED NATIONS DEVELOPMENT PROGRAMME

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C O N T E N T S

APPENDICES

INTRODUCTION

PROJECT PURPOSE

The Government of Mexico, the United Nations Development Programme (UNDP) and the United Nations Industrial Development Organisation (UNIDO) have concluded an agreement and are co-operating in carrying out a project entitled "Mexican Institute for Assistance to Industry". The objective of this project is to draw up a comprehensive programme for the development of the country's packaging industries taking into account national requirements and the maximum utilisation of domestic raw materials.

One input to this project is a study forecasting the short- and medium-term consumption of packaging in the United Mexican States, so that an assessment can be made of the country's installed and planned production capacity from which to investigate the need for new packaging production units.

Pira, the UK national research association for paper and board, printing and packaging, has been commissioned to carry out this study and, as principal contractors, engaged Mexican counterpart support through sub-contracting to Laboratorios Nacionales de Fomento Industrial (LANFI) to help in obtaining published statistics and unique data from field visits in Mexico. These investigations and their subsequent analyses by Pira's Techno-Economics Group have resulted in this report - a statistical and economic review of the packaging industries of the United Mexican States 1980-1985.

STUDY COVERAGE

This study investigates the five major packaging material categories of: metals; plastics; glass; paper, paperboard and wood; their various combinations and packaging containers made therefrom. Data has been collected on their production and consumption, broken down by packaging material and pack type, and end-use applications respectively for the period 1975-1980, and a forecast made covering the period 1980-1985.

The findings of the report have been presented under the following headings:

- Conclusions and implications
- Summary tables
- General economic conditions
- Packaging materials production and conversion
- Packaging usage by main consuming industry sectors

A description of the general economic conditions prevalent in Mexico and their impact at the macro-economic level lead to suggested changes needed in industry structure for the future development of the Mexican packaging and consumer industries.

Data has been collected and estimates made of total national capacity, production output and trade for each packaging material from which apparent consumption has been derived. These derived figures or market size estimates have been broken down where possible into major end-use sectors. Price trends, in the form of price indices, of the various packaging materials are indicated and technological developments reviewed. These

developments are related to packaging research in North America which, because of the proximity to Mexico, is considered likely to impact sooner rather than later on the Mexican packaging industry.

Packaging usage has been broken down by the main consuming industry sectors. For each sector there is a discussion on factors affecting demand, new product development and substitution potential in the use of other packaging materials/packs, and an outlook for the future.

The major findings of the report are drawn together in the form of conclusions, and implications for the future development of the Mexican packaging industry have been identified and assessed.

STUDY METHODOLOGY

The study has involved the collecting of numeric data and expert opinion for use in generating a scenario of packaging production and consumption in the United Mexican States, now and in the future.

Three main types of data source have been used in preparing these scenarios, namely:

- Government sources, eg General Statistics Bureau of the Programming and Budget Secretariat (SPP), trade statistics

- trade associations (known locally as camaras)

- companies involved in packaging production and the major consuming companies of packaging.

Information from these sources has been collected, collated, analysed and integrated into the main body of the report. Summary tables have been prepared from this data and can be found at the front of the report. Published sources of statistics are acknowledged against the appropriate tables; company data and where we have been asked not to quote a source have been termed "industry estimates".

The collection of information has taken two forms:

- desk research of published sources relating to the production and consumption of packaging in Mexico and the identification of relevant organisations and companies who needed to be interviewed.

- interviews to obtain supplementary information in areas where published statistics are lacking.

The sample of companies interviewed was prepared based on the 'Pareto' or 80:20 rule where 20% of the companies involved have 80% of the marketplace. Under guidance from Pira, LANFI selected the companies/organisations to be visited based on their knowledge of local conditions, a list of whom are shown in Appendix 1. A letter of introduction, outlining the project concepts and giving reasons for the visit, together with interview schedules is shown in Appendix 2.

Data gathered from published sources and interviews have been analysed and judgements made on their validity, using industry opinion and Pira-subject expertise prior to use for forecasting and the preparation of the final

report. Forecasts have been made on selected statistics, primarily consumption figures using a one-on-one linear regression analysis technique and various criteria for correlation purposes. These criteria include: GNP, GNP per capita, population, output by primary, secondary or tertiary industry.

To further check the validity of the forecasts and the historic perspective of the Mexican packaging industry, sections of the report were returned to industry contacts for their comments. These have been incorporated (where justified) into the final report.

CONCLUSIONS

GENERAL

During the next decade, the world economy as a whole will experience slower growth and tighter energy markets. Within this environment the countries which are newly industrialising, especially those with their own energy resources, are likely to grow the fastest, and Mexico is one of these countries.

In addition there are geographic advantages. To the north, the United States of America provides a substantial market, but imposes high standards of quality in both the products and their packaging. This serves as a goal for Mexican export industries; if they can export to the USA, they can export to any market in the world. To the south, Mexico has a whole continent either newly-developing or underdeveloped. These countries provide not only a market for consumer goods, but also a market for capital goods machinery and technologies that have been developed and adapted in Mexico. There are also two long coastlines which provide ample opportunities for the development of fishing industries and tourism. The ports are currently in need of expansion and this is in hand, but reflects the lack of adequate capital investment. Transport as a whole in the country has suffered from low levels of investment and this has tended to reinforce the concentration of industry into a few geographic areas.

Packaging industries tend to be established near their user markets and therefore - except for the packaging of agricultural and fish produce - these have been developed in areas of high industrial concentration. Certainly for rigid packaging, bottles, cans, rigid board boxes etc, it is necessary to be near their user industries. The case is not so strong for flexible forms of packaging which can locate more widely. However as a whole, the packaging industry is not very susceptible to government pressure to establish new plants away from centres of population and industrialisation. In addition, the problem of poor transportation makes companies locate, where possible, near their sources of raw materials.

Certainly one of the most intransigent problems for the Government is the growth of population. At 3.6% per annum, this is one of the fastest rates of demographic growth in the world. It is imperative that this rate should be cut if serious destabilising factors are to be avoided. Already there is a problem with rural underemployment and urban growth has not been adequate to deal with the migration from the land. The country has problems with feeding the population as it is now, and has had to step up imports of basic grains. In addition, the Government is establishing a mechanism for food processing and distribution through low-price retail outlets. This is a particularly important area where the packaging industry can make a positive contribution to the national welfare through saving on food wastage in distribution and retailing.

However, there is still the underlying problem of income distribution with a relatively small proportion of the population receiving the bulk of the benefits from the growth of the economy. Part of the aim of industrial development is to absorb the younger unemployed and thereby share the national income more equitably. These young people with higher education levels also have higher aspirations for an improved life-style compared with that which their parents accepted. It would be most unfortunate if these factors were overlooked. The current Administration is working along these lines, but the population rate of growth makes it a serious

continuing problem. The development of consumer industries to meet these increasing demands can also be seen to favour the development of more sophisticated and increased amounts of packaging.

Despite the slowdown of the world economy, Mexico can continue to grow and develop. Partly this is due to the stability resulting from the development of oil resources; but also the growing population provides an opportunity as well as a problem. Although primarily unskilled at present, the working population can be rapidly upgraded to higher levels of skill using more sophisticated technology and thereby generating increased wealth. There are certainly still problems to be resolved, in particular, the relationship between price controls and the level of inflation. In some cases, the packaging industry has suffered from price controls which have constrained production of adequate quality materials, eg tinplate.

After a number of years of neglect, when the Government was concentrating on oil exploration and development, agriculture now has a dominant place in the planning for economic development. There are however a number of complex inter-related problems. There is very little cultivatable land and this is mostly split into small uneconomic units. Irrigation schemes receive support, but to recoup the costs it is usually necessary to grow cash crops, fruit and vegetables for export, or tobacco. This does not help to feed the expanding population, and the level of imports has to rise, especially grain and beans. The Government is also developing a support scheme for basic foods and protein to help poorer people. Both the increased exports of fruit and vegetables and the food support scheme offer opportunities for the packaging industry. New investment in packaging for these sectors is in addition not tied to the dominant industrial urban centres and can provide a limited amount of employment in rural areas.

The fishing industry has similarly been short of investment funds. Until recently, there was little investment, either private or government. However, the Government has instituted plans for considerable development in this area as part of its food support programme. Processed fish products and canned fish have traditionally been a luxury item, but with increased catches and more streamlined processing and canning it is intended that this protein-source should be more readily available. There will be a need here for increased can capacity and there is a plan by one concern to establish a two-piece can-line for packing its fish products. This innovation should reduce the relative cost of the packaging and assist in keeping prices down.

The mineral resources of Mexico are plentiful and available, but there is a problem with poor communications and adequate energy supplies. From the packaging point of view there are ores of iron, and bauxite, but problems of inadequate primary smelting result in the bauxite being exported and alumina and aluminium ingot being imported.

Oil exploration and development has had the major part of government investment until quite recently, up to 50% of total budget. As a result, a number of other areas of social development (health and welfare, schools etc) and industrial development (transport, electricity generation, agriculture, petrochemicals etc) have not received similar funds. However, in the current world economic situation, Mexico has the advantage of an established oil industry to provide a stable source of income for the development of these other areas. The Government still faces the problem of choice; should the maximum support be given to developing social welfare and education facilities, or should industrial development be the major

concern, and the development of improved transport and energy resources. Either of these two extremes should be avoided and a programme which embraces as much of both as possible would probably minimise the future disequilibrium.

Increased levels of education and aspiration on the part of consumers, and intervention from the Government in the distribution of food will both increase the level of demand for packaging materials and packs. Currently modern retailing methods, self-service supermarkets and hypermarkets are largely restricted to the main conurbations. In rural areas retailing is mainly by small stores and markets where there is less need for packaging of goods. Even in these rural areas though as more processed food and other consumer goods become available, the impact of packaging will be increasingly felt. The benefits of packaging of foods, less wastage through the distribution and retail chain, can make a substantial contribution to raising the nutritional level of the population as a whole.

Developments in manufacturing industry will also cause an increased demand for packaging. There will be more goods available and therefore a greater need for packaging, but also these goods are becoming more sophisticated and therefore require greater protection during distribution and enhanced presentation at the point of sale.

PAPER AND BOARD

Statistics in this sector of the packaging industry were found to be readily available, though often the breakdown into product categories was not as comprehensive as was wished.

Total consumption of paper and board packaging materials has increased though not steadily, with a fall of 6.4% in the volume of demand in 1974/75. Subsequently growth has been around 8% per year. However, the share of this total demand which is satisfied by domestic production has fallen from 99% in 1971 to 92% currently. This is considered to be caused by inadequate pulp supplies resulting in lower levels of capacity utilisation. For the future, consumption of paper and board packaging is expected to continue expanding. Capacity installed should be adequate to meet demand if capacity utilisation levels can be improved. From 1982 to 1985, the forecasts suggest an increasing shortfall of domestic capacity to meet demand, even at high levels of utilisation. Installed capacity is expected to expand to 1660 thousand tonnes, but this will not meet the anticipated growth of demand which by 1985 is forecast to reach 2355 thousand tonnes.

As well as this problem of inadequate capacity, the Mexican paper industry has suffered, and continues to suffer, because of insufficient pulp supplies and also of wastepaper. Pulp suppliers are not able to obtain sufficient quantities of wood from domestic forests, and papermakers have had to import pulp and wastepaper. Capital investment in pulping facilities has not kept up with demand because of the lack of raw materials.

Although pulp and papermaking is an energy-intensive industry, there is no evidence that currently, or for the future, the industry will be constrained by this. In addition, the industry is unlikely to be hampered by a shortage of labour; papermaking is a capital-intensive operation and does not require a large highly-skilled labour-force.

Paper and board packaging is therefore at the beginning of a period of rapid growth which more than matches the growth of the economy. The main cause for concern, and one which requires further more detailed study, is the supply of raw materials from indigenous sources both primary pulps - wood or bagasse - and secondary raw materials, especially wastepaper.

PLASTICS

Statistics were obtained from the General Bureau of Statistics, the Mexican Institute for External Trade and the General Department of Customs. Further data was supplied by two industry trade associations, the Asociacion Nacional de la Industria Quimica and the Asociacion Nacional de Industrias del Plastico, and from interviews with PEMEX (Petroleos Mexicanos) and other companies in plastics production and conversion. Most of the data collected referred to plastics capacity, production and consumption as a whole, and it was not possible to isolate sufficiently accurately that specific part related to packaging. However, by looking at these totals it was possible to produce meaningful statements about tne likely availability of plastics, and from the point of view of packaging what will be the major growth areas.

Mexico is in the fortunate position of having adequate supplies of oil, from which the main plastics materials are derived, and will not be so exposed to the oil price fluctuations which have disrupted other countries. In recent years though there has not been adequate capacity in the downstream petrochemical industries to meet the demand, and a number of plastics materials have had to be imported. The supply of feedstocks is largely in the hands of PEMEX and with the concentration of effort on oil exploration and extraction they have also had to handle the imports of some petrochemical derivatives for the production of plastics. Following the 1979 National Industrial Development Plan, both Government and private industry have been more willing to invest in downstream production capacity. If the plans currently in hand are realised, Mexico should be self-sufficient in petrochemicals by 1982 and have the potential to develop an export operation.

For low density polyethylene, domestic production has failed to keep pace with demand; in 1975 imports supplied 5.6% of estimated consumption, but by 1978 this had risen to nearly 40%. As a result, PEMEX has had to increase its imports. Total national consumption is forecast to rise 7.5% a year to 1985, and additional capacity is required if this demand is not to be met by increased imports. The main products are films, both light-weight and heavy duty, which take approximately 75% of total LDPE, with the remainder in bottles and closures.

High density polyethylene demand was, until 1978, entirely met by imports, but the plant installed by PEMEX now meets most current domestic requirements. For the forecast period, annual growth in demand is expected to be 8% per year, and further installations are necessary if domestic capacity is to be adequate to meet demand. The largest market for HDPE is bottles, large containers, crates and pails.

Polyvinyl Chloride capacity is currently adequate to meet domestic demand, but also to provide a surplus for export; Mexico has been a net exporter of PVC since 1977. With a growth rate of 5% forecast to 1985, the present capacity should be able to meet domestic requirements until 1985. The bulk of PVC is for rigid sheet and film with some cling and stretch films, bottles and closures utilising the remainder.

Annual average growth in the consumption of polystyrene has been 10-11% per annum during 1975/79, and the bulk of this has been provided by domestic capacity. In the forecast period to 1985 consumption is anticipated to grow

by 6-8% per year, but this increase in demand will be met by the planned capacity installations. PS is used mainly for thin-walled injection-moulded or vacuum-formed containers and cosmetics and pharmaceuticals packages.

Until recently, the domestic demand for polypropylene was met entirely by imports, increasing by 97% between 1975 and 1978. Anticipated growth in consumption is estimated to be 7-9% for the period to 1985. Film is the predominant end-use for PP, mainly for snack foods and confectionery markets; some is used for crates and pails, with the balance being taken by twines for tying, or woven sacks.

All plastics materials and packaging products will grow during the forecast period to 1985. This growth will be partly the result of growth in total packaging, but also from the substitution of plastics for other traditional packaging materials, such as paper and board, glass and wood.

REGENERATED CELLULOSE FILM

Most of the data used in the section on regenerated cellulose film was derived from industry sources. In addition, since the industry is very concentrated and there are no imports and only limited exports, this sector is self-contained.

Capacity is still expanding and will continue to do so up to 1985, but at a lower rate than in earlier periods. This capacity will be adequate to meet the demand since this material will be facing stiff competition from OPP films in particular. The total demand for packaging will be increasing rapidly and regenerated cellulose films will benefit from that, but at a lower percentage of the total. The traditional markets for regenerated cellulose film, snacks, sweets, bread, cigarettes and tobacco will increasingly use alternative films or in some applications a laminate with regenerated cellulose film as one of the components. It is unlikely that the industry will suffer from any shortage of raw material for the anticipated levels of production.

TINPLATE

Some of the data for this section was obtained from General Statistics Bureau, and the Mexican Institute for External Trade. This was further supplemented by statistics from the Steel Industry Trade Association, and a number of industrial interviews. Unfortunately, much of the data gave very different values for the same time series and it has in some cases proved impossible to reconcile the discrepancies. In such cases, the data series has been chosen which seems the most reasonable. Consumption of tinplate for packaging is estimated to continue increasing in volume terms but not at as rapid a rate as might be expected. Firstly, there is the impact of the two-piece can which will take much of the beer and carbonated beverage market and be used in some food applications. In addition there is competition from aluminium cans, glass and plastics bottles, and in special food uses, the retortable pouch.

If present plans are realised there should be adequate domestic capacity to meet demand by 1985. Currently, the tinplate industry is hampered by government price controls, which have depressed the price to such an extent that producers are unable to make plate of a sufficiently high quality to be used for food packaging. Even if this problem did not exist, current capacity would be insufficient, and there still would be dependence on imports. For 1980 it is estimated that 270 thousand tonnes of tinplate were imported, a 90% increase on the previous year. Furthermore, the industry is suffering from insufficient supplies of one of the basic raw materials - rolled coil. The steel industry expansion plans will raise capacity to over 10 million tonnes by 1985, but there are many urgent demands for steel from other expanding and developing industries. Given the other problems facing the tinplate industry however, the relative shortage of rolled coil, which is currently decreasing, is not seen as of major importance. Far more important is the need to upgrade the production of the industry, both the quantity produced but also the quality of the product. Improved tin coating techniques are required which will reduce the pinholing problem, permit the use of the plate for food applications and thereby cut the level of imports.

CANS AND CONTAINEPS PRIMARILY OF TINPLATE

There are basically two kinds of metal cans, open-top and general line. The former type are the traditional food and beverage cans which once open are not usually re-sealable; made primarily from tinplate, these are now being made from a range of other materials, eg tin-free steel (usually chromium plate) or aluminium. Originally manufactured in three-pieces and soldered together, recent innovations have included the replacement of soldering with welding and the development of the two-piece can, either drawn and wall-ironed (DWI) or drawn-redrawn (DRD). General line cans are usually three-piece, of tinplate with a reclosable lid, and are used for packaging a diverse range of products from paint to powdered milk.

The open-top can-making operation has in the past expanded capacity to meet increased levels of demand, and this is expected to continue throughout the forecast period. New machines will mostly be for the production of two-piece cans especially for beverage packaging. There will remain the problem of obtaining adequate quantities of good quality tinplate but this can be solved by imports.

For general-line containers, again capacity will expand to meet the needs of the consuming industries. In the food area, there may be some substitution by rigid plastics containers and laminated film pouches in folding cartons for dried goods (milk, instant coffee etc). For many other uses paints, inks, varnishes etc, it is unlikely that the general-line container will suffer much competition.

STEEL DRUMS AND PAILS

Data on this sector of the packaging industry is limited. Some is published by the General Bureau of Statistics and the Mexican Institute for External Trade, and this was supplemented with industrial interviews. From the forecasts made it seems as though consumption of these steel packaging products will suffer an absolute decline in the period to 1985. The rate of decline varies from product to product, but all products in this sector will experience a reduced market. Capacity, which currently stands at 7.5 million units per year, has already a surplus over demand and the situation may be expected to deteriorate. There are two main factors contributing to this decline: firstly, plastics drums and containers are taking an increasing share of these markets and this trend will continue at an accelerating pace during the forecast period. The second factor is the increased use of larger containers, eg tankers and intermediate bulk containers, which are taking an increasing share of traditional drum markets.

A further factor which has so far not been studied is the level of steel drum reconditioning in Mexico. Although the number of reconditioned drums is probably not large, they can play an important part in the industry. Most significantly, the reconditioned drum can keep steel drums commercially viable when the cost of drum re-usage is below the level of non-returnable drums made from competitive materials.

AEROSOLS

Most of the data on aerosols and their usage was supplied by the Instituto Aerosol.

This is another industry where capacity seems to be expanded whenever necessary to meet the growth in demand. To some extent the aerosol business is constrained by the effects of inflation, but expansion of aerosol usage will take two forms. Firstly, there is increased demand for products already packaged in aerosols, and secondly there is the additional range of products which will be packed in aerosols.

For certain products, eg hairsprays and insecticides, there will be a trend to larger sizes and this will mean that numbers of aerosols filled will not increase as much. Unfortunately there are not currently any figures showing the breakdown of aerosols filled by size.

Another significant underlying factor which may affect growth in the future is the availability of tinplate. Of the total of aerosols filled, it is estimated that 75% are tinplate containers. At the present time 60-70% of these containers are made of imported tinplate, and this proportion is likely to remain at approximately the same level unless the quality of domestic tinplate can be improved.

ALUMINIUM

Statistics on the aluminium industry in Mexico are readily available from the Instituto del Aluminio, but these do not identify specifically packaging end-uses. To supplement these figures, a number of industrial interviews were carried out with both producers and users.

Overall the consumption of aluminium for packaging is expected to grow at an average 8.5% per year for the period to 1985. Expansion will come from more use of foil and sheet - especially cans for beer and carbonated beverages. Developments in laminates and co-extrusions for particular food products will also add to the increased use of aluminium in packaging. Capacity utilisation is estimated to be 80% currently, and with the expansion plans already announced, there will be adequate capacity to meet the increased demand to 1985.

Mexico does have considerable resources of bauxite, but currently this is not smelted at home but exported, and alumina and aluminium ingots are imported for further manufacturing and conversion. A domestic primary smelting plant would certainly enable the aluminium industry to expand at less cost than with the current dependence on imports. However, such a plant would require considerable capital input from the Government as well as private industry. In addition, primary smelting requires large amounts of electricity, and further generating facilities would have to be built.

GLASS CONTAINERS

Some data on the production of glass containers is available from the General Statistics Bureau, trade data from the Mexican Institute for External Trade, and this was supplemented by interviews with glass packaging manufacturing companies. Total national capacity for glass containers has been increasing at 13.5% per year during 1970-1979, and for the forecast period to 1985 expansion will continue but at the slower rate of 10.5% per year. This gives a potential output of 9.5 billion units a year. If the current plans for expansion are carried through, then capacity will be adequate to meet the increase in demand. The slowing of the rate of growth in demand is due to a number of factors. In the markets for pots and small bottles such as pharmaceuticals and cosmetics, there is a considerable substitution of glass by both rigid and flexible plastics and laminates. This partly on a cost basis but also consumers liking for plastics and other non-breakable packs. In glass bottle markets, there are developments of plastics bottles for everything from cooking oil to carbonated beverages, and for beer there is increasing competition from cans, either three- or two-piece, tinplate or aluminium. However, glass has still many advantages and there are many innovations which could be employed to swing markets back towards glass. Foremost among these is the development of lighter-weight bottles, in some cases with a plastic sheath to provide additional protection and higher-quality printing surface. Glass has many associations of purity in the minds of consumers and this can be a marketing advantage. Beer and carbonated beverages could be packaged in wide-mouth, easy open bottles as a competitor to cans.

However, without closer study of the substitution factors particularly between plastics and glass, it is only possible to say that there will, within the forecast period, be sufficient capacity in glass container manufacturing to meet the anticipated growth in demand. This industry has the additional advantage that, except for small quantities of special additives and colourants, all raw materials are readily available within the country. Energy, which represents approximately 20% of total production costs, may cause problems if planned electricity generating facilities do not start-up on time.

WOOD

Because of the diversified nature of this industry and the wide range of products and sizes, it was not possible to obtain any comprehensive data on wooden packaging. A limited amount of data on nailed and wired wooden boxes is collected by the Camara Nacional de las Industrias Derivadas de la Silvicultura.

Wooden container making in Mexico is largely carried out at sawmills who see themselves as being in the timber industry rather than packaging industry and boxes are just one of a range of timber products they produce.

From the information that was obtained it is clear that timber packaging will continue to grow, but at a very slow rate, benefiting from the growth in packaging as a whole. The situation with regard to competition and technological change is likely to change little.

Wooden crates and containers are used mainly for the export of motor vehicle parts and other machinery, and fruit, vegetables and fish. The last three end-uses are being lost to plastics and wet strength fibreboard cases. Pallets are being used increasingly throughout all types of industry for both consumer and industrial products.

This industry has only limited scope for technical and marketing developments and those taking place are geared towards reducing weight and improving handling techniques.

Raw material availability is not seen as posing any great problems, except in special areas; eg Mexico has to import oak for wine and spirit barrels.

AREAS FOR FURTHER STUDY

During the fieldwork involved in this study, sometimes resulting from discussions at interviews, a number of problem areas have been identified. These may be considered as priorities for further more detailed investigation, to ensure the smooth development of the Mexican packaging industry.

Subjects for this future study can be divided into those that could be classified as macro problems, relating to the whole of the packaging industry in its relations vis à vis the economy as a whole, the development of export markets, or its influence of retailing patterns; or micro problems, where consideration needs to be given to one sector of the total packaging industry in Mexico. A number of such potential areas for more detailed study are suggested below.

MACRO STUDY AREAS

Firstly, a more detailed study is required to establish more exactly the size, structure and composition of the packaging industry and its relationship with the whole economic system.

An alternative approach could entail the construction of an input/output model of the packaging industry, which would facilitate the identification of likely constraints on development. In addition, further investigation could usefully be carried out on the contribution that packaging can make to the development of export industries. The saving of wastage and improved distribution of food that can result from more packaging could be assessed.

Studies could also be carried out to investigate the future cost and availability of packaging materials and their inter-relationships.

MICRO STUDY AREAS

Paper and board

Fibre availability 5-10 years, looking at both virgin fibre and secondary, recycled fibre.

Plastics

Proportion of total consumption being taken by packaging end-uses and more precise growth rates for these.

Regenerated cellulose film

Exact measurement of the rates of substitution of alternative plastics films for RCF.

Tinplate

Detailed assessment of supply problems, especially quality, is this simply a function of price or is improved technology required; level of potential import-saving.

Cans and containers primarily of tinplate

More accurate measurement of capacity, production, and consumption of open-top cans and especially their use for beverages related to glass and plastics bottles.

Steel drums and pails

Investigate the level of drum reconditioning and whether this can significantly arrest the change to plastics drums.

Aerosols

Develop additional data collection in conjunction with Instituto Aerosol, eg annual fillings by size of container and product packed; usage of different propellants, use of different body materials, tinplate, aluminium, plastics and glass.

Aluminium

Feasibility of primary smelting of domestic bauxite; rate of substitution of aluminium for tinplate cans, especially for beverages; potential for foil packs, eg retort pouch.

Glass containers

Rate of substitution of plastics for glass, especially for beverages, cosmetics and toiletries; more detailed study of the carboy market, and its growth potential.

Wood

Rates of transfer from wood to other packaging materials in the different user markets, eg horticulture, fishing, motor vehicle components; investigation of innovations using combination of wood with corrugated board, plastics films.

The economy of the Mexican States is enjoying and will continue to enjoy rapid development, and in such a healthy position it is important that both Government and individual companies should have access to the fullest possible information and data for policy decision-making. In sponsoring this initial exercise, UNIDO have helped provide the groundwork for what should become a continuing exercise of data collection and analysis. This first study has in addition highlighted areas of potential difficulty whilst at the same time providing some of the data for their solution.

SUMMARY TABLES

TABLE A PRODUCTION OF PACKAGING MATERIALS BY VOLUME 1975-1979/80

Material	Unit	1975	1976	1977	1978	1979	1980
Paper bags		38.5	36.2	36.6	35.6	35.5	
sacks		117.3	117.6	123.3	133.8	124.7	
wrapping	000 tonnes	70.4	59.2	64.5	69.6	67.7	
liner		281.3	319.1	347.6	376.4	401.0	
Corrugating medium		111.7	133.0	150.3	164.8	193.7	
Board							
uncoated duplex		20.2	21.2	10.9	16.6	20.2	
coated duplex	000 tonnes	90.0	104.6	117.9	122.9	136.4	
grey		29.8	33.9	37.9	36.4	34.6	
Regenerated cellulose film	000 tonnes	17.5	19.5	20.0	20.2	22.1	21.2p
Tinplate for containers	000 tonnes	204.2	164.5	193.0	183.1	174.9	142.0p
General-line cans	million units		1580.8	1529.8	2117.1	2413.3	2663.3p
Steel drums							
for alcohol			6712	7702	6029	6158	
other	000 units		1363	1435	911	942	
Lined pails			7720	8893	8471	7496	
Aerosols	million units	43.0	43.0	47.5	49.6	56.1	60.0p
Glass bottles		2492.5	2543.6	2915.2	3170.1	3496.6	
jars	million units	172.5	169.8	155.5	192.7	171.1	
ampoules		214.2	270.2	273.0	265.4	269.0	
Wood boxes	000 m^3				211.5	231.8	

p provisional

TABLE B ESTIMATED MOVEMENT IN THE VOLUME OF PRODUCTION OF PACKAGING MATERIALS 1975-1979/80

%

	1975/76	1976/77	1977/78	1978/79	1979/80
Paper bags	-6.0	1.1	-2.7	-0.3	
sacks	0.3	4.8	8.5	-6.8	
wrapping	-15.9	9.0	7.9	-2.7	
liner	13.4	8.9	8.3	6.5	
Corrugating medium	19.1	13.0	9.6	17.5	
Board					
uncoated duplex	5.0	-48.6	52.3	21.7	
coated duplex	16.2	12.7	4.2	11.0	
grey board	13.8	11.8	-4.0	-4.9	
Regenerated cellulose film	10.2	0.3	0.1	8.5	
Tinplate for containers	-19.4	17.3	-5.1	-4.5	-23.4
General line cans	na	-3.2	38.4	14.0	10.4
Steel drums					
for alcohol	na	14.7	-21.7	2.1	
other	na	5.3	-36.5	3.4	
Lined pails	na	15.2	-4.7	-11.5	
Aerosols	0	10.5	4.4	13.1	7.0
Glass bottles	2.1	14.6	8.7	10.3	
jars	-1.2	-8.4	23.9	-11.2	
ampoules	26.1	1.0	-2.8	1.4	
Wood boxes	na	na	na	9.6	

TABLE C ESTIMATED CONSUMPTION OF PRINCIPAL PACKAGING MATERIALS BY VOLUME 1975-1979, 1982, 1985

Material	Unit	1975	1976	1977	1978	1979	1980	1981	1982	1985
Paper and board	000 tonnes	786.7	855.6	923.9	996.7	1099.1	1359.0	1384.9	1581.6	2355.0
Regenerated* cellulose film	000 tonnes	21.5					22.0			21.5
Tinplate for containers	000 tonnes	275.5	243.2	322.0	298.5	308.3	404.0		387.6	436.0
Steel drums										
for alcohol			6712	7702	6029	6158	5407		4046	2091
other	000 units		1387	1475	931	963	759		318	96
Lined pails			7720	8893	8471	7496	7464		6719	5649
Aerosols	million units	43.0	43.0	47.5	49.6	56.1	60.0		67.4	80.2
Aluminium foil	tonnes	4010	4725	5234	5504	5415				
Glass bottles	million units	4045.0					6382.5			7756.6

* capacity figures

TABLE D ESTIMATED MOVEMENT IN CONSUMPTION OF PRINCIPAL PACKAGING MATERIALS BY VOLUME

Material	% 1975/76	1976/77	1977/78	1978/79	1979/80	1980/82	1982/85
Paper and board total	8.8	8.0	7.9	10.3	11.8	28.7	48.9
Regenerated cellulose film	2.8% per annum 1975/1980				8% overall for period 1980/1985		
Tinplate for containers	-11.7	32.4	-7.3	3.3	31.0	-4.1	12.5
Steel drums							
for alcohol	na	14.7	-21.7	2.1	-12.2	-25.2	-48.3
other	na	6.3	-36.9	3.4	-21.2	-58.1	-69.8
Lined pails	na	15.2	- 4.7	-11.5	-0.4	-10.0	-15.9
Aerosols	0	10.5	4.4	13.1	7.0	12.3	19.0
Aluminium foil	17.8	10.8	5.2	-1.6			
Glass bottles	11.6% per annum 1975/1980				21.5% overall for period 1980/1985		

TABLE E PRICE INDICES FOR PRINCIPAL PACKAGING MATERIALS

Material
Paper and board
Thermoplastics
LDPE
HDPE
PVC
PS
PP
Average of all thermoplastics
Regenerated cellulose film
Tinplate for containers
Tinplate containers
Steel drums
Aluminium
Glass containers
Wood containers

Base year 1970 = 100

1975	1978	1980
na	134	259
113		200
115		210
165		250
170		360
na		na
130		
146		300
150		200
130		250
130		200
120		180
140		225
140		360

P A R T I

GENERAL CONDITIONS

GENERAL CONDITIONS

GEOGRAPHY

Mexico is the third largest country in Latin America with an area of over 760,000 square miles, more than eight times the size of the United Kingdom. It is bounded to the North by the USA, to the South by Belize and Guatemala, to the West by the Pacific Ocean and to the East by the Gulf of Mexico.

The Government redrew its geographic zone system early in 1979. The new system divides Mexico into three zones: Zone I comprises the least developed areas of the country and Zone III the most industrialised.

Zone I: receives preferential assistance. It includes five industrial harbours: Coatzacoalcos, Lazaro Cardenas, Las Truchas, Salina Cruz and Tampico, and their surrounding areas. (These areas are given priority I-A.) Other cities with potential for industrial and urban potential are also included (priority I-B). Altogether this zone includes 11 areas.

Zone II: these areas have state priority, and include areas selected by local government for special development within the state, in agreement with Federal Government.

Zone III: this area is scheduled for further regulation of its industrial and commercial development. It is subdivided into one area of controlled growth composing the Federal District and its surrounding environs; and one "consolidation area" where there are centres of population within the first area. Within this zone, except for limited exceptions, companies receive no assistance.

Each zone is divided into A and B categories which further determine the incentives granted to firms establishing there, as part of the Government plans to improve employment outside the main industrial areas.

POPULATION

The population, estimated at 64.6 million in 1977 and 66.9 million in 1978, is increasing currently at the rate of approximately 3.6% per annum. It is hoped that this rate may be cut to 2.5% by 1982, and to 1% by the end of the century. Although the rate increased only slightly between 1972 and 1978, it is still one of the highest rates of demographic growth in the world, and this creates many serious economic and social problems.

Since 1970, the urban population has been growing faster than that in rural areas, partly due to the natural birth rate, but also to the migration of people from country to towns. They are attracted by the higher standards of living and also displaced owing to lack of cultivable land. Mexico City now has a population in excess of 16 million people and this has resulted in many social and economic problems. The Federal District comprises the capital, Mexico City, and its suburbs and is situated at an altitude of over 7,000 feet. The two next largest cities are: Guadalajara, at a height of 5,200, some 400 miles north-west of the capital, with a population of approximately 2 million and a centre of light industry; and Monterrey with a population of 1.9 million, situated in the north-east, close to the US border, the most important centre for heavy industry outside the Federal District. The main ports (with population figures in brackets) in the Gulf of Mexico are Veracruz (260,500) and Tampico (369,000), and in the Pacific Coast are Acapulco (240,000) and the new port of Lazaro Cardenas (60,000) which opened in 1974.

It is estimated that for 1978, 28% of the population were economically active, with 40% of the workforce engaged in agriculture, 20% in manufacturing, and 32% in the services sector.

The rural poor constitute a major problem, with approximately 3.5 million farm workers either underemployed or unemployed. There has been a tendency for those people to move to large cities in search of improved standard of living, but this has merely swelled the number of urban underprivileged.

With the aid of the Family Planning Co-Ordinating Council, intensified efforts are being made to reduce population growth. It is hoped that the annual rate may be brought down to 1% by the end of the century, and if this Government initiative works, it is estimated that Mexico's population will be about 104 million. However, if population continues growing at the present rate, then it will be fast approaching 140 million by the year 2000. For the purpose of this study a middle estimate has been taken; because although government plans will have a considerable effect, it is unlikely that targets can be completely met; population estimates are given in the following table.

TABLE 1.1 POPULATION OF THE UNITED STATES OF MEXICO: ACTUAL AND FORECAST

	(millions)
1970	50.6
1973	56.2
1976	62.4
1977	64.6
1978	66.9
1979	69.4
1980	71.8
1985	80.4
1990	95.1
2000	125.0

Source: Estimates

The structure of the population can also be viewed as a problem or an opportunity. Approximately 30 million people, almost half the population, are under 15 years old; and almost three-quarters are under 22 years of age. These will swell the numbers of unemployed, but they are also a resource of labour which can be trained for jobs in the expanding manufacturing sector.

ECONOMIC CONDITIONS

Mexico has enjoyed uninterrupted economic growth for more than 25 years. Growth rates in 1976-1977 were the lowest in the period, with GDP only increasing 2.1% in 1976 and 2.8% in 1977. This recession caused a significant departure from the long-term trends, but during 1979 and 1980 the economy recovered its vitality and is expected to continue growing at 8% or more up until 1983. 8%-10% growth in GDP is about the minimum required to absorb the growing labour force.

TABLE 1.2 GDP OF MEXICO: ACTUAL AND FORECAST

(thousand million pesos, 1960 prices)

1975	390.3
1976	398.6
1977	405.7
1978	440.6
1979	474.5
1980	508.0
1982	595.8
1985	718.3

Source: Diemex Wharton

In the longer term growth prospects are good but there are a number of destabilising factors. Improvements in economic activity since 1976 have led to increased imports and a deterioration in the balance of trade, despite greatly increased oil exports and growing foreign sales of manufactured goods, in particular machinery and transport equipment.

TABLE 1.3 GDP PER CAPITA, MEXICO: ACTUAL AND FORECAST

(pesos, 1960 prices)

1975	6,489
1976	6,395
1977	6,344
1978	6,693
1979	6,841
1980	6,740
1982	8,000
1985	8,930

Source: Estimates

The above table shows the GDP per capita for Mexico forecast to 1985. The figures clearly show the problems of re-establishing overall growth after the period of economic disruption in 1976 and 1977. With the increased expansion of the economy during the life of the present Administration, GDP per capita is expected to grow by 6.5% per year. However, there are problems of income distribution and these must be faced.

In addition the rate of inflation has been causing concern, and the policy of the current Adminstration is to maintain economic growth in order to generate additional employment, at the cost of higher inflation.

TABLE 1.4 INFLATION RATES

1977	1978	1979	1980
29%	16%	25%	30-35%

Inflation at these levels has a severe effect on the economy since it tends to discourage saving and investment, affects income distribution, generates pressures which increase foreign dependence, disturbs the tax system, and generates social conflict that may threaten the market economy. This situation can be worsened if, as in recent years, the Government's stated anti-inflation efforts are undermined by large increases in the money supply. It is estimated that in 1978/79 liquidity grew by 37% and an anti-inflation policy cannot operate effectively under these conditions.

In recent years government policy has been to boost the oil industry and this sector has received as much as 50% of total State budget. This has meant that other sectors have had investment programmes postponed, in particular transport facilities, ports, railways and highways, the steel industry and electricity generation.

During the years of Echeverria Administration there was an upsurge of State involvement in industry, and during those uncertain years 1970-1976 there was a considerable slow-down in private investment. Now many parts of industry are short of the necessary capacity for expansion. Exports of manufactured goods have not increased as they might have done, as in many sectors companies are working to capacity just meeting increased domestic demand. Mexico has decided not to join GATT and this will further shield industry from the rigours of the open market. In addition, the current high level of imports can only be maintained by exporting increasing quantities of oil. After a 3.2% fall in imports during 1976/77 there was a dramatic increase of 37.8% in 1977/78. Part of this was the result of higher levels of economic activity but much of the increase was caused by a relaxation of import restrictions.

A wide range of goods were removed from the list of those requiring import permits, including: chemicals; capital goods; machinery for the automotive, agricultural, textile, fishing and forestry sectors; and some categories of consumer goods. A further boost to imports followed the need to import food to feed the growing population because the agricultural sector (discussed in more detail elsewhere), is failing to produce adequate output and as a result capital expansion plans are having to be postponed while valuable

foreign currency is expended on food imports. In addition, the ports facilities are inadequate for the total level of imports required and again food takes priority over capital machinery and other goods.

A further problem is caused by the serious overvaluation of the peso. Theoretically, the peso is floating, but like his predecessors Lopez Portillo has tried to maintain the relationship between economic confidence and currency stability, and this can only be done by exporting increasing quantities of oil and further pushing up inflation.

PRIMARY INDUSTRIES

AGRICULTURE

Mexican agriculture is held back by weaknesses in infrastructure and in the land tenure system. Only about 16% of the total land area is cultivable since much of the country consists of a high, arid plateau incapable of producing crops without expensive irrigation. As a whole, agriculture, livestock, forestry and fishing only contribute 9-10% of GDP although they employ 40% of the working population.

Agriculture operates under the ejido system of land tenure dating from 1910. The Government assigns small plots of land, either individually or communally to peasants, whilst still retaining ownership. About 40% of Mexico's total irrigated area of 10 million hectares is held under the ejido system. Productivity is low, 70% of the farming population works under the system but only accounts for 35% of total annual agricultural output. Conversely, the commercial agricultural sector (involving larger units) represents only 4% of Mexican farms, but accounts for over 50% of agricultural output. Agriculture therefore suffers from inefficient exploitation of small, non-irrigated plots. Throughout the 1970s, agricultural production has failed to keep pace with population growth, resulting in increased imports of foodstuffs, particularly basic grains.

Programmes to collectivise ejidos, aimed at increasing farm productivity through larger scale methods, began in the mid-1970s and the present Government is placing much greater emphasis on this sector.

From 1974-1976 agricultural production grew at an annual rate of only 0.3%, in 1976/77 the rate was 2.7%, and in 1978 production increased by 3.1% over 1977. This slow growth rate may be partially due to the erratic climatic conditions but most of the cause must be the maldistribution of land. Owing to uncertainty arising from the expropriation of farms and restrictions on farm credit, farmers have been reluctant to invest in machinery and equipment. Also with the bulk of resources being channelled into industrial development, particularly oil exploitation, the agricultural sector has been of secondary importance.

Principal food crops are maize and wheat, followed by sorghum, kidney beans, barley, rice, soya beans and other oil seeds; although shortfalls in the production of most of these crops has meant that they have had to be imported. The major export crops are sugar cane, cotton, coffee, fruit and vegetables.

With the introduction of the National Agricultural Development Plan in 1979, it is hoped that the inherent inefficiency of agricultural performance may be overcome, in order that Mexico may become self-sufficient in at least basic foodstuffs by 1982. Substantial investment is being made in irrigation, fertilizers, soil conservation and improving means of distribution as well as storage facilities.

In agricultural chemicals, 1979 in particular was a year of recovery, with increases of production for all types of fertilizers, up to 28% in the case of ammonium nitrate and superphosphates. Overall growth, according to FERTIMEX, was 5% when compared with 1978 levels. In 1979 domestic production met 85% of Mexican consumption, and 1980 is expected to show the country self-sufficient in most types of fertilizers owing to recent investment in new capacity.

The Secretariat of Commerce has set up a commission to monitor the availability of basic foodstuffs within the country, and the Confederacion de Cameras Nacionales de Comercio (CONCANACO) is seeking to establish a chain of private-sector basic food supply centres to aid the distribution of certain foodstuffs.

FISHING

It is estimated that less than 10% of Mexico's annual fishing potential of 9 million tons is exploited, contributing 0.1% of total GDP. The 1977-1982 fisheries plan aims to increase fishing activities by 30% and production by 360%, but this plan seems doomed to failure. In 1978, the catch was only 696,444 tons - well below the target of 957,000 tons, and in 1979 output should have been 1.5 million tons but was actually only 1.2 million tons. A further problem during 1979 was the oil spillage at the Ixtoc offshore oil well, with the subsequent fire and widespread pollution of the Gulf of Mexico. The actual extent of this damage is still not known for certain, but commercial fishing was banned in the waters of Yucatan and Campeche. However, in mid-1979, the big fishing fleet of Productos Pesqueros Mexicanos started operating again after a 30-month stoppage owing to docking and equipment problems. This has made a substantial difference to the production outlook, but since it is estimated that only 1% of private investment capital is available to the fishing industry, it is incumbent on the Government to provide funds for additional capital expansion.

MINERAL RESOURCES

Mexico has extensive supplies of mineral resources with almost every known mineral occurring; with 20% of total supply, the country is the foremost producer of silver in the world. Mining contributed 4.7% of total GDP during 1979. Mexico is a leading producer of copper, lead, zinc, tin and sulphur, with important coal and radioactive materials resources also being mined.

The mining sector has a considerable amount of state participation, and private mining is 51% in Mexican hands.

Mining output fell in 1978, partly due to depressed prices, but also due to lack of capacity in some areas. However, with increased prices and demand for mining products, new mines have been planned as well as expansion of existing mines.

A growth rate of 4-5% per annum is expected, and during the six years of the Lopez Portillo Administration the mining sector is receiving considerable investment (US $2 billion). This growth and development is beneficial to the Government since it generates significant employment. Each job directly related to mining is estimated to generate five others so that the investment and expansion currently taking place should create 800,000 new jobs. In addition, the products of mining are all exportable and help reduce the dependence of the economy on the oil industry as a generator of foreign currency.

Of the mining products related to packaging, currently 50% of the country's tin requirement is imported. However, recent discoveries in Durango, Zacatecas and Guanajuato should alter this in the three/five-year period, and thereafter with regard to steel, which will be discussed specifically later on, there are problems finding sufficient domestic iron to meet the demands of the enlarged steel plants. This problem will become more acute if the current steel expansion plans are carried through, and the industry will have greater dependence on imported pig iron. In addition, there remains a shortage of adequate supplies of correct grades of coke and these too have to be supplemented by imported supplies.

In the case of aluminium, there is again the problem of sufficient raw materials and in this case of electricity too, if the expansion plans are to be realised. New deposits of suitable raw materials have been found, but the energy required for the conversion to alumina and finally to aluminium may not be available.

All these mining industries have suffered, as have many other parts of industry, by the inability of the railway system to cope with the transport needs. This is a problem which can only get worse, causing real delays for the country's industrial expansion, unless considerable investment is made in both improved track and more rolling stock.

PETROLEUM

The oil sector has become of prime importance to the whole economy, and of all sectors there is most investment in petroleum and petrochemicals. It is also the fastest growing sector of the Mexican economy having increased its share of Gross Domestic Product from 3.6% in 1973 to 7.3% by 1979.

Mexico has been an oil producer since the early 1900s, but in 1938 the oil industry was nationalised and the State oil corporation PEMEX was formed. PEMEX is responsible for the exploration and production of petroleum and petroleum products and it also dominates the petrochemical industry.

During 1974, the discovery of oil in the states of Tabasco and Chiapas rendered Mexico self-sufficient in crude oil and imports of crude oil ceased in July 1975.

Following further discoveries in the Reforma field (Chiapas and Tabasco), the Sonda field (Campeche), Chicontepec (Veracruz) and Sabinas (Coahuila), Mexico is now a net exporter of crude oil with the US taking 50% of total exports. Average daily production of crude oil during 1979 was 1.6 million barrels, 288,000 more per day than in 1978 - a rise of 21.7% on 1978. It was earlier hoped that production would reach 2.25 million barrels a day in 1980 and this would act as a ceiling for oil exploitation until 1982, the

end of the term of office of the present Administration. This is unlikely to be met this year, but should be realised before 1982, and of this total output 50% is planned for export.

PEMEX has had little difficulty in attracting international financial institutions to support its plans for increased refinery capacity, although the Mexican Government was constrained by restriction placed by the IMF on external borrowing.

The share of federal expenditure going to PEMEX is larger than to any other branch of the public sector, including social services. PEMEX's share was increased from 122 billion pesos in 1977 to 216 billion pesos in 1979.

PETROCHEMICALS

The petrochemical industry is becoming increasingly important to the Mexican economy representing 0.7% of total GDP. PEMEX was aiming at self-sufficiency in basic petrochemicals and the eventual development of an export market. Some 20 billion pesos have been allocated under the six-year national industrial plan for secondary petrochemical projects. However, many of these long-term projects are delayed for one reason or another. However, some spectacular growths have been made in basic petrochemicals in particular: methanol, ethylene, and ethanol.

For secondary petrochemicals, 1979 was a year with more ambitious plans for volume increases than at any time in the previous four years. Total investment in this area is expected to raise total installed capacity by 2 million tonnes a year. This boost has been to some extent the result of decisions on the part of private industry to become involved in these projects, following the 1979 National Industrial Development Plan. In addition to tax assistance and energy discounts, producers are being offered cut price raw materials by PEMEX.

As a result of these moves, products such as polystyrene and PVC will double their volume potential. The differential raw materials prices offered by PEMEX vary from region to region, and are related to the Adminstration's desire to create employment in certain areas.

From the point of view of foreign trade, although some basic petrochemicals must still be imported, this situation should be considerably better by 1982, when much of the new capacity will be on stream.

A similar situation exists for secondary petrochemicals where steadily expanding installed capacity should meet the increasing domestic demand and enable imports to be reduced.

SECONDARY INDUSTRIES

As a whole the manufacturing sector of the Mexican economy has remained stable at 23% contribution to total GDP, employing approximately 20% of the working population.

Industrialisation is part of the plan for the development of the Mexican economy, but it has not had adequate investment to make a substantial improvement. During the six years of the previous Administration, investors

were unwilling to put their money into industrial development. Following that was the economic crises of 1976/77 which disrupted the efforts to greater industrialisation.

At the same time, the current high level of expenditure on petroleum development has reduced the quantity of funds available for other industrial projects. Currently the main problem is inflation, which is having a constraining effect on savings, with many investors transferring funds into real estate etc rather than investing.

So, despite the Government actively promoting industrial development by means of easy credit facilities and import substitution policies, the manufacturing sector has not grown in its percentage of total GDP. It is estimated that Mexico is now able to provide four-fifths of the nation's demand for consumer goods, and there is a sound engineering base of light and heavy capital equipment.

Sections of manufacturing that are important consumers of packaging materials and packs are discussed in more detail in Part III of this report.

CONCLUSIONS

Taking the world economy as a whole, the next decade will be an environment of slower growth and tight energy markets. Within this environment, the countries likely to grow fastest are the newly industrialising countries of which Mexico is an example. In addition there are the oil resources, which means the economy can continue expanding without the constraint of overall energy shortage which is impeding the growth of a number of other countries. Mexico can be expected to move further away from the traditional labour-intensive areas - textiles, clothing, footwear, wooden goods, toys and plastic goods - increasingly into product areas where there is mature standardised technology - steel, chemicals, man-made fibres, cars and motor components. One of the great assets available to countries such as Mexico, when compared with the older industrialised economies, will remain the plentiful supply of unskilled and semi-skilled labour. Skill profiles of such newly industrialising countries rapidly shift upwards once industrialisation is established, especially where governments emphasise training and apprenticeship. These factors make such countries easy recipients of new, higher-skill technologies; while rapid growth and increasing local capital resources combine to create a spirit of enterprise and production flexibility seldom found in mature capitalist economies.

These advantages are not long lasting, the mere process of industrialisation rapidly erodes the advantage of cheap labour, and as real wages increase there is the need to move up the product ladder towards higher value-added goods. In addition, there is the exogenous threat of protection. This may be in the form of selective protection in the industrialised countries, eg the GATT multi-fibres arrangement with its quota system. A widespread move towards protection by the developed world would immediately damp the growth of export-oriented economies. Such a move would be self-defeating but the pressures for protection will be considerable.

It is clear that Mexico has considerable wealth potential from its petroleum and other mineral resources. However, the problems of building an adequate industrial infrastructure to provide sufficient employment for the rapidly expanding population are very complex and will depend to a large extent on large amounts of Government investment.

In addition the agricultural sector must be improved to feed the population and reduce the dependence on imported basic foods. In recent years wage levels have fallen behind the rate of inflation, and the Government continues to emphasise this need to minimise the inflationary effect of wage settlements. There are also minimum wage levels set at the beginning of each year by the National Minimum Wage Commission, with different rates for different states.

The presidential term of Lopez Portillo has certainly benefited the economy. His pragmatic approach to the economic problems has helped to restore both domestic and foreign confidence. The high rate of inflation and the apparent inability to distribute the wealth of the country more evenly will, however, undermine some of this hard won confidence.

The demand for packaging depends on the state of the economy, and level of expenditure on packaging materials as a whole is rising faster than the rate of increase of GDP. Since most manufactured products whether industrial or consumer goods, for domestic consumption or for export, need to be packaged, this rate of increase is inevitable. The different materials will experience variable levels of increase in demand, depending on the level of sophistication of the market.

In Mexico, where the majority of people have low standards of living, the lack of disposable income will be a brake on the expansion of the packaging industry. Growth rates are nonetheless expected to be very good with rates of increase of 10% per annum or more for traditional packaging materials, paper, glass, and tinplate, whilst plastics and laminated materials will grow at a rate of at least 15% per annum.

In terms of the markets for packaging materials, the continued buoyancy of the economy will provide expanding opportunities. In particular, the development of the food processing and packaging industry should be noted. However, this trend will depend on rapid changes taking place in wholesale and retailing facilities, the development of more supermarket outlets, and changing patterns of consumption.

Increasing consumers' disposable income is the key to growth in the use of packaging and with the current income distribution pattern, packaging development will not be at its potential rate.

If the Administration can allocate more investment funds into mining and manufacturing industries, rather than oil exploration, it will thereby create employment and a more balanced economy and absorb some of the rural underemployed.

In addition, with the development of the agricultural sector, both for export of products and also to more nearly meet the domestic demand for basic food, these factors will increase demand for all types of packaging.

MEXICO - GENERAL ECONOMIC DATA

Sector	Unit	1975	1976
Primary Industry (agriculture, mining etc)	000 million pesos 1960 prices	37.51	36.08
	% change year on year		-3.8
Secondary Industry (manufacturing industry)	000 million pesos 1960 prices	139.94	144.49
	% change year on year		3.3
Tertiary Industry (services etc)	000 million pesos 1960 prices	212.85	218.03
	% change year on year		2.4
Population	millions	60.1	62.4
Total Employment	millions	na	17.0
GDP Total	000 million pesos 1960 prices	390.3	398.9
GDP per capita	pesos 1960 prices	6489	6395

Source: Dimex Wharton

1977	1978	1979	1980	1982	1985
37.34	41.34	41.55	43.00	45.84	50.83
3.4	10.7	0.5	3.5		
143.01	167.50	184.20	200.91	245.94	310.60
1.0	17.1	10.0	9.1		
225.39	231.76	248.72	264.11	304.06	356.88
3.4	2.8	7.3	6.2		
64.6	66.9	69.4	71.8		80.4
17.3	17.7	18.4	19.1	20.6	22.8
405.7	440.6	474.5	508.0	595.8	718.3
6344	6693	6841	6740	8000	8930

P A R T I I

PACKAGING MATERIALS PRODUCTION AND CONVERSION

PAPER AND BOARD PACKAGING

1. STATISTICAL SOURCES

Some data on paper and board packaging is available from the Direccion General de Estadistica, Secretaria de Programacion y Presupuesto (General Statistics Bureau, Programming and Budget Secretariat). Trade data was obtained from the Instituto Mexicano de Comercio Exterior - IMCE (the Mexican Institute for External Trade). Further quite detailed statistics are collected and published by the Camara Nacional de las Industrias de la Celulosa y del Papel - CNICP (the national association for the pulp and paper industries). However, this data is collected for the production of all grades of paper and board and the packaging materials are not broken down as comprehensively as would be useful. In addition, it has not been possible to obtain data in great detail on the production and consumption of all the many different types of paper and board packaging.

Unfortunately, as in a number of other areas of packaging, it was often difficult to relate the different material classifications used in the separate statistical collections and the project team relied on estimates derived from the statistics as collected. These were supplemented by interviews with a number of leading paper and board packaging manufacturers and converters, and where this data has been used they are referred to as "trade estimates".

2. TOTAL NATIONAL CAPACITY

Before discussing the production and consumption of paper and board packaging, it is necessary to consider the supply of the basic raw material - pulp.

Figures in the table show the position of production, imports of the broad categories of wood and other pulps.

TABLE 2.1 PRODUCTION, IMPORTS, AND APPARENT CONSUMPTION OF WOOD AND OTHER PULPS 1975-1979

000 tonnes

		Chemical sulphate	Woodpulp sulphite	Chemical pulp annual plants	Mechanical pulp	Others	Total
1975	Production	298.6	14.9	183.9	50.8	2.1	550.3
	Imports	40.3	26.4	-	14.6	11.6	92.9
	Apparent consumption	338.9	41.3	183.9	65.4	13.7	643.2
1976	Production	342.0	14.5	208.0	53.7	4.7	622.9
	Imports	64.9	19.4	-	13.5	2.2	100.0
	Apparent consumption	406.9	33.9	208.0	67.2	6.9	722.9
1977	Production	364.4	14.4	233.8	54.0	5.4	672.0
	Imports	49.3	13.1	-	4.4	0.8	67.6
	Apparent consumption	413.7	27.5	233.8	58.4	6.2	739.6
1978	Production	393.8	16.4	228.0	59.8	8.3	706.3
	Imports	75.7	18.9	-	13.8	8.1	116.5
	Apparent consumption	469.5	35.3	228.0	73.6	16.4	822.8
1979	Production	375.5	20.7	252.3	59.5	9.6	717.6
	Imports	112.6	22.1	-	19.5	12.2	166.4
	Apparent consumption	488.1	42.8	252.3	79.0	21.8	884.0

Source: CNICP (Camara Nacional de las Industrias de la Celulosa y del Papel)

Demand for all virgin pulp has risen 28% in the period 1975/79, and imports as a whole have remained a fairly stable percentage of this total at around 14% a year. This overall import figure, however, disguises the different experience of the component parts, eg sulphate wood pulp imports have risen from 11% to 16% of apparent consumption in the period under review. This is of importance to the packaging sector since long-fibre sulphate pulps, both bleached and unbleached, are used in most paper and board packaging materials.

Another source of raw material for packaging paper and board making is waste paper, and here again collection of waste in Mexico is inadequate to meet the increased demand and imports have risen as the table below indicates.

TABLE 2.2 IMPORTS OF WASTE MATERIALS FOR PACKAGING PAPER AND BOARD PRODUCTION 1975-1979

	000 tonnes				
	1975	1976	1977	1978	1979
Volume	42.2	55.4	102.8	155.1	195.5
% share of total pulp imports	31.2	35.7	50.6	46.3	47.7

Source: Secretaria de Comercio y Secretaria de Programacion y Presupuesto

Waste paper also is used in many types of packaging, notably corrugating medium and grey board. The importance of imported sulphate wood pulp and waste paper for the production of packaging materials is seen when considering the furnish for these grades of paper and board. Sack papers need to be strong since multiwall sacks are used in sizes up to 50 kg, hence 90-100% unbleached sulphate long-fibre soft wood pulp is used. For bags, lower quality bags use 80% sulphite unbleached woodpulp and 20% hardwood or annual plant pulp; for better quality bags, bleached sulphate or sulphite pulp with a similar proportion of hardwood or annual plant pulp. Wrapping paper grades require 70-80% unbleached long-fibre sulphate pulp with the balance of annual plant pulp. In the case of liner board, 80-100% is unbleached sulphate long-fibre softwood pulp. In the case of test liner, this is 40/50% sulphate pulp with a layer of unbleached bagasse or waste paper. Corrugating medium is either 100% bagasse semi-chemical pulp, 100% waste, or mixtures of the two, and might include some hardwood short-fibre unbleached semi-chemical sulphate or sulphite pulp. Uncoated duplex board as used, for example, in cigarette packets uses 80% mechanical pulp, 15% sulphate long-fibre, and 5% hardwood bleached sulphate pulps. Coated duplex board uses a similar furnish. Grey board (used eg for breakfast cereal packets) has a furnish of 80% waste paper, 15% hardwood bleached and 5-10% bleached long-fibre sulphate softwood if the board is lined.

Total national capacity for packaging grades of paper is as shown in Table 2.3a.

TABLE 2.3a MEXICO, INSTALLED CAPACITY FOR PACKAGING PAPER GRADES 1977-1980, FORECAST TO 1985

000 tonnes

1977	1978	1979	1980	1981	1982	1983	1984	1985
1023	1114	1210	1308	1435	na	1526	1600	1660

Source: CNICP

The growth of installed capacity has been gradual over the past few years and this moderate expansion is expected to continue. However, the industry faces a number of serious problems which must be resolved if the capacity already installed is to be fully utilised. By far the most important problem is the inadequate and sporadic supply of pulp to the industry. Inadequate exploitation of Mexico's timber reserves has continually hampered the paper and board industry in its efforts to meet the expansion of domestic demand. In 1979 in particular, paper manufacturers were forced to turn to foreign suppliers for a large part of their pulp needs. In the longer term, this problem becomes worse, since the pulp manufacturers who are already working below capacity are reluctant to make any additions to plant or undertake expansion projects until an adequate flow of raw material is assured. In the year 1980 pulp consumption is expected to be in the region of 2.3 million tonnes, an increase of 23% over 1979. Of this total, 769 thousand tonnes will be from domestic sources, 833 thousand tonnes will be waste also from domestic sources, and a substantial 424 thousand tonnes of pulp will have to be imported.

Alternative data on the capacity for packaging paper and board in Mexico is published by the Food and Agriculture Organisation of the United Nations, and this data is shown below.

TABLE 2.3b MEXICO CAPACITY FOR WRAPPING, PACKAGING PAPER AND PAPERBOARD 1976-1981

000 tonnes

	1976	1977	1978	1979	1980	1981
Kraft liner	55	55	55	85	225	225
Other linerboard	442	451	451	451	443	443
Fluting medium	202	205	215	275	275	275
Sack kraft	133	144	145	145	145	145
Other kraft wrapping	50	50	50	50	50	50
Solid bleached board	35	35	35	35	40	40
Other folding boxboard	163	163	163	163	208	208
Other packaging paper and board	113	123	123	123	123	123
Total wrapping and packaging paper and board	1193	1226	1237	1237	1509	1509

Source: UN Food and Agriculture Organisation

Most of the new projects announced recently are in the paper and board producing sector, rather than in the pulp sector where raw material shortages have dampened enthusiasm for development. In the packaging area, a new paper liner, corrugated carton and box plant is being developed in Tijuana, mainly producing for export to US California, with a capacity of 60,000 tonnes per year. At Chihuahua, an export-oriented project is taking shape for the production of kraft paper, liner and corrugated board. In addition, Empaques de Carton Titan, an affiliate of the Alfa Group, is expanding its capacity for the manufacture of corrugated board boxes, moulded pulp products, spirally-wound tubes and semi-kraft paper from 198-282 thousand tonnes a year. This expansion involves a 116.4 million pesos investment at the company's Monterrey plant. Another subsidiary, Cajas de Carton Monterrey also increased its capacity from 26.8 to 40.8 thousand tonnes in 1980, at a cost of 34 million pesos.

Unipak and Continental de Envases de Carton Corrugado also announced kraft paper projects. Unipak has a new liner unit in Cuernavaca where corrugating medium and corrugated board boxes are being produced. The 12 thousand tonnes of capacity has been expanded by 55.2 thousand tonnes. Continental is building a new unit at Ecatepec in the State of Mexico, which will produce corrugated board to a total capacity of 14.4 thousand tonnes. Also, in 1979, Papeles Ponderosa completed an 80 thousand tonnes per year facility for the production of folding cartonboard both coated and uncoated.

However, in spite of these capacity increases, it seems unlikely that the industry will be able to meet the growth in domestic demand, or even achieve high levels of capacity utilisation, unless the problem of pulp supply can be resolved.

3. INDUSTRY STRUCTURE AND LOCATION

The paper and board industry as a whole in Mexico is concentrated, the main companies being Carton y Papel de Mexico, Empaques Modernos San Pablo, Carton Titan and Grupo Atentique in relation to paper and board packaging products. Geographically also, the paper and board packaging industry is very concentrated, with nearly 60% of total output coming from Mexico DF and the State of Mexico; two other states with a significant share of production are Nuevo Leon and Jalisco with 20% and 12% respectively. The remainder is split between the States of Michoacan, Puebla, Morelos, Guerrero and Queretaro.

4. PRODUCTION

Production figures for various types of paper and board packaging are shown in Table 2.4.

TABLE 2.4 MEXICAN PRODUCTION OF PAPER AND BOARD FOR PACKAGING 1975-1979

000 tonnes

	1975	1976	1977	1978	1979
Paper					
Sacks	117.3	117.6	123.3	133.8	124.7
Bags	38.5	36.2	36.6	35.6	35.5
Wrapping	70.4	59.2	64.5	69.6	67.7
Liner	281.3	319.1	347.6	376.4	401.0
Kraft				(33.4)	(32.0)
Semi-kraft				(343.0)	(369.0)
Corrugating medium	111.7	133.0	150.3	164.8	193.7
Total	619.2	665.1	722.3	780.2	822.6
Board					
Uncoated duplex	20.2	21.2	10.9	16.6	20.2
Coated duplex	90.0	104.6	117.9	122.9	136.4
Grey board	29.8	33.9	37.9	36.4	34.6
Total	140.0	159.7	166.7	175.9	191.2
Total packaging paper and board	759.2	824.8	889.0	956.1	1013.8

Source: CNICP

These figures show how little the paper and board packaging sector was affected by the economic problems in 1975/76, and most parts that were affected very quickly recovered their underlying long-term growth pattern. The exceptions to this are bags, sacks and wrappings, where some of the

market has been taken over by plastics substitutes. For the future it seems likely that bags will only hold their share of the market at best and there could be an absolute decline here; for sacks and wrappings there does seem to be hope for futher expansion as the total market for these types of products expands.

The pulp and paper industry is considered as a basic manufacturing industry in the National Industrial Development Plan, and as such its inputs are essential for the development of other industrial sectors as well as meeting domestic consumer demand. The Government is therefore pledged to assist and stimulate this sector as a whole, with top priority being given to the manufacture of all types of pulp. Under the Plan the paper and board sector is committed to achieving growth of at least 7.5-9% per year in the period 1979/82 and 9-10% between 1982 and 1990. At the same time, the sector is expected to contribute to the total economy of Mexico assisting in the growth of GDP and levels of employment as set out in the Plan.

5. TRADE BALANCE

In general the pulp and paper sector of industry has had a deficit on its trade balance because of rising imports, particularly of pulp for newsprint. Imports of pulp in total in 1980 are estimated to have risen 90% when compared with 1979, while domestic production rose by only 8%. All types of pulp are being imported with probably the biggest increase being in the area of sulphate pulps both bleached and unbleached; in mechanical pulps the increase in imports 1979/80 is expected to be in the region of 45%. Waste paper is also being imported in larger quantities to help meet the shortfall in domestic supply. In 1979, 215 thousand tonnes were imported, an increase of 91% when compared with 1978, and secondary fibre imports are expected to exceed 400 thousand tonnes in 1980.

TABLE 2.5 MEXICAN IMPORTS OF PAPER AND BOARD PACKAGING BY VOLUME AND VALUE 1975-1980

volume in tonnes

	1975	1976	1977	1978	1979	1980*
Board boxes	3547.1	3605.4	4257.7	na	2350.6	4125.1
Waterproof board boxes	83.2	63.7	159.3	na	110.6	74.8
Bags	728.4	130.2	37.6	na	18.4	99.5

value in 000 pesos

Board boxes	21025.3	30788.5	49798.4	na	32609.2	73049.1
Waterproof board boxes	352.5	388.9	1484.1	na	1457.6	2190.1
Bags	3969.8	1701.3	2919.8	na	951.2	3183.1

* estimated

Source: IMCE (Instituto Mexicano de Comercio Exterior)

The figures from IMCE are hard to explain, especially with the non-availability of data for 1978. However, on these figures its would appear that there was a substantial fall in the level of imports between 1977 and 1979 which does not match the increasing level of total consumption for the period. Alternative data, obtained from the trade association CNICP, show a rather different picture of the trend in imports of paper and board for packaging.

TABLE 2.6 MEXICAN IMPORTS OF PAPER AND BOARD FOR PACKAGING, VOLUME 1975-1979

000 tonnes

	1975	1976	1977	1978	1979
Cartonboard	21.3	30.7	34.0	38.5	49.7
Kraft up to 160 gsm	na	na	na	na	24.0
Kraft more than 160 gsm	na	na	na	na	9.3
Other	6.4	na	0.9	2.2	2.4
Total	27.7	30.7	34.9	40.7	85.4

Source: CNICP

These figures show a continuing increase in the level of imports over this period with a 16.6% increase during 1977/78 and a substantial 109.8% between 1978 and 1979. Looking at individual products within the paper and board packaging sector, there are some substantial increases in level of imports. For example, semi-bleached kraft board, here volume of imports rose 51.2% between 1978 and 1979; kraft papers also showed a 60% increase in volume of imports. Only relatively small volumes of folding cartons were imported in 1979 but they are in important sectors of the end-use markets, namely medicines and cigarettes. However in this sector, the start-up of the Papeles Ponderosa plant will reduce the need for imports. Exports from the paper and board packaging industry in Mexico are traditionally small and intermittent, with only limited volumes being involved. On the whole, the industry in Mexico has not been able to meet domestic demand owing to inadequate supplies of local raw materials for pulp manufacture. This shortfall could be met if there were a change in the mechanism for export of timber and a reduction in the amount of bagasse burned as fuel at the sugar refineries.

6. MARKET SIZE

Total consumption of paper and board in packaging is shown in the table below.

TABLE 2.7 APPARENT CONSUMPTION OF PAPER AND BOARD PACKAGING IN MEXICO 1975-1979

000 tonnes

1975	1976	1977	1978	1979	1980*
786.7	855.6	923.9	996.7	1099.1	1359.0

* provisional

Source: CNICP

Growth in consumption of paper and board packaging materials has been very changeable in the last 10 years. Between 1972 and 1973 volume of demand increased by 18% and in the period 1973/74 a rise of 11.6% was recorded. Conversely, during 1974/75 there was a drop of 6.4% in the volume of demand. Since then progress has been steady but more moderate with increases of around 8% per year, except for 1978/79 when a rise of 10.3% was recorded. From the point of view of the paper and board packaging industry in Mexico, it should be noted that its share of this domestic demand has been falling steadily. From a high point of 99.8% of domestic demand in 1971, this level of market coverage had fallen to 96.5% in 1975 and to 92.2% by 1979. Clearly the industry, though expanding its capacity, is increasingly unable to meet the growing domestic demand except for corrugated board.

Currently, it is estimated that 12% of production of board boxes are used to pack products for export, especially fruit and vegetables.

In the period to 1985, consumption of total paper and board packaging is expected to be as shown in the table below.

TABLE 2.8 FORECAST CONSUMPTION OF PAPER AND BOARD PACKAGING MATERIALS 1979-1985

000 tonnes

1979	1980	1981	1982	1985
1099.1	1228.8	1384.9	1581.6	2355.0

Source: Estimates

These figures indicate a steady increase in demand for paper and board packaging resulting from the continued buoyancy and expansion within the economy as a whole. There are certainly problems for the industry to solve, if it is to meet this potential demand. It seems possible that the installed capacity for this sector will be adequate to meet these levels of demand up to 1982, but it remains to be seen whether capacity utilisation will be sufficiently high. Currently, there is the problem of insufficient supplies of pulp and this will be a continuing problem. In addition, the

machinery installed in some plants is getting old, and output is reduced through downtime, in some plants there is currently only 80% capacity utilisation.

It has not been possible to estimate the market shares of the major companies but these are believed to relate fairly closely to their proportion of the total national capacity.

7. END-USER INDUSTRY SECTORS

The main consuming industries for paper and board packaging are food, drink and tobacco, pharmaceuticals, domestic appliances, vehicle industries, agriculture and horticulture, and the electrical industry. All these industries are expanding and benefiting from the overall growth in the economy and will continue expanding during the five-year forecast period. More detailed assessments of these end-markets sectors are included in Part III of this report.

8. PRICE TRENDS

From discussions with relevant organisations and individual firms, the following estimate of price movements for total paper and board packaging has been derived.

TABLE 2.9 PRICE INDEX FOR PAPER AND BOARD PACKAGING 1970-1980

1970=100

1978	1980
133.7	258.8

Source: Industry estimates

This index relates to all packaging products of paper and board in total and therefore disguises some of the differences experienced by the constituent products. Unfortunately, at this stage there is not sufficient confidence in the broken-down figures to permit their inclusion. However, it may be said that up to 1975 most materials' prices moved at about the same rate with the exception of corrugated board which had risen to 150-160 in the index. In the period 1975/80 price movements were more varied, with corrugated board moving on to 350 while folding cartons only increased to about 220. These figures must be treated with caution and they certainly will not reflect the experience of all producers and consumers of paper and board packaging materials.

With the shortfall in domestic production, resulting from insufficient raw materials rather than insufficient capacity, and the need to supplement domestic supply with imported materials, the next five years will bring further price increases in line with the trend over the last five years.

9. TECHNOLOGICAL DEVELOPMENTS

There are a number of technical developments likely in the paper and board packaging area. There will be further development of paper as one constituent of a composite material with plastics and aluminium foil. Other than these, innovations will be mainly concerned wtih the functional improvement of paper packaging, eg lighter-weight papers and greater tear strength, or with improved coatings, eg coated kraftboard and heat-sealable waxes. There will be further introduction of the wrap-around, bag-in-box type of packaging for fragile foods and free-flowing products. This will take the form of either filled bags being put in sleeves, or bags and pouches in paperboard cartons. In a number of cases this approach to packaging will be as little as half the cost of a metal can for the same product packaged. In addition there will be the development of special coated boards for longlife milk packs.

In the bags and sacks area, there will be few technical developments, and the continued use of these products will depend on the price differential with plastics for the same pack performance. In sacks there are likely to be developments in the area of automation - filling, weighing, sealing etc, but those will apply equally to plastics sacks.

Solid fibreboard will continue to lose its market to lighter weight corrugated materials and flexible packaging, shrink and stretch wrap. However, with the development of waterproof boards, these may take some of the fruit and vegetable packaging market from traditional wood containers especially for export. Carton Titan has recently developed a Transit Container for fruit and vegetables which combines fibreboard and wood.

For folding cartons, there will be developments in coatings and laminated boards, but here too there will be increasing competition from E-flute corrugated board and flexible packaging.

PLASTICS MATERIALS

1. STATISTICAL SOURCES

Some data on the production of plastics materials is available from Government sources, the Direccion General de Estadistica of the Secretaria Programacion y Presupuesto. Statistics on imports and exports were obtained from the Mexican Institute for External Trade - Instituto Mexicano de Comercio Exterior (IMCE), and the Direccion General de Aduanas (General Department of Customs). Further data on capacity and production is published in the annual report of Petroleos Mexicanos (PEMEX). Two trade associations also collect statistics on various aspects of the plastics industry: Asociacion Nacional de la Industria Quimica (ANIQ) - the National Association for the Chemical Industry, and Asociacion Nacional de Industrias del Plastico (ANIPAC) - the National Association for the Plastics Industry. Interviews were held with some of these organisations and also with a number of companies in plastics production and packaging conversion industries.

2. TOTAL NATIONAL CAPACITY

The supply of feedstocks for the manufacture of the main plastics materials is in the hands of Petroleos Mexicanos (PEMEX) the national oil production company. The massive investment in oil exploration and development has meant that as far as primary feedstocks are concerned, Mexico will not be so exposed to the oil price fluctuations which hamper plastics industries in other parts of the world. Naptha is extracted from crude oil and naptha provides the essential basic materials for the main thermoplastic packaging materials, namely ethylene, propylene and benzene. LDPE and HDPE are derived from the polymerisation of ethylene, PS from the liquid styrene monomer which is produced by the reaction of ethylene with benzene, PVC from the reaction of ethylene and chlorine, and finally PP from the polymerisation of the propylene gas.

The total national capacity for various plastics materials is shown in the table below.

TABLE 2.10 TOTAL NATIONAL CAPACITY FOR HIGH AND LOW DENSITY POLYETHYLENE, VINYL CHLORIDE AND STYRENE 1975-1979

000 tonnes

	1975	1976	1977	1978	1979	1980
LDPE	99	99	99	99	99	99
HDPE	-	-	-	100	100	100
Polyvinyl chloride	101	101	116	125	136	136
Polystyrene	52	56	58	98	109	na

Source: Annario Estadistico - PEMEX
Annario de la Industria Quimica Mexicana - ANIQ

It is very difficult with the data available at the moment to estimate what proportion of total plastics materials are used for packaging so the figures given in this part on capacity will relate to all plastics. Estimates of the amounts of plastics materials consumed in the various packaging materials and packs are given in the section on end-uses.

The petrochemical industry is becoming increasingly important to the Mexican economy representing 0.7% of total GDP. PEMEX is aiming at self-sufficiency in basic petrochemicals and the eventual development of an export market. Some 20 billion pesos have been allocated under the six-year national industrial plan for secondary petrochemical projects. However, many of these long-term projects are delayed for one reason or another. In spite of this, some spectacular growths have been made in basic petrochemicals, in particular, methanol, ethylene, and ethanol.

With the plant at Poza Rica in Veracruz producing ethylene and high density polyethylene, these materials will no longer have to be imported to such an extent as formerly. In addition, new plants such as those of Glicoles Mexicanos and Poliestirenos, and expansions completed at Teveftalatos Mexicanos, Fenoquimia, Petrocel and Cydsa-Bayer, will substantially improve the performance by the secondary petrochemicals industry, with an overall annual growth rate of 15%.

Resin for plastics and plasticizers grew approximately 20% in 1979. Polystyrene recorded a 34% growth, as a result of the new Resistol plant in Tlaxcala and that of Poliestireno y Derivados. The sector now consists of eight major manufacturers and total installed capacity is expected to reach 200,000 tonnes a year by 1982.

PVC output rose nearly 50% in the years 1977/78, with the coming on stream of several new plants, but this rate of growth slowed to nearer 15% in 1978/79.

For the future, in the basic petrochemical sector, some 30 new plants are presently being constructed to come on stream during 1981 and 1983. A further 36 basic petrochemical projects are being developed, in most cases with capacity and location already decided upon but not the start-up dates.

The 36 projects involve an additional capital expenditure of 49 thousand million pesos, for petrochemical plants and the processing of gas to provide raw materials for those plants. This investment is being carried out in Ostion, Northeast of Coatzacoalcos (Veracruz), Altamira (Tamaulipas), and Dos Bocas (Tabasco).

For secondary petrochemicals, 1979 was a year with more ambitious plans for volume increases than at any time in the previous four years. Total investment in this area is expected to raise total installed capacity by 2 million tonnes a year. This boost has been to some extent the result of decisions on the part of private industry to become involved in these projects, following the 1979 National Industrial Development Plan. In addition to tax assistance and energy discounts, producers are being offered cut price raw materials by PEMEX.

As a result of these moves, products such as polystyrene and PVC will double their volume potential. The differential raw materials prices offered by PEMEX vary from region to region, and are related to the Adminstration's desire to create employment in certain areas.

From the point of view of foreign trade, although some basic petrochemicals must still be imported, this situation should be considerably better by 1982, when much of the new capacity will be on stream.

A similar situation exists for secondary petrochemicals where steadily expanding installed capacity should meet the increasing domestic demand and enable imports to be reduced.

3. INDUSTRY STRUCTURE

By its very nature the production of thermoplastics is a very capital intensive operation and as such is a highly concentrated sector. For HDPE and LDPE, PEMEX is the sole manufacturer and supplier since it controls the level of all imports of these materials. Other thermoplastic materials are provided by a few other large concerns, notably CYDSA, Resistol, Alpha Group, Poliestireno Derivados and Polimeros de Mexico.

At the level of plastics conversion for packaging there is a much wider diversity of companies. Some of those listed above are also packaging converters, but there is also a multitude of medium- and small-sized companies catering for the wide range of pack types.

Overall it seems likely that the industry will become more concentrated in the hands of the large groups: CYDSA, ALPHA, VITRO and VISA.

4/5/6. PRODUCTION, TRADE BALANCE, MARKET SIZE

Given the complexity of the plastics industry, this section deals with each of the thermoplastics in turn, giving details of level of production, imports, exports and estimated consumption:

Low density polyethylene

TABLE 2.11 PRODUCTION, IMPORTS, EXPORTS AND ESTIMATED CONSUMPTION OF LOW DENSITY POLYETHYLENE 1975-1979

tonnes

	1975	1976	1977	1978	1979	1980
Production	99,287	93,705	95,043	96,411	95,646	91,424
Imports	5,936	14,091	41,283	62,105	35,906	104,022
Exports	-	-	-	5	-	-
Estimated consumption	105,223	107,796	136,326	158,521	131,552	195,446

Source: Asociacion Nacional de la Industria Quimica (ANIQ)
Direccion General de Estadistica - Secretaria de Programacion y Presupuesto (SPP)
Direccion General de Aduanas
PEMEX

PEMEX the sole producer of LDPE in Mexico is unable to supply sufficient material owing to inadequate capacity. As a consequence, PEMEX has to import increasing quantities of LDPE at a high price and sell it to consuming industries at a lower price. In fact, imports increase each year as the level of domestic production becomes more unable to meet home demand. In 1975 domestic production supplied 94% of demand, this figure had fallen to 61% during the period to 1978. Exports are non-existent. Consumption continues to increase and the table below shows the estimated forecast consumption for all LDPE to 1985.

TABLE 2.12 FORECAST APPARENT NATIONAL CONSUMPTION OF LDPE 1980-1985

tonnes

1980	1981	1982	1983	1984	1985
195,446	208,235	234,879	251,238	277,762	308,309

Source: CEMIQ-LANFI

This forecast shows consumption increasing at an annual average rate of just over 6%. There is clearly a need for further capacity to be installed unless these increased levels of consumption are to be met by higher levels of imports.

High Density polyethylene

TABLE 2.13 PRODUCTION, IMPORTS, EXPORTS AND ESTIMATED CONSUMPTION OF HIGH DENSITY POLYETHYLENE 1975-1979

tonnes

	1975	1976	1977	1978	1979	1980
Production	-	-	-	3,266	59,557	66,853
Imports	36,086	38,461	45,374	56,405	7,643	26,043
Exports	-	-	-	-	-	-
Estimated consumption	36,086	38,461	45,374	59,671	67,200	92,896

Source: Asociacion Nacional de la Industria Quimica (ANIQ)
Direccion General de Estadistica - Secretaria de Programacion y Presupuesto (SPP)
Direccion General de Aduanas
PEMEX

Until recently, demand for this material had to be entirely met by imports, but a 100 thousand tonne capacity production unit has been installed by PEMEX which has led to a dramatic shift to domestic supply. This has

altered the situation from one of 100% dependence on imports to 89% supply from domestic sources within three years. Estimated consumption has increased by 4% per annum during the period 1975-1979. This rate of growth is expected to increase during the forecast period to 1985, when an annual average rate of 8% is more likely.

Polyvinyl chloride

TABLE 2.14 PRODUCTION, IMPORTS, EXPORTS AND ESTIMATED CONSUMPTION OF PVC 1975-1979

tonnes

	1975	1976	1977	1978	1979	1980
Production	49,620	67,203	65,558	97,634	106,791	133,210
Imports	6,187	7,538	1,591	1,623	2,450	na
Exports	1,214	7,011	7,257	19,503	5,526	na
Estimated consumption	54,593	67,730	59,892	79,754	103,715	na

Source: Asociacion Nacional de la Industria Quimica (ANIQ)
Direccion General de Estadistica - Secretaria de Programacion y Presupuesto (SPP)
Direccion General de Aduanas

As the above figures show, Mexico currently has more than adequate PVC capacity and has been a net exporter since 1977. Consumption has been erratic with a 24% increase in 1975/76, followed by an 11.6% drop in the next year, and then a 33.2% jump in 1977/78. It seems now as though the position has stabilised and an annual average growth rate of 4.7% is anticipated for the forecast period 1980-1985 as the following table shows.

TABLE 2.15 FORECAST APPARENT NATIONAL CONSUMPTION OF PVC 1980-1985

tonnes

1980	1981	1982	1983	1984	1985
103,715	119,421	142,703	181,173	204,900	232,228

Source: CEMIQ-LANFI estimates

Polystyrene

TABLE 2.16 PRODUCTION, IMPORTS, EXPORTS AND ESTIMATED CONSUMPTION OF PS 1975-1979

tonnes

	1975	1976	1977	1978	1979
Production	38,420	41,575	48,749	51,402	80,121
Imports	936	385	1,082	2,258	2,310
Exports	117	25	-	300	131
Estimated consumption	39,239	41,935	49,831	53,360	82,300

Source: Asociacion Nacional de la Industria Quimica (ANIQ)
Direccion General de Estadistica - Secretaria de Programacion y Presupuesto (SPP)
Direccion General de Aduanas

Annual average growth rate in consumption of polystyrene has been 10-11% during the period 1975/79. The major part of this demand has been met by domestic capacity with small amounts of imports making up the balance. For the forecast period to 1985 consumption is estimated to increase by an average rate of 6-8% per year as the table shows.

TABLE 2.17 FORECAST APPARENT CONSUMPTION OF PS 1980-1985

tonnes

1980	1981	1982	1983	1984	1985
82,300	103,513	121,014	131,760	149,183	169,250

Source: CEMIQ-LANFI estimates

Polypropylene

TABLE 2.18 PRODUCTION, IMPORTS, EXPORTS AND ESTIMATED CONSUMPTION OF PP 1975-1979

tonnes

	1975	1976	1977	1978	1979
Production	-	-	-	-	-
Imports	26,368	34,000	37,578	52,059	70,342
Exports	-	-	-	-	-
Estimated consumption	26,368	34,000	37,578	52,059	70,342

Source: Asociacion Nacional de la Industria Quimica (ANIQ)
Direccion General de Estadistica - Secretaria de Programacion y Presupuesto (SPP)
Direccion General de Aduanas

Growth in consumption of polypropylene has increased in the period by 97%, all of this demand being met by imports. Anticipated growth in consumption is estimated to be 7-9% per year for the period 1980-1985.

7. END USES

At this stage, analysis is confined to the principal packaging end-uses for the various plastics materials.

Low density polyethylene

The bulk of LDPE is converted into films; that is film for bags, wrappings and carrier bags; thicker film for sacks, both heavy duty container sacks and refuse sacks; and films for shrink, stretch and cling-wrap applications. Approximately 75% of LDPE is used for extruded films for a number of end-uses. A further 10% is taken for bottles, and the remainder is utilised for closures and coatings. Some bottle applications are being lost to HDPE, but these are more than made up by extra film uses.

High density polyethylene

Bottles are traditionally the largest end-user of HDPE polymer, accounting for up to a third of total consumption. Other major uses are large containers, films, crates and pails taking approximately 20% for the first two end-uses and 10% of the total divided between crates and pails. In addition, closures account for about 5% of total HDPE packaging use. HDPE is in a number of cases, eg bottles, gaining ground from LDPE and from HDPE/LDPE blends. In addition, the development of high molecular weight films with greater strength for a given gauge will encroach on LDPE film markets. Large containers of HDPE will increasingly take end-uses from steel and tinplate containers.

Polyvinyl chloride

The bulk of PVC in packaging, up to 50%, is used for rigid film and sheet with another 20% being absorbed by stretch, cling and shrink films. Bottles also take approximately 20% of the total with closures and other miscellaneous items forming the balance. For many end-uses there are problems of controlling the levels of vinyl chloride monomer in the converted product, and this has slowed the growth in the use of this material.

Polystyrene

Thin-walled containers either injection-moulded or vacuum-formed represent the bulk of PS used for packaging, approximately 35-45% of the total. They are used for dairy and associated products. Another significant market for PS is disposable cups with 20% of the PS usage. Containers for pharmaceuticals and cosmetics represent approximately 10% of usage as do trays and punnets and expanded polystyrene. Polystyrene is produced from styrene monomer which in turn is derived from benzene. Many countries, but most importantly the USA, are substituting benzene for lead in petrol, and this has sometimes resulted in a shortage of benzene and a resultant constraint on supply of polystyrene.

Polypropylene

Film constitutes the largest end-use, accounting for between 30-40% of total consumption of PP for packaging, which is used mostly in the snack foods and confectionery markets where it is replacing cellulose film. A further 20% is manufactured into boxes, crates and pails, especially crates for the dairy and brewery industries. Woven sacks and bags take approximately 10-15% of total PP, with twine using 10%. The balance is made up with miscellaneous products, including closures, strapping and thin-wall moulded containers.

In addition to the breakdown of use by plastic material, this survey also attempted the more difficult task of estimating and forecasting trends in the use of the various plastics material and pack types. This proved a very involved task, and the following section presents such information as was obtained with package interpretation and outlook where possible. The plastics package converting industry in Mexico is very varied - some parts are highly concentrated, and others more diversified - and both types of industry sector present different problems of data gathering and analysis. In later studies it is hoped that more comprehensive information will be obtained, thus permitting forecasts of a less tentative nature. There follows the best possible current analysis of the use of plastics materials by type of package material or pack type.

Films

For PE and PP flexible films, the industry is very concentrated with four main companies (Polycel group, Celloprint, Rey Print and Agusa) holding 70% of the market with the remaining 30% split between 40 small companies. This level of concentration is fairly stable with the industry expanding as demand allows. There are problems with raw materials imports which are often of inadequate quality. All raw material imports are channelled

through PEMEX. There are no direct exports, though some of the products packed are destined for countries overseas. In the area of substitutions, PP films are taking an increasing share in markets normally using regenerated cellulose film.

Total national capacity is estimated currently to be 40.5 thousand tonnes which is expected to grow to 60 thousand tonnes in the five years to 1985. The industry is currently running at about 90% capacity utilisation with production in 1979/80 approximately 36.5 thousand tonnes of film. Of this total, the distribution of sales is estimated currently to be as follows: 60% snack foods, 30% cakes, coffee, supermarket bags, and 10% confectionery. In terms of geographic distribution of these sales, 70% is sold into the Mexico DF with the remaining 30% divided between Guadalajara, Monterrey, Morelia, Toluca and Puebla.

PVC films, both rigid sheet and shrink, stretch and cling films, represent 50% of total PVC and for packaging end-uses. Currently total national capacity is estimated to be 2.5 thousand tonnes which will increase to 4.5 thousand tonnes by 1985. The industry is very concentrated; the largest firm Pyn SA holding approximately 70% of production, the remainder being split between smaller concerns, eg FOLMEX. It is unlikely that this basic structure will alter in the forecast period. Though imports are not a major contributor to total domestic sales, there has been some concern expressed in the industry about low-price film being dumped in Mexico by Japan and Taiwan and these have had a considerable effect on the price structure. Exports were formerly quite considerable but the industry is now fully occupied meeting domestic demand and finds itself unable to compete with international prices. The market size is estimated to be 2.4 thousand tonnes at present and this will expand to an estimated 4.4 thousand tonnes by 1985. It is not expected that there will be any substitution for PVC by other materials though there may be changes in consumer habits. PVC will benefit, as will all forms of packaging, from the increased use of automatic packaging machinery; these help to raise the standard of packaging, and products are thus better protected and presented. Main end-uses of PVC film and sheet are pharmaceuticals, food, records, beer, and furniture. In terms of geographic distribution, 60-70% is consumed in Mexico DF, 20% in the north Monterrey, and 10-15% in the central area, Guadalajara.

Co-extruded films are produced in Mexico by one company MAPLA with a present capacity of 200 tonnes of film. This capacity is almost fully utilised and the firm plans to expand capacity to 400 tonnes per year by 1985 to meet increased demand. There are no imports or exports currently so the market size has an upper limit the same as capacity. There is some competition from laminated films, and this is expected to increase. The main user industries are food, pharmaceuticals and chemicals but the percentage split between them is not known. Almost all the film is used by industries in Mexico DF.

Bottles, pots and jars

Total national capacity for plastics bottles, pots and jars in Mexico is estimated to be 100 million units a year currently. There has been no way of breaking these products out any further either by type or by material, but in general it may be assumed that the bottles will be all sizes up to 1 litre capacity made of PE or PVC, and the jars and pots will be mostly less than half-litre capacity and made of PS. Total capacity is expected to

expand to 150 million units within the forecast period to 1985. A number of the companies involved make other blown and moulded products besides packaging so to that extent it is difficult to talk of capacity for packaging products, but it seems likely that as demand increases firms will be able to switch production facilities to meet the changed circumstances.

The structure of the industry is fairly concentrated with a few large firms dominating the market and small firms being established to meet specialist needs. For pots and jars, mainly for cosmetics and pharmaceuticals, the major firms and their market shares are estimated as follows: KS Morelos 30%, Plasticos Wilton and Plastico Rivera Guadalajara 20% each, Moldes Quintanilla 10%, CIPSA 10% and the remaining 10% split between smaller companies. For bottles, eg for shampoo etc, the main companies are Regio Plast 45%, Carton y Papel de Mexico 25%, CIPSA 12% and the rest including Plastipres 18%.

There is very little trade in these packaging products, the only imports being very sophisticated costly cosmetics packs, and exports are prohibited by high freight charges. There are few outside influences on this sector of the packaging industry although the imposition of the IVA (value added tax) in 1980 had a depressing effect on the sales of some of the products packed. In addition there was an increase in the price of PE during 1979 which had to be passed on to the pack users. Currently production levels of 60-80% are being recorded and this is adequate to meet present demand. If capacity expands as planned, then there should be little difficulty in meeting the increased levels of demand in the forecast period, provided adequate supplies of raw material are available. The main markets are chemicals, pharmaceuticals and cosmetics, but estimates of their shares of the total market are not currently available.

Plastics drums and jerricans

This product range is most usefully separated into two, with small drums up to 50 litres and jerricans forming one part, and large drums 50 litres and over the other.

For small drums and jerricans the supply side is very concentrated with the main producers being KS Morelos, CIPSA, Envases Industriales de Plastico, Plasti Envases, Productos Industriales Potosi and Regio Plast.

For large drums of 50 litres and over, the structure is also very concentrated with the main producers being Plasti Envases, Rotomaldeo, Envases Industriales de Plastico, Digitec and CIPSA.

The total market for all sizes of drums has grown from an estimated value of 60 million pesos in 1975 to 240 million pesos, and is expected to reach 480 million pesos by 1985. Unfortunately it has not been possible to obtain any breakdown of these packaging items into units and sizes. There is undoubtedly great growth potential in this area as plastics containers are substituting for all the traditional materials - glass, tinplate and steel - in most market areas. There is some market resistance, in that users are sometimes mistrustful of plastics but provided adequate raw materials, especially PE, are available plastics will continue to expand. The main markets are the chemical industry including agricultural chemicals 80%, food industry 20%. Finally 80% of the user industries are based in Mexico DF, the remainder spread out amongst Monterrey, Guadalajara, and Vera Cruz.

For other plastics packaging products, the information and data received so far have been inadequate for even tentative estimates of current and future positions to be made.

8. PRICE TRENDS

Increases in the price of oil naturally cause an increase in the price of plastics, as do increases in the rate of inflation in the economy as a whole. However, because the manufacture of polymers is a complex operation, and there is the additional conversion of the material to packaging form, the actual raw material cost becomes less significant as it moves along the processing/production chain. Tentative price indices are given in the table below.

TABLE 2.19 PRICE INDEX FOR PLASTICS MATERIALS 1970-1980

	1970 = 100	
	1975	1980
LDPE	113	200
HDPE	115	210
PVC	165	250
PS	170	360
PP	na	na
Average all plastics	135	225

Source: Industry estimates

9. TECHNOLOGICAL DEVELOPMENTS

Developments of films will be related both to modified film and also to its use in a wide range of laminated and coated forms, giving improved strength, gas barrier and general protective qualities. Further development will be seen in co-extruded films, metallised films, HDPE high molecular weight film for use in retail packaging replacing some LDPE film, and possibly the introduction of PET coated boards, as a replacement for aluminium foil containers.

Films will be widely developed for use in laminated form for various types of retortable and non-retortable pouches for food and beverages.

For bottles there is the possibility of blow-moulded bottles production by co-extrusion, combining two or more layers with complementary properties. It is likely that the PET bottle will make an impact within the forecast period. Essentially, these are stretch blown PET bottles with a HDPE or PP base cup. They have the advantage over other plastics materials in that they can withstand the high pressure exerted by carbonated soft drinks. In the USA they have been successfully introduced, following the ban by the FDA on the use of nitrile resins. However because of the relatively high cost of the material, they are only used in larger sizes, 1.5 litre and above. These bottles are lighter weight and reduce shelf space requirement for beverages.

There are likely to be considerable developments in plastic containers, eg cartons, tubs and trays, both vacuum formed and injection moulded using either polystyrene or polypropylene.

In the closures field, there will be the introduction of the wadless closure, and developments of various pilfer-proof designs.

REGENERATED CELLULOSE FILM

1. STATISTICAL SOURCES

All the data and forecasts included in this section are based on industry sources and estimates resulting from interviews with the companies concerned.

2. TOTAL NATIONAL CAPACITY

The figures for total national capacity of regenerated cellulose film in Mexico both historical and forecast are given in the table below.

TABLE 2.20a TOTAL NATIONAL CAPACITY FOR REGENERATED CELLULOSE FILM 1970-1985

000 tonnes

1970	1975	1980	1985
16.2	19.0	23.0	23.0

Source: Industry estimates

These statistics show the rapid growth of capacity in the period 1970/75 - almost 60% during that period. In the five years to the present, capacity was still expanding but at less than half its former rate. As a consequence of the new thermoplastics being introduced into packaging, regenerated cellulose film has found its traditional markets being lost. In the forecast to 1985 there is some continued growth, but this will only amount to a total of 8% over the five-year period. Certainly regenerated cellulose film will continue to be used in packaging, but increasingly this will be in the form of a laminate with other flexible plastics.

3. INDUSTRY STRUCTURE

The regenerated cellulose film industry is very concentrated in Mexico with the largest firm CYDSA holding 60/70% of total national capacity, with their product Celerey. The remainder of capacity is with Celanese. This structure is not likely to change.

4. PRODUCTION

Data for production of regenerated cellulose film were obtained from the Direccion General de Estadistica.

TABLE 2.20b PRODUCTION OF REGENERATED CELLULOSE FILM IN MEXICO 1975-1980

000 tonnes

1975	1976	1977	1978	1979	1980
17.5	19.5	20.0	20.2	22.1	21.2

Source: Direccion General de Estadistica

5. TRADE BALANCE

There are no imports of regenerated cellulose film for packaging in Mexico. Some of the material is exported, amounting to no more than 10% of annual production. The bulk of exports are destined for the USA, with smaller quantities going to countries of Central and South America.

6. MARKET SIZE

It has not been possible to obtain or derive figures on the volume of regenerated cellulose film consumed in Mexico, but value figures show the market increasing from an estimated 750 million pesos in 1975 to approximately 2,250 million pesos for 1980. However, these value figures should be used with caution owing to an increase in price during the period. It is estimated though that the current market size must be approximately 22 thousand tonnes of regenerated cellulose film a year compared with 20-21 thousand tonnes in 1975.

7. END USES

Of the total production of film, it is estimated that approximately 70% goes to packaging conversion into bags and wrappers for snacks, sweets, bread, and cosmetics. The remaining 30% is used in film form for overwrapping cigarettes, tobacco, and some food applications. However, in many of these markets, regenerated cellulose film is facing increasing competition from OPP (biaxially oriented polypropylene). In addition there will be competition from high molecular weight HDPE film. Fortunately, given the expansion of the total market for packaging materials, it is unlikely that regenerated cellulose film will suffer a decline, but rather will not get the full advantage of the expansion.

In the main it will be large user companies who will switch to the OPP films, since they will be able to afford the necessary capital investment. Smaller companies will continue to use regenerated cellulose film in the period to 1985.

8. PRICE TRENDS

A price index for regenerated cellulose film is given below.

TABLE 2.21 PRICE INDEX OF REGENERATED CELLULOSE FILM 1970-1980

1970 = 100

1975	1980
146	300

Source: Industry estimates

Price trends for regenerated cellulose film are likely in the future to be more closely tied to changes in price of thermoplastic materials, especially OPP and high molecular weight HDPE.

9. TECHNOLOGICAL DEVELOPMENTS

With a mature material such as regenerated cellulose film the potential for development becomes progressively smaller. Other than continuous improvement in efficiency and economy, little development is likely. Machine handling properties of the film, together with heat sealing methods, and lacquers and coatings will be improved. High yield films will be introduced especially in the markets for cookies, snacks and crisps, where OPP competes strongly. In addition there is some potential for metallised cellulose film to compete with foil and foil laminates - especially in the confectionery market.

It is unlikely that there will be any problem of raw material availability for regenerated cellulose film in the forecast period to 1985; even though the industry depends on raw material imports, in particular, sodium hydroxide and sulphuric acid from Canada and Alaska.

TINPLATE

1. STATISTICAL SOURCES

Some basic data in this area is available from the Direccion General de Estadistica, Secretaria de Programacion y Presupuesto (General Statistics Bureau, Programming and Budget Secretariat). Trade data were obtained from IMCE - Instituto Mexicano de Comercio Exterior (the Mexican Institute for External Trade). More detailed data on output and some forecasts were drawn from the Camara Nacional de la Industria del Acero (Steel Industry Trade Association). In addition, interviews were held with key staff at the Camara and in a number of manufacturing companies. There is no camara or trade association of can and metal box manufacturers in Mexico.

Before looking at tinplate packaging in detail, it is necessary to review the current and future situation in one of the major suppliers of raw materials for tinplate, namely steel. A study carried out by the Secretariat of National Resources and Industrial Development indicated that steel production should reach 10 million tonnes a year by 1985, 15 million tonnes by 1990, with capacity increasing to 20 million tonnes by the year 2000. In 1978, output and capacity stood at 6.8 million tonnes and 9.3 million tonnes a year respectively. SIDERMEX, the Mexican Government's holding company for the three State steel mills, has expansion in hand for its Sicartsa mill at Lazaro Cardenas on the Pacific Coast, raising the installed capacity from 1.3 to 2.7 million tonnes. In 1979 output and capacity had reached 7.1 million tonnes and 9.4 million tonnes respectively. Further plans for expansion have been announced to meet the target capacity for 1990. One of the main expansion plans is for the Las Truchas plant, where capacity will be raised by a further 2 million tonnes per year from the current level of 1.3 million tonnes; output here is to be mainly structural steel and rods. In addition, SIDERMEX has authorised 4.8 million tonnes further capacity expansion at other plants by 1985.

Besides the problem with insufficient ore resulting in dependence on imported pig iron, the industry faces further difficulties in meeting anticipated domestic demand. In particular, the needs of PEMEX for steel to meet the growth in oil exploration and export will be hard to fulfil. Also the inadequacy of the railway system for the distribution of the products of the steel industry is expected to worsen. However, in spite of these structural difficulties, it is assumed that there will be sufficient raw material available for conversion to tinplate and packages of tinplate, since the percentage of total steel consumed by packaging end-uses is falling.

TABLE 2.22 PRODUCTION OF STEEL IN MEXICO 1975-1980

000 tonnes

1975	1976	1977	1978	1979	1980*
5,272	5,298	5,601	6,775	7,117	8,096

* estimated

Source: Canacero

The other major input to tinplate, namely tin, is not available in sufficient quantities and national production has to be supplemented by imports.

2. TOTAL NATIONAL CAPACITY: TINPLATE

In Mexico total national capacity for the production of tinplate is shown in the following table.

TABLE 2.23 TOTAL NATIONAL TINPLATE CAPACITY IN MEXICO 1970-1985

000 tonnes.

1970	1975	1980	1985
150	200	200	200

Source: Industry sources

The current situation is that even if the industry were working at full capacity and at a satisfactory quality level, it would still be inadequate to meet domestic demand. This means a continuing need to import tinplate, to meet home consumption. To some extent the current Government's policy of price control has resulted in the inadequate supply of suitable tinplate. Since prices are kept unnaturally low for the domestic product, the manufacturers cannot afford to make good quality tinplate, thus leaving the way open for relatively expensive imports as well as distorting the balance between tinplate and its competitors - aluminium and glass containers. In addition this results in canned foods being relatively expensive, up-market products, rather than cheap staple food items because tinplate for food products has to be imported.

3. INDUSTRY STRUCTURE

The tinplate industry is very concentrated in Mexico. The largest firm is AHMSA - Altos Hornos de Mexico - with 95% of total production and 80% of capacity. The only other company is HYLSA which represents 20% of capacity but only 5% of production. AHMSA is a part of the State steel enterprise SIDERMEX. Currently capacity utilisation is low and this results mainly from insufficient supplies of rolled coil. Production is mainly tinplate and tin-free steel, since blackplate is not made in Mexico. TFS is slowly growing in comparison with tinplate mainly because of the favourable price differential. In fact this trend may be reversed if the two-piece can becomes more popular since TFS is not suitable for the newer type of can. However, TFS will still be used for three-piece cans for food where greater wall strength and rigidity is required for the food processing operation.

4. PRODUCTION

TABLE 2.24 PRODUCTION OF TINPLATE IN MEXICO 1975-1980

tonnes

1975	1976	1977	1978	1979	1980
204,150	164,540	193,021	183,094	174,898	142,000

Source: Canacero, SPP

This table shows clearly the inability of the tinplate manufacturing industry to compete and produce products at the price levels fixed by the Government. It is to be hoped that this situation can be remedied or else the level of imports will continue to increase. Domestic production has fallen each year since end-1977, and the fall from 1979 to 1980 is estimated to have been 23%.

5. TRADE BALANCE

As has been stated, imports of tinplate have become an increasing necessity as the table below indicates.

TABLE 2.25a IMPORTS OF TINPLATE 1975-1980
VOLUME AND VALUE

	1975	1976	1977	1978	1979	1980
tonnes	71,365	79,031	130,225	117,250	140,098	270,000
million pesos	465.8	729.5	1527.3	1432.0	2065.6	*na*

Source: IMCE
Canacero

Since the recovery from the 1975 economic troubles, imports of tinplate have increased, except for a 10% fall in 1978, when compared with 1977 following the devaluation of the peso. In the year 1980 it is estimated that imports of tinplate will have increased 90% or more when compared with 1979. Most of these imports are from the USA.

There is, in addition, some import of cans from the USA for beer and asparagus packaging for export.

There are virtually no exports of tinplate from Mexico.

There are also considerable imports of tin-free steel for can making.

TABLE 2.25b IMPORTS OF TIN-FREE STEEL 1975-1979

tonnes

1975	1976	1977	1978	1979
15,024	18,164	25,051	20,328	24,161

Source: Canacero

6. MARKET SIZE AND SHARE

Apparent national consumption for tinplate in Mexico, taking account where necessary of the level of exports, is shown in the table below.

TABLE 2.26a APPARENT CONSUMPTION OF TINPLATE PACKAGING IN MEXICO 1975-1980

000 tonnes

1975	1976	1977	1978	1979	1980*
275.5	243.2	322.0	298.5	308.3	404.0

* provisional

Source: Based on data from Camara Nacional de la Industria el Acero

As has been mentioned, AHMSA holds 95% of the total market for domestically produced tinplate and the remaining 5% is taken by HYLSA. Consumption is estimated to increase to 387.6 thousand tonnes by 1982, and to 436.0 thousand tonnes by 1985.

TABLE 2.26b PROJECTED CONSUMPTION OF TINPLATE FOR PACKAGING 1980-1990

tonnes

	1980	1981	1985	1990
Tinplate cans	336,500	359,300	389,000	419,000
Crowns and caps	80,000	86,000	114,000	158,000
TOTAL	416,500	445,300	503,000	577,000
Other uses	10,600	11,500	15,000	20,000
TOTAL USAGE	427,100	456,800	518,000	597,000
Mexican production	142,000	180,000	195,000	195.000
Imported tinplate + TFS	300,000	277,000	323,000	402,000
	442,000	457,000	518,000	597,000

Source: Estimates

7. END USES

It is estimated that approximately 85% of tinplate is used in the packaging industry, the balance being shared between distribution and retailing, automobiles, electrical and tools amongst others. More detail on the packaging end-uses is given in Part III.

8. PRICE TRENDS

After discussions with various sources the following estimate of price movements for tinplate has been derived.

TABLE 2.27 PRICE INDEX FOR TINPLATE 1970-1980

1970 = 100

1975	1980
150	200

Source: Industry estimates

The price of tinplate is regulated by the Government and an increase of 6% per annum has been permitted. With the current trends in the economy, such modest increases are insufficient to enable manufacturers to produce good quality products or consider expanding capacity.

9. TECHNOLOGICAL DEVELOPMENTS

The main technological development essential for the tinplate industry is the introduction of improved coating facilities which will enable domestically produced tinplate to be used for food cans and reduce the dependence on high-priced imports. However, this depends to a large extent on the Government permitting higher price increases for domestic tinplate to encourage the manufacturers to be more innovative.

CANS AND CONTAINERS MANUFACTURED PRIMARILY FROM TINPLATE

This section covers what are generally known as 'open-top' and 'general-line' cans.

The open-top can has traditionally been the food and beverage can and was originally a three-piece soldered seam tinplate can with tinplate ends. For some end-uses, specifically beer and carbonated beverages, the tinplate ends have been replaced by easy-open ring tear-off aluminium ends, and this approach has also been adopted for some food products. In the early 1970s, the drawn and wall ironed can (DWI) was introduced. This two-piece can was originally manufactured from tinplate with an easy-open aluminium top. It may also be made entirely from aluminium. More recently there has been the introduction of the drawn, redrawn can (DRD) for both beverages and food. 'Tin-free' steel cans (TFS) are also available, primarily for beer, but progress has been slow.

The general-line can is also traditionally a three-piece can with a lid which may be removed and replaced: such containers are used for paint, dried milk etc.

1. STATISTICAL SOURCES

Sources of data here were the same as those for the section on tinplate, with the inclusion of a number of can converters who were interviewed. There is no Camara for can and metal box manufacturers in Mexico.

2. TOTAL NATIONAL CAPACITY

Owing to problems of inadequate data and the fact that many of the open-top cans are produced in-house by user industries, it has not been possible to arrive at any verifiable figures for total national capacity. However, it appears that currently, capacity for open-top cans is in the region of 4.5 thousand million units a year, and that general-line capacity is approximately 2.8 thousand million a year. The capacity for open-top cans is expected to grow to approximately 5.4 thousand million units by 1985. General-line can capacity is estimated to be approximately 5 thousand million cans by 1985.

Currently, capacity utilisation is between 75-85% so there is a limited amount of excess capacity which can be absorbed as the market expands. Then, the main companies will have to consider further investment in can-making capacity.

There are presently 24 can-making lines in Mexico, 10 two-piece lines for beer and carbonated beverage cans, 6 lines producing shallow-drawn cans for fish, and 8 traditional can-lines for other end-uses.

3. INDUSTRY STRUCTURE

The can-making industry is fairly concentrated in Mexico with the main company Zapata holding 50% of the total national capacity through a number of subsidiary companies. Other main companies are Continental Can, Can

Crown Cork, Nuevo Modelo and Fabricas Monterrey (FAMOSA - who are mainly concerned with the production of cans for the Visa Group beer and carbonated beverage companies).

Of the five really large can makers in Mexico, Nueva Modelo, Envases Generales and Crown cork have technical links with their American associates who are the three largest can makers in the USA. The Zapata group is an international can-maker in its own right with technical know-how on a world-wide scale. FAMOSA is Mexican owned but calls on foreign know-how as needed. In addition there are a number of smaller firms.

There are also the integrated can-makers who make cans for their own products (20% of the total can making market).

Over the years, material consumption per can has been reduced by lower weight of tinplate, lower tin coatings, the use of tin-free steel (TFS) and double-reduced plate and by high investment in coil cut-up lines.

Most can-making capacity is located near centres for beer and food-processing production, ie Mexico State, Monterrey, Guadalajara, Bajio, and Toluca.

At present, most of this capacity is for the traditional soldered-seam three-piece can, although FAMOSA currently have 50% of their capacity in two-piece cans and are planning to make further investment in two-piece capacity with the addition of two further can-making lines. In addition, the Government has proposed legislation relating to permissible levels of lead in contact with foodstuffs, which would speed up the changeover from soldered-seam to welded-seam cans and even to the use of two-piece cans for some food applications.

4. PRODUCTION

Production figures for general-line cans are given in the table below.

TABLE 2.28 PRODUCTION OF GENERAL-LINE CANS 1976-1980

million units

1976	1977	1978	1979	1980
1580.8	1529.8	2117.1	2413.3	2663.3

Source: Direccion General de Estadistica,
Secretaria de Programacion y Presupuesto

Following a fall in 1976/77, production of general-line containers grew 38% in the following period and has settled down to an estimated growth rate of 8% for the next five years.

There are currently no official figures available for the production of open-top cans in total but this is estimated to be in the region of 3.5-3.8 thousand million cans per year.

However production of open-top cans for beer is currently in the region of 1,200 million units a year, with a further estimated 100 million units imported.

Of the total production of open-top cans, 50% are for easy-open beer and carbonated beverage containers.

The most frequently used can is the 355 cc (12 fl. oz.) size.

Two further plants for the production of two-piece cans are currently being built, and by 1983 it is expected that capacity will exceed domestic demand.

5. TRADE BALANCE

Imports and exports of tinplate packaging as collected officially are shown in volume terms in the table below.

TABLE 2.29 EXTERNAL TRADE TINPLATE PACKAGING TOTAL

tonnes

	1975	1976	1977	1978	1979
Imports	2356	1881	3683	1381	4585
Exports	1167	1124	1448	615	77

Source: Instituto de Comercio Exterior

Unfortunately, this does not give any indication of which products are involved in this trade, but quantities are small. There is one packaging product broken out by IMCE and value and volume figures are given in the following table.

TABLE 2.30 IMPORTS OF TINPLATE CONTAINERS OF ONE LITRE CAPACITY 1976-1980

	1976	1977	1978	1979	1980
Volume - tonnes	1896	3692	na	1833	966
Value - million pesos	34.1	101.2	na	2.4	1.2

Source: IMCE

Again these quantities are quite small and declining during the period to 1980.

6 + 7. MARKET SIZE AND END USE

End uses in particular markets are dealt with in more detail in Part III but in weight terms, the amount of tinplate going to various markets and the total apparent consumption is given below.

TABLE 2.31a CONSUMPTION AND RELATIVE DISTRIBUTION OF TINPLATE PACKAGING 1975-1980

000 tonnes

	1975	1976	1977	1978	1979	1980*
Food	166.6	133.3	189.7	171.9	177.6	232.7
Drink	51.7	53.0	69.1	70.1	72.5	94.9
Chemicals	15.5	16.5	17.7	17.0	17.5	23.0
Other	41.7	40.4	45.5	39.7	41.0	53.7
Total	275.5	243.2	322.0	298.7	308.6	404.3

* provisional

Source: CEMIQ-LANFI

Open-top cans are used almost exclusively for canned fruit and vegetables, carbonated beverages and beer.

General-line cans utilisation is split between five main industry sectors, ie food, toiletries and cosmetics, motor oils, polishes and adhesives, and paints, but currently there is not enough data available to give a breakdown of the total market into these sub-sectors.

TABLE 2.31b CONSUMPTION OF TINPLATE CANS - BY END-USE; FORECAST 1980-1990

	1980	1981	1985	1990
Sanitary cans (other than fish)	900	976	1215	1455
Fish (round)	191	220	370	550
(irregular)	100	140	245	390
Beer and soft drinks	1718	1900	3000	4420
Nectars and fruit juice cans	560	625	915	1460
Milk cans	607	631	739	895
Aerosols	67	75	110	190
Other general line cans	375	391	467	558

Source: Estimates

8. PRICE TRENDS

Given the diversity of products of tinplate the price range is very variable, but in general these follow the price of steel and an average index is given.

TABLE 2.32 PRICE INDEX FOR TINPLATE PACKAGING

1970=100

1975	1980
130	250

9. TECHNOLOGICAL DEVELOPMENTS

No dramatic new technological or marketing developments are foreseen for the open-top can in the immediate future. There will be an increasing concentration on the use of the two-piece can for beverages with savings of 20% or more in materials cost, and three-piece can production for these products will be phased out over the five-year period. There is also likely to be greater emphasis on the stronger welded can, which dispenses with the use of lead.

For general-line containers there is again unlikely to be a significant technological innovation, and here the market will be increasingly under threat from competition from other packaging forms, notably rigid and flexible plastics, composites and laminates.

It is expected that the two-piece can will make greater inroads in the beer rather than the soft drink markets. As there are fewer brands of beer, there can be longer runs of a particular brand without the need for a label change, and the beer can market is larger.

Overall, gauge reductions will continue especially in the two-piece can, where it will be possible to make 30% weight reduction. This will yield a saving in raw material, and cut transport costs. Can strength can be maintained by fabricating beadings round the can body.

Other possible innovations include: the use of the drawn-redrawn process on pre-coated tin-free steel, eliminating the need for coating after forming; use of nickel for a coating in place of tin; the introduction of the steel easy-open can end.

STEEL DRUMS AND PAILS

1. STATISTICAL SOURCES

Information in this sector of the packaging industry is currently very limited, and there are problems relating the different sets of data with one another. A limited amount of data on the production of steel drums is available from Estadistica Industrial Anual published by Direccion General de Estadistica. Data on imports was obtained from the Instituto Mexicano de Comercio Exterior (IMCE). A certain amount of additional information was obtained from industrial sources including major companies.

2. TOTAL NATIONAL CAPACITY

Owing to the inadequacy of information, it has only been possible to make tentative estimates for total national capacity for steel drums and pails.

TABLE 2.33 TOTAL NATIONAL CAPACITY STEEL DRUMS 1976-1979

000 units

1976	1977	1978	1979
8500	8500	8000	7500

Source: Trade estimates

3. INDUSTRY STRUCTURE

There are 15 main manufacturers of steel drums in Mexico and they are concentrated in Mexico City and State, Guadalajara and Monterrey. It is likely that as the market continues to shrink in the face of competition from plastics and other forms of bulk packaging, there will be a tendency for the industry to concentrate by acquisition. Some of the manufacturers will diversify into plastics drums, while others will have to close.

The largest companies producing steel drums in Mexico are Bliss and Laughlin, Envases y Laminados SA, Recimex SA, Tambores y Cubetas SA, and Envases y Troquelades del Bajio.

4. PRODUCTION

The following table gives data on the volume and value of production for steel drums and lined pails.

TABLE 2.34 PRODUCTION OF STEEL DRUMS AND LINED PAILS 1976-1979
VOLUME AND VALUE

	1976	1977	1978	1979
Steel drums for alcohol				
000 units	6712	7702	6029	6158
million pesos	104.4	119.4	147.5	171.4
Steel drums (other)				
000 units	1363	1435	911	942
million pesos	103.3	137.1	148.7	233.6
Lined pails				
000 units	7720	8893	8471	7496
million pesos	148.0	199.7	248.1	281.3

Source: Direccion General de Estadistica

5. TRADE BALANCE

Some import figures are available from IMCE and these are shown in the table below.

TABLE 2.35 IMPORTS OF STEEL DRUMS 1975-1980
VOLUME AND VALUE

	1975	1976	1977	1978	1979	1980
000 kgs	503.3	530.5	449.4	na	475.2	121.7
000 pesos	5126.8	4850.3	8203.5	na	346.9	84.5

Source: IMCE (Instituto Mexicano de Comercio Exterior)

Whilst these figures show a substantial decline in imports, it is not sufficiently detailed to allow an accurate calculation of the number of units, ie drums, that these figures represent. However, it is estimated that approximately 22.8 thousand drums were imported in 1975, and this figure fell to 5.5 thousand drums by 1980.

There are no figures available on exports of these products and it has been assumed, therefore, that they are insignificant, and no account has been taken of them in the estimate of consumption.

6. MARKET SIZE

Using the production and trade figures given above, an estimate of consumption of steel drums (other than those for alcohol) with forecast is given below.

TABLE 2.36 CONSUMPTION OF STEEL DRUMS IN MEXICO 1976-1979 WITH FORECAST TO 1985

000 units

	1976	1977	1978	1979	1980	1982	1985
Steel drums (other)	1387	1475	931	963	759	318	96
Steel drums (alcohol)	6712	7702	6029	6158	5407	4046	2091
Lined pails	7720	8893	8471	7496	7464	6719	5649

Source: Trade estimates

The forecast shows a dramatic fall in demand for these drums, but this is to be treated with great caution owing to the inadequacy of the data on which the forecast was based.

Conversely steel drums for alcohol, whilst also experiencing a decline in the forecast period to 1985, are only expected to decline by 61% in 1980/85. In the same forecast period, consumption of lined pails is expected to decline by 26%.

7. END USES

The main drum sizes used in Mexico are 57, 110, 200, 208 litres capacity.

The bulk of steel drums is absorbed by the chemical, petrochemical and allied industries, which between them take around 60% of total production.

Mineral oil refining including lubricants, oils and greases, is the second largest end-user, probably taking 25% of the total. The food and drink sector together absorb only 5% of production and the remaining 10% is miscellaneous uses, the paint industry being the most important.

In the chemical industries, the main end-use products are general chemicals, detergents, dyes and pigments, disinfectants, cleaning products, adhesives and printing inks.

8. PRICE TRENDS

There was very little information to be had on price trends for steel drums, but using what there was and relating that to movements in the price of steel, the trend as shown below was estimated. Up to 80% of the total production cost of a steel drum is accounted for by raw materials, and of these, 50% is accounted for by the steel alone. Labour costs, which probably represent between 20-25% of total costs, have also risen throughout the period.

TABLE 2.37 PRICE INDEX FOR STEEL DRUMS IN MEXICO

1970 = 100

1975	1980
130	200

Source: Trade estimates

9. TECHNOLOGICAL DEVELOPMENT

The steel drum industry is mature and, as such, technical developments tend to relate to maximising efficiency and minimising cost rather than to any changes in the basic drum itself. There have been improvements in seaming techniques and increasing prices will encourage the use of thinner gauges.

Increased competition can be expected from plastics and tinplate drums when differing rates of cost increases are taken into account. However, in certain areas the improved design and manufacturing technology of plastic drums will make them more competitive with steel. In some narrow areas, where chemical inertness is an important factor, eg corrosive materials and dyestuffs, the plastic drum will have a distinct competitive advantage.

Another factor bearing on the switch from steel to plastics drums, is the trippage rate for steel drums. Most plastic drums are non-returnable since they are relatively difficult to cleanse for re-use, while steel drums can be used many times for an average of 7 trips. However, at the present no figures were available in the use and re-use of steel drums.

AEROSOLS

1. STATISTICAL SOURCES

The Instituto Aerosol collects figures on an annual basis for sales of aerosols by different types of fillings. These figures and further discussions with the Instituto formed the basis for this section. Additional data was obtained from a study of tinplate carried out by CEMIQ, the Centre for Chemical Information within LANFI.

2. TOTAL NATIONAL CAPACITY

To a considerable extent, the capacity for aerosol production and filling expands as and when the market demand calls for additional plant. The supply of containers for aerosols can be relatively easily increased by the can manufacturers from their surplus capacity; and the production of valves does not entail very large capital investment when there is a need for expansion. However an estimate of total capacity is as follows.

TABLE 2.38 TOTAL NATIONAL CAPACITY AEROSOLS 1970-1980 FORECAST TO 1985

million units

1970	1975	1980	1985
28	35	70	100

Source: Instituto Aerosol

The aerosol industry has constraints on demand for its products. In particular, inflation has a restraining effect for two reasons: firstly, it reduces real income per capita and aerosols, being for the most part luxury commodities, will be constrained by high levels of inflation; secondly, in times of inflation, manufacturers must reduce their unit costs or increase volume throughput in order to hold profit margins. Part of the solution lies in increased size of aerosols and this is seen particularly for hair sprays and household products reducing the relative cost per unit of product packed. Unfortunately a breakdown of aerosol fillings by size is not collected at present, so it is not possible to quantify this trend.

3. INDUSTRY STRUCTURE

The industry is fairly concentrated with a few firms producing aerosol components - propellant, cans, valves etc. The main companies producing tinplate bodies are Envases Mexicanos SA, Isabel SA, Envases Generales Continental; for aluminium bodies - Industria Santa Clara, and Tubos de Estano; for glass containers - Vidriera Monterrey and Panamericana de Vidrio; for valves - Aervalv SA, Valvulas de Precision SA, Olan de Mexico SA; for propellants - fluorocarbon, Alocarburas SA, Quimo Basicos SA; for hydrocarbon; Aeropress SA, Propelentes Mexicanos SA. In addition there are about 150 companies involved in filling aerosols; about

30 of these are major companies sharing the bulk of the market, the remaining 120 companies are medium to small in size concentrating on specialised products with a limited market. The main companies include the following: Bayer de Mexico, Johnson, H-24 (insecticides), Home Products, Aerobal (pack manufacturer), Stan Home, Alberto Culver, Schulton de Mexico, Beiesdorf, Avon, and Gillette. It is unlikely that this basic structure will change significantly in the five-year forecast period.

4. PRODUCTION

Production of aerosols in Mexico and the volume of tinplate required for their production is shown in the following table. Tinplate is the most important material used for aerosols with an estimated 75% of the total units, the balance is made up of 20% aluminium and 5% glass.

TABLE 2.39 PRODUCTION OF AEROSOLS IN MEXICO 1975-1980

	1975	1976	1977	1978	1979*	1980*
Tinplate apparent consumption (tonnes)	4644	4644	5130	5350	6048	6467
Aerosols produced (million units)	43.0	43.0	47.5	49.6	56.1	60.0

* provisional

Source: CEMIQ-LANFI

After a period of no growth during the recession of 1975/76, production of aerosols has increased at almost 10% a year, but this rate of growth is unlikely to be higher than 6% per year for the forecast period to 1985 owing to the general economic situation. This rate is based on the forecast of tinplate consumption for aerosols produced by CEMIQ.

5. TRADE BALANCE

There are no imports of aerosols as such, but 60-70% of the tinplate for the cans is from abroad. Inadequate domestic supply and too low quality of the domestic tinplate are the main reason for this high import requirement.

Exports are very low, mainly of individual products, insufficient to be of any significance, and this position is unlikely to change. There is currently a limited export of valves and gas propellants, and these may increase but not to any sizeable amount.

6/7. MARKET SIZE AND END USE

Table below gives details of the total market size for aerosols and the total broken down by type of filling. Figures are only given for two recent years, but they do show the development of new products over the period and relative growth of more traditional aerosol products.

TABLE 2.40 SALES OF AEROSOLS BY TYPE OF FILLING 1977 AND 1979

	million units	
	1977	1979
Deodorants	15.1	11.2
Anti-perspirants	7.5	6.6
Intimate deodorants	-	0.6
Perfumes, colognes	3.1	2.3
Hair sprays	4.9	5.0
Foot preparations	1.6	1.0
Insecticides	7.0	15.0
Air fresheners	3.2	3.1
Household cleaners	1.7	2.2
Industrial products	1.4	2.0
Shaving cream	0.9	1.5
Paints	0.9	1.5
Fire extinguishers	-	0.2
Pharmaceuticals	-	1.4
Engine ignition sealers and starters	-	1.0
Total	47.3	54.6

Source: Instituto Aerosol

These figures show the decline in relative importance of such traditional aerosol products as deodorants and anti-perspirants. The former fell from 31.9% of total fillings in 1977 to 20.5% by 1979; and anti-perspirants' share fell from 15.8% to 12.0% in the same period.

This may reflect an increase in market-resistance to these products packed in aerosols, a move to larger sizes of aerosol container, or the growth in roll-on deodorants and anti-perspirants.

The most frequently used sizes of aerosols in Mexico are 6 ounce (170.5 cc), 10 ounce (284.1 cc), and 16 ounce (454.6 cc).

One product which consistently increased its share of total fillings, insecticides, grew from 14.8% to 27.5% of total between 1977 and 1979. In addition new products have appeared in aerosols for the first time, eg intimate deodorants, fire extinguishers, some pharmaceutical preparations and engine ignition sealers and starters.

8. PRICE TRENDS

Insufficient information was available to make an index of price movements for aerosols, but from the information received it is estimated that aerosol packs increased in price by 12% in 1976/78 and by a further 34% in 1978/80.

9. TECHNOLOGICAL DEVELOPMENTS

Currently the breakdown of aerosol by type of container is estimated to be tinplate 75%, glass 5% and aluminium 20%. It is unlikely that these proportions will change significantly. It is not clear whether the Government has any plans to restrict the use of fluorocarbons; in any case a significant proportion of aerosols are already using the less controversial hydrocarbon propellants. Only approximately 30% of fillings currently are fluorocarbons.

The majority of tinplate aerosols are three-piece, soldered-seam containers, but there is likely to be a trend to welded-seam cans as these allow for enhanced decoration. It is unlikely that two-piece cans will make much headway in the aerosol market, since the main benefit of this manufacturing process is material saving through having thinner walls, and these would not meet the requirements for rigidity in an aerosol pack.

There is the possibility of substitution of aerosols by pump-action dispensers but for the moment these are too expensive to compete with aerosols for most products.

Plastics aerosols are still at an early stage of development in the USA, but the plastic aerosol has the considerable advantage that it may be adapted to a variety of shapes and designs which would be a tremendous marketing asset. However, the relatively high costs of suitable plastics and their permeability, are the principal current competitive disadvantages.

ALUMINIUM FOIL

1. STATISTICAL SOURCES

Statistics for production, imports and exports of aluminium and aluminium products are collected by the Instituto del Aluminio, but unfortunately the data are not broken down in sufficient detail to identify specifically packaging products. Further data were collected from industry, particularly end-use breakdown figures.

This section deals with aluminium foil and sheet in packaging. Such information as there is on aluminium cans is contained in the section on cans and containers manufactured primarily of tinplate.

2. TOTAL NATIONAL CAPACITY

TABLE 2.41 TOTAL NATIONAL CAPACITY ALUMINIUM FOIL PACKAGING MATERIALS 1975-1985

	tonnes		
	1975	1980	1985
Foil	5,000	8,000	30,000

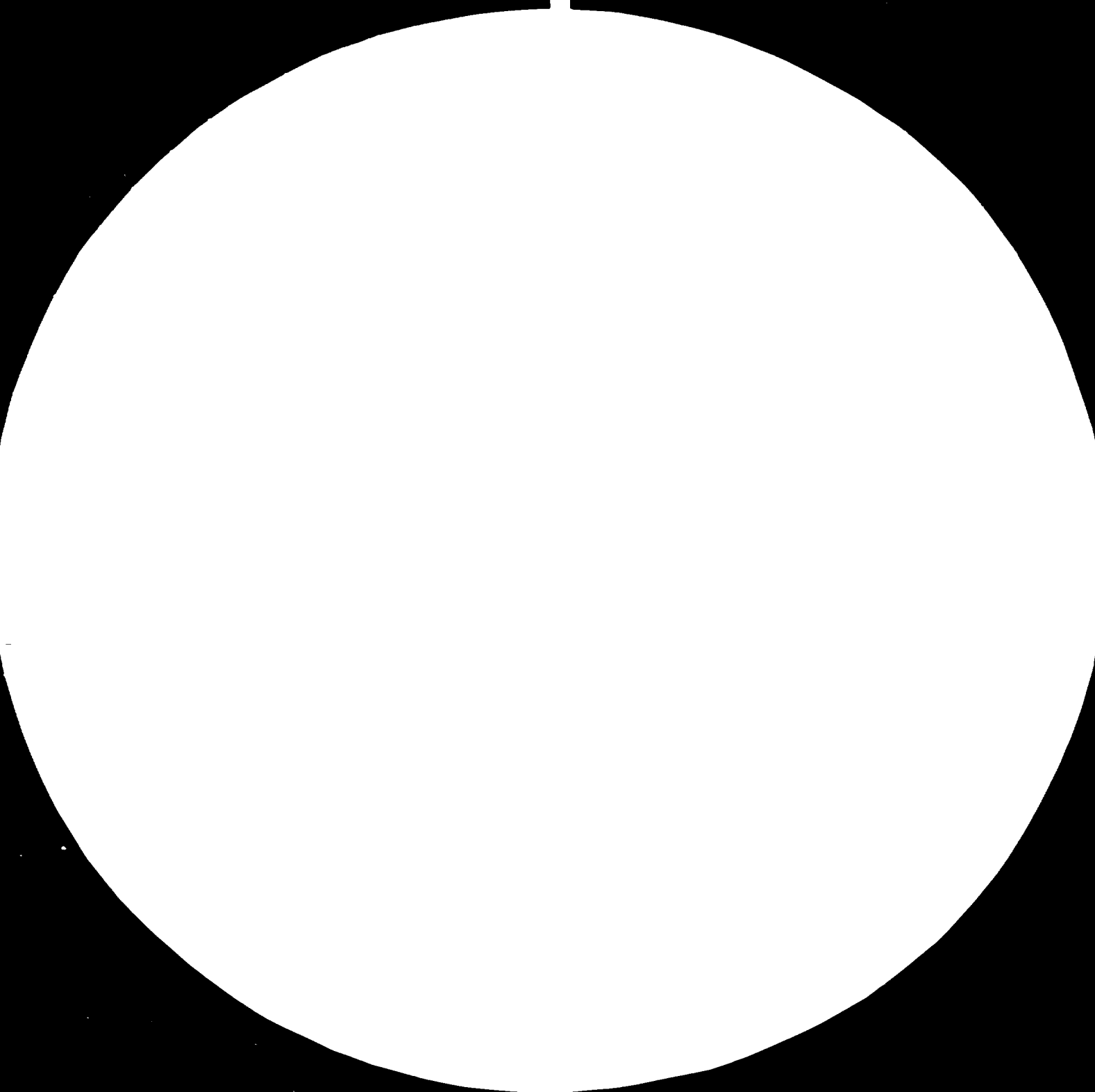
Source: Instituto del Aluminio

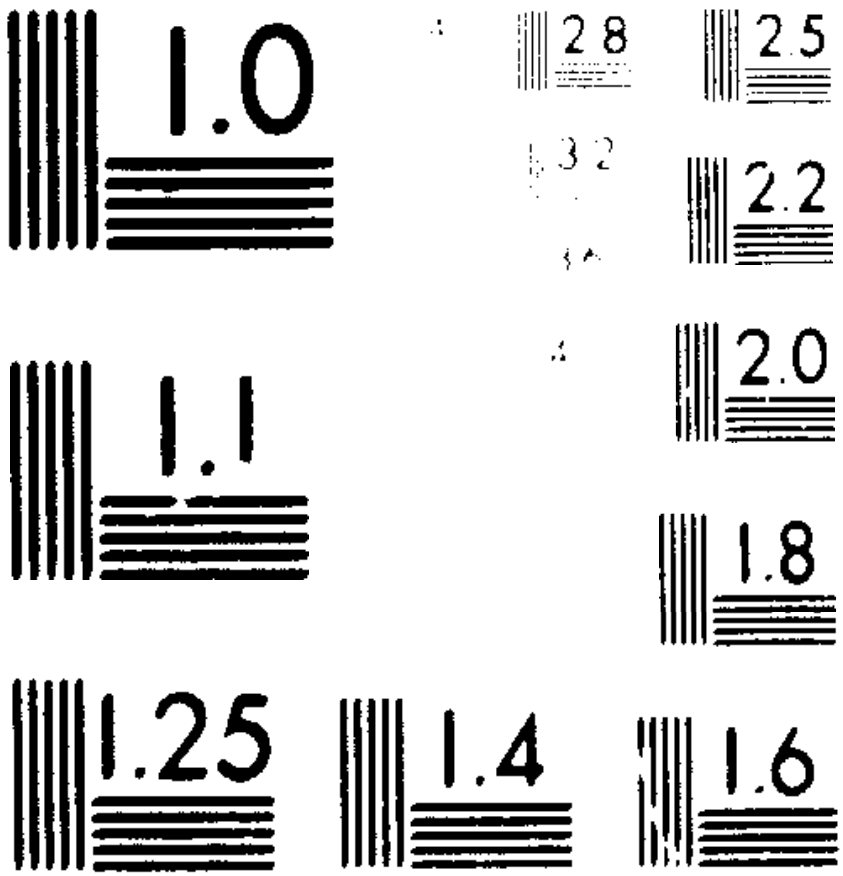
Currently, the industry is working at approximately 80% of capacity which is an improvement on the 60% operating levels of five years ago. However, with new capacity being introduced, capacity utilisation levels are likely to remain at about 80% for the five-year forecast period.

3. INDUSTRY STRUCTURE

The aluminium packaging industry is highly concentrated; there is only one producer of aluminium billet, one packaging producer, five laminate manufacturers, and two foil rollers. The laminate producers are Alcan Aluminio, Reynolds Aluminio, Alumex, Ecko, and Aluminio Laminado. The two foil rollers are Alcan Aluminio and Reynolds Aluminio. It seems likely that this basic structure will not change, but each producer will expand as the total market allows. The industry as a whole has recovered well from the recession and the current position is considered to be stable. However, all manufacturers are investigating new production systems which will allow improved quality control and higher volume of production.

In addition there are a number of companies producing easy-open can ends for beer and carbonated beverages, including Crown Cork de Mexico SA, Envases Genesales Continental de Mexico SA, Fabricas Monterrey SA, Industria Metalica del Envase SA, Isabel SA, Mexicana de Envases SA, and Nueva Modelo SA. Further capacity for easy-open ends is being installed by Envases de Jalisco SA, and Fabricas Monterrey (Toluca).




1.0
2.8
2.5
3.2
2.2
2.0
1.1
1.8
1.25
1.4
1.6

4. PRODUCTION

Total national production of different types of aluminium products in Mexico is given in the table below.

TABLE 2.42 PRODUCTION OF ALUMINIUM PRODUCTS 1975-1979

	000 tonnes				
	1975	1976	1977	1978	1979
Sheet	14.6	16.3	16.9	20.9	23.7
Foil	4.4	5.1	5.5	5.9	7.8
Extrusion	19.1	22.0	19.1	24.0	31.1
Powder and paste	0.4	0.4	0.4	0.5	0.6
Castings	11.5	11.6	11.3	31.9	36.4
Total	50.9	55.5	53.2	83.3	99.6

NB. Figures may not add to totals shown owing to rounding

Source: Instituto del Aluminio

Aluminium for use in packaging comes mainly from the second category, namely foil. These total production figures are now integrated with trade data, and an estimate of consumption is shown in the table below.

TABLE 2.43 PRODUCTION, IMPORTS, EXPORTS AND ESTIMATED CONSUMPTION OF ALUMINIUM IN TOTAL 1975-1979

	000 tonnes				
	1975	1976	1977	1978	1979
Production	50.9	55.5	53.2	83.3	99.6
Imports	33.2	30.8	16.3	29.2	36.4
Exports	1.1	1.6	2.5	3.7	3.0
+Recycled material	9.4	9.8	7.5	12.3	14.9
Estimated consumption*	92.4	94.4	74.5	121.1	147.8

+ industrial waste calculated at 11%

* excluding billet

Source: Instituto del Aluminio

During this period, production of aluminium has increased by more than 95% and domestic supply now provides 74% of total consumption, compared with only 63% in 1975. However, production of sheet and foil has fallen from 37%

in 1975 to 31% of total production in 1979, which suggests that packaging end uses are declining as a percentage of the total market for aluminium products.

The structure of the market for aluminium is as follows:

	%
Electrical industry	26
Packaging	18
Construction	16
Consumer goods	15
Machinery and equipment	8
Transport	6
Others	11
	100

Source: Instituto del Aluminio

5. TRADE BALANCE

The table above shows that imports of aluminium as a whole have not changed much in the last five years and are in fact a declining proportion of total consumption. On the other hand, exports have almost ceased since Mexican industry is fully utilised meeting the increasing domestic demand.

As far as raw materials go, these were discussed in Part I, but it should be remembered that if this industry is to continue growing at its present pace, then sufficient energy must be available for the basic bauxite smelting to be carried out in Mexico itself, rather than the present system whereby bauxite is exported and the aluminium industry has to depend on imports of higher priced alumina and aluminium ingot from abroad, notably the USA.

In 1979, the latest year for which figures are available, Mexico imported 50 thousand tonnes of alumina and 56 thousand tonnes of aluminium ingot. It is expected that this import of ingot and alumina will increase as the industry expands, unless the Government is willing to assist in the high capital cost of building a primary smelter.

There are virtually no exports of aluminium packaging products other than a small amount of easy open-tops to other South American countries, notably Venezuela.

6. MARKET SIZE

From industry estimates it is suggested that the total market for aluminium products is currently 150 thousand tonnes a year and that this will double in the five-year forecast period. Packaging is expected to take an increasing share of this total.

7. END USES

A limited amount of end-use data has been collected and this is presented in the table below.

TABLE 2.44 ALUMINIUM PACKAGING BY END-USE 1975-1979

tonnes

	1975	1976	1977	1978	1979
Chocolate and confectionery	699	1225	1562	1567	1320
Cigarettes	1035	813	791	888	1096
Other	2276	2687	2881	3049	2999
	4010	4725	5234	5504	5415

Source: Alcan Aluminio SA
Reynolds Aluminio SA

Overall consumption of aluminium in these end-use sectors has been mixed, with only cigarettes increasing usage in the latest year. However, it is expected that as a whole consumption of aluminium for all types of packaging will increase on average 8.5% per year during the five-year forecast period.

8. PRICE TRENDS

The only price index figures that were offered are as shown below.

TABLE 2.45 PRICE INDEX OF ALUMINIUM PACKAGING 1970-1980

1970 = 100

1975	1980
120	180

Source: Industry estimates

9. TECHNOLOGICAL DEVELOPMENTS

Technical developments for the future will be mainly in the expanding foil laminate sector, and will apply particularly to the usage of such materials for retortable and non-retortable pouches and containers of all types.

In addition there will be increased use of thinner guages of foil in both unsupported form, and in laminates with paper and plastics materials.

There are unlikely to be any dramatic developments in respect of unconverted foil but some progress will be made with the use of foil for caps and membranes. Improvements in processing methods will be introduced as will improved technology to reduce costs per unit.

Foil containers also will experience continuous improvement to cut costs, increase unit sizes, improve sealing methods.

GLASS CONTAINERS

1. STATISTICAL SOURCES

Most of the statistics in this section are based on those available from the Direccion General de Estadistica, Secretaria de Programacion y Presupuesto (General Statistics Bureau, Programming and Budget Secretariat). Trade data were obtained from the Instituto Mexicano de Comercio Exterior - IMCE (the Mexican Institute for External Trade). Further statistics were collected from a sample of glass manufacturing companies and where these have been used they are described as "trade estimates".

2. TOTAL NATIONAL CAPACITY

Estimated total national capacity of glass containers in 1970 is estimated to have been in the region of 1.6 thousand million units per year, which has increased to 4.2 thousand million units per year currently, an increase of 162.5% over the period, averaging 13.5% per annum. If current investment plans are realised, capacity will increase to approximately 8.0 thousand million units per year by 1985, a slightly slower average increase of 10.5% per year. This should be adequate to meet anticipated growth in consumption of glass packaging. 1979 was a year of considerable expansion for the glass industry as a whole, but some ambitious expansion plans were delayed by problems in construction of plants. However, a more promising development was the opening of the Vidriera Queretaro plant by the Grupo Vitro. Currently this facility is only working at 50% capacity so production expansion is possible in this area.

Currently, the industry overall is working 90-100% capacity mostly to meet domestic demand.

3. INDUSTRY STRUCTURE

The glass industry as a whole is very concentrated in Mexico and the same is true of the glass packaging sector. Grupo Vitro, dominates the industry with 80% of the total. This group comprises Vidriera Monterrey, Vidriera Mexico, Vidriera los Reyes, Vidriera Guadalajara, and Vidriera Queretaro amongst others, as well as the specialist ampoule manufacturer Envases de Borosilicata.

Of the 51 plants in the Vitro Group, nine are devoted to the manufacture of glass bottles; in 1978 they produced 2.33 thousand million units and in 1979 an estimated 2.80 thousand million - an increase of 20%.

The remainder of total industry is comprised of small companies, eg Panamerica de Vidrio (specialises in cosmetics sector), Vidriera Oriental and Nueva Fabrica Nacional de Vidrio (FANAL), none of which has a significant share of the glass packaging industry. This high level of concentration is not likely to change during the forecast period.

The industry is estimated currently to be 50% in Mexico DF but it is expected that further expansion will be in other areas and thus the relative importance of the DF will be reduced. This trend to decentralisation will include both manufacturing plants and administrative facilities.

4. PRODUCTION

TABLE 2.46 MEXICAN PRODUCTION OF GLASS CONTAINERS 1975-1979

000 units

	1975	1976	1977	1978	1979
Bottles	2,492,531	2,543,648	2,915,155	3,170,086	3,496,598
Jars	172,501	169,778	155,494	192,678	171,135
Ampoules	214,232	270,243	272,993	265,388	268,971

Source: Direccion General de Estadistica: Secretaria de Programacion y Presupuesto

The production in the different sections of the glass container industry has varied greatly for the period under review. Bottle manufacturers have recovered well from the recession of 1975/76 and in 1978/79 gained an increase of 10% in the volume of production. Glass jars - mainly for the food and pharmaceuticals industry - have been less fortunate, and except for 1977/78 when output rose by 24%, the trend has been to lower levels of production with a fall of 11% in output between 1978/79. This must reflect the lower levels of demand in consuming industries markets as a result of de-stocking, and the substitution by plastics packs, especially for pharmaceuticals. In the case of ampoules, after a spectacular jump of 26% in 1975/76, improvement has been modest with a 1.4% increase in output for 1978/79.

The remainder of this section concentrates solely on glass bottles, as these represent the bulk of glass packaging (see table above) and data was not available currently on other forms of glass packaging.

5. TRADE BALANCE

The volume and value of imports of glass packaging products vary considerably from year to year since they are used mainly to top up domestic production to meet the demand. The table below shows data for recent years.

TABLE 2.47 IMPORTS OF GLASS BOTTLES 1975-1980 BY VOLUME AND VALUE

volume in tonnes

	1975	1976	1977	1978	1979	1980*
Bottles up to 5 litres	413.2	435.9	110.0	na	258.7	353.2
Bottles of 5 litres and over	40.5	21.8	10.8	na	1.6	38.5

	value in 000 pesos					
	1975	1976	1977	1978	1979	1980
Bottles up to 5 litres	2661.6	1965.2	2204.1	na	3147.8	9750.1
Bottles of 5 litres and over	116.7	96.0	106.7	na	25.1	232.0

* estimated

Source: IMCE (Instituto Mexicano de Comercio Exterior)

These import figures show the effects of the economic crisis of 1975/76. When demand for glass packaging fell, users and producers were left with considerable stocks which had to be used. This de-stocking was still continuing into 1977 and caused a considerable reduction in imports. Since then the industry has been expanding but apparently not fast enough to meet domestic demand, and as a result imports have started to increase again to top-up domestic supply.

TABLE 2.48 EXPORTS OF GLASS BOTTLES 1975-1980 BY VOLUME AND VALUE

	Volume (tonnes)	Value (000 pesos)
1975	22.8	55.2
1976	32.3	107.0
1977	78.6	408.2
1978	na	na
1979	16.1	79.8
1980	13.5	125.3

Source: IMCE

Exports, as the above table shows, are also at a relatively low level, with no manufacturer having more than 5% of production destined for export. Most of this export of glass packaging is to other countries in Central and South America.

As far as the glass industry itself is concerned, there is little import of raw materials other than special ingredients, eg selenium, sodium dichromate, sodium carbonate and other cobalt colourants. Some silica and sand, up to 10 of requirements in some cases is also imported.

6. MARKET SIZE

The consumption pattern for glass bottles is shown in the table below.

TABLE 2.49 CONSUMPTION OF GLASS BOTTLES 1970-1985

million bottles

1970	1975	1980	1985
1,666.7	4,045.0	6,382.5	7,756.6

Source: Estimates

These consumption figures suggest that at least for the next five years, glass packaging production in Mexico should be adequate to meet the growth in domestic demand, provided the planned new capacity does come on-stream.

The annual percentage increase declines throughout the period in the face of competition from plastics bottles and metal cans for beer and carbonated beverages.

7. END USES

The end-market breakdown for glass containers varies from one manufacturer to another, but for the industry as a whole the breakdown of end-use is estimated to be as shown below.

Beer and alcoholic drinks	28%
Carbonated beverages	37%
Food	25%
Cosmetics and pharmaceuticals	13%
Other	2%

Source: Trade estimate

It is possible to identify a number of potential threats to the glass packaging industry. Firstly, there is the possibility of legislation on non-returnable bottles. From discussions with both manufacturers and users, a move of this sort is considered to be unlikely, but such a legislative change would have a considerable effect on the industry. As an additional problem, there is substitution potential to either cans for beer and carbonated beverages and to plastics in food and cosmetics/pharmaceuticals markets. In particular milk is now being increasingly packaged in waxed board cartons, and cooking oils and shampoos tend now to be in plastics bottles. If plastics packaging in particular is developed to give improved product presentation and better impact strength, then this will certainly increase the rate of substitution of plastics for glass. In the cans versus bottles area, the main threat to glass must be in the area of two-piece cans of either tinplate or aluminium. As new capacity is installed these packaging products will become more competitive with glass. Glass jars on the other hand seem to be in a fairly stable position and this market is expected to grow at approximately 8-10% per annum to 1985.

8. PRICE TRENDS

The prices of individual glass packaging products have varied in the last 10 years, but for the glass packaging industry as a whole the table below shows the trend in prices.

TABLE 2.50 PRICE INDEX FOR GLASS PACKAGING PRODUCTS 1970-1980

1970 = 100

1975	1980
140	225

Source: Industry estimates

With the increases in capacity which are either in progress or planned and the ready availability of raw materials, prices of glass packaging products are likely to remain fairly stable, in line with the level of inflation in the economy as a whole. The influence of the Government price controls and the differing experience of the producers and consumers of glass packaging have not been studied in great depth, but given the structure of the industry some form of price regulation would appear to be necessary.

9. TECHNOLOGICAL DEVELOPMENTS

Most glass container developments in recent years have been in beverage bottles amongst which are: non-returnable bottles, lighter-weight bottles, plastic-coated bottles, and bottles with a plastics shield. Non-returnable bottles for beers and carbonated beverages are becoming more common. The latter three developments are basically the same technology, ie the use of shrink and shrink foamed plastic coatings. For the most part, plastics coatings are only being used for carbonated beverages since the pasteurisation of beer would be more difficult with a coated bottle. The advantages of these packs are that they are lighter weight, they eliminate the need for in-plant labelling and they give better print and graphics quality. These innovations when applied in other countries, notably the USA, have reduced the total packaging cost and enabled glass bottles to offset in some degree the traditional cost advantage of the metal can over the non-returnable glass bottle. At present the situation in Mexico has not reached a point where these nicer advantages need to be thought about. However, if for example energy costs, particularly electricity, escalate, then some of these innovations would help glass retain its competitive position.

WOOD

1. STATISTICAL SOURCES

The total forest products industry in Mexico is considerable with overall capital invested of 33.5 thousand million pesos. This total industry may be divided into pulp and paper, sawmilling, plywood, packaging and resins, by far the larger component is paper and board which represents 65.7% of total investment. To contrast, that section related to packaging represents only 0.6% of total investment. This indicates that wood packaging remains a very labor-intensive, small scale operation in Mexico.

Because the wood packaging industry is highly diversified and disaggregated, there are problems for any agency wishing to collect data for the industry as a whole. Some data is available from the Camara Nacional de las Industrias Derivadas de la Silvicultura and it is on this information that most of this section is based. Further supplementary information was obtained from manufacturers and users of wood packaging products.

2. TOTAL NATIONAL CAPACITY

There is no available data on national capacity for the whole wood packaging industry. A limited amount of data on wooden boxes is published and this is shown in the table below.

TABLE 2.51 NATIONAL CAPACITY - WOODEN BOXES

	million units	
	1978	1979
Nailed boxes	42.0	42.0
Wired boxes	18.0	18.0
	60.0	60.0

Source: Camara Nacional de las Industrias Derivadas de Silvicultura

This industry is in a stable position with little expansion in demand for its products owing to the high level of substitution to other materials in its main markets, eg steel, aluminium, and plastics for transit packaging, plastics and moisture-proof board for fruit and vegetables. The overall market for these types of packs is expanding but wood is only just holding its own share of the total.

3. INDUSTRY STRUCTURE

The wood packaging industry is very diversified. Information from the Camara shows that there are 455 firms making nailed and wired boxes alone.

The industry is concentrated geographically, with the bulk of firms located in Michoacan and Durango, with 252 and 131 of the total firms respectively. Chihuahua has 33 companies, Mexico, DF 10, and Jalisco 7, with the few remaining companies distributed throughout the other states.

A large proportion of wood packaging products are made at sawmills and other small, local companies (talleres), so the industry can be said to be very disaggregated.

However it can be stated that for the most part, the wired boxes are made by larger companies, and the nailed boxes are made by small local companies or groups of individuals.

4. PRODUCTION

Production figures for the industry as a whole are not available, but from industry interviews it was concluded that wood packaging had recovered well after the economic recession, although the devaluation had initially caused a decrease in demand. However, since most of wood packaging is used for export, the industry was quick to recover. Some data is available from the Camara on wood box production and this is given in the table below.

TABLE 2.52 PRODUCTION OF WOODEN BOXES - VOLUME

	000 m^3	
	1978	1979
Nailed	150.0	162.3
Wired	61.5	69.5
Total	211.5	231.8

PRODUCTION OF WOODEN BOXES - VALUE

	million pesos	
	1978	1979
Nailed	457.6	495.1
Wired	280.1	316.2
Total	737.7	811.3

Source: Camara Nacional de las Industrias Derivadas de la Silvicultura

Production of nailed and wired boxes grew in volume terms 8.2% and 13.0% respectively between 1978 and 1979 and this level of expansion may be expected to continue for the forecast period.

There is some breakdown of this production of wired wood boxes by state for 1979:

State	Production (million of boxes)
Durango	10.4-13.4
Nayarit	0.8
Chihuahua	3.5
Jalisco	0.5
Morelos	0.8
TOTAL	16.0-19.0

Source: Camara Nacional de las Industrias Derivadas de la Silvicultura

5. TRADE BALANCE

The wood packaging industry does not import or export anything directly. However, many of the products packed are for export, eg fruit and vegetables, also computers, typewriters, vehicle parts and electrical machinery.

6. MARKET SIZE

Given the very localised nature of this industry, it has been assumed that the market size directly governs the level of production. As the economy expands, the market grows and firms producing wood products utilise more of their capacity for package-making as opposed to other timber products.

7. END USES

This varies very widely from one company to another, but traditionally the products packed in wood are fruit and vegetables, fish, electrical machinery, mechanical equipment etc. However, in most of these product areas the market growth is being taken by substitute package materials and packs.

Some statistics on the usage of wired and nailed boxes have been collected, and these are represented below.

TABLE 2.53 USAGE OF WIRED WOOD BOXES - ALL END-USES 1978-1979 SEASON

Product	000 units	%
Fruit and vegetables	13,771	82.1
Industrial packaging	2,500	14.9
Chickens and others	500	2.9
	16,771	100.0

A further breakdown of the horticultural use of wired wood boxes is as follows.

TABLE 2.54 USAGE OF WIRED WOOD BOXES - HORTICULTURAL END-USES 1978-1979 SEASON

Product	000 units	%
Cucumbers	3,714	27.0
Cantaloupe	3,671	26.6
Chile	3,659	26.6
Aubergine	1,454	10.6
String bean	631	4.6
Squash	353	2.6
Peas	267	1.9
Others	19	.1
	13,771	100.0

The geographic breakdown of this demand is shown below:

TABLE 2.55 USAGE OF WIRED WOOD BOXES BY STATE 1978-1979 SEASON

State	000 units	%
Sinaloa	9,876	71.7
Michoacan	1,875	13.6
Jalisco	682	5.0
Sonora	627	4.6
Guanajuato	106	0.7
Others	602	4.4
	13,771	100.0

Fruit and vegetable packaging also employs nailed wood boxes and the breakdown by type of product packed is shown below.

TABLE 2.56 USAGE OF NAILED WOOD BOXES - HORTICULTURAL END-USES 1978-1979 SEASON

Product	000 units	%
Tomato	5,847	66.8
Squash	1,494	17.1
Cantaloupe	1,116	12.8
Garlic	237	2.7
Aubergine	36	0.4
Cucumber	14	0.2
Cabbage/peas	4	
	8.748	100.0

Wooden boxes for fruit and vegetables are being replaced by waterproof board, and in some cases plastics, although the latter are still relatively expensive. For transport and distribution, wooden containers are being substituted by metal ones. For pallets, however, wood is still the favoured material in Mexico, but data on pallets is currently not available.

8. PRICE TRENDS

Given the range and diversity of products in this sector of the packaging industry it was difficult to compile a general price index. However, from data on prices it has been possible to estimate the index below:

TABLE 2.57 PRICE INDEX FOR WOOD PACKAGING PRODUCTS 1970-1980

1970 = 100

1975	1980
140	360

Source: Industry estimates

9. TECHNOLOGICAL DEVELOPMENT

Wood is a very traditional packaging material and there are unlikely to be any major developments in this area. However, Carton Titan has recently developed a transit package that combines fibreboard and wood, and developments of this sort and those occurring in the plastics and metals area provide an increasing threat to the sate of health of the wood packaging industry.

In order to delay the erosion of their markets, it is important that producers, particularly of wired wood boxes should seek to raise productivity and reduce wastage and thereby hold prices as competitively as possible.

P A R T I I I

PACKAGING USAGE: BY MAIN CONSUMING INDUSTRY SECTOR

INTRODUCTION

Packaging is used for all products whatever their type and end-use, whether they are destroyed after use, are semi-durable or durable, for domestic consumption or use in industry. It is impossible to investigate in detail all products which need packaging and to make an exhaustive study of all end-uses.

However, a study has been made of a number of end-use markets for packaging in an attempt to discover changes in packaging requirement, both in the quantity and in the type of materials used.

For the most part these are consumer product markets, particularly food, drink and tobacco, but a number of durable goods and industrial packaging markets have been investigated.

Each market has been studied according to the following plan:

- production
- packaging
- outlook

However, the amount of information available varies greatly from one market to another and as a result the coverage is not uniform. It is hoped that in subsequent studies of this nature, it will be possible to make a more complete assessment of the trends in consumer markets for packaging materials and packs.

One area which could be usefully studied is the relationship of packaging to the distribution and retailing of food products; in particular, the benefits of packaging resulting from less wastage and more efficient handling of food products. The Government's SAM programme (Systema Alimentario Mexicano) is of great interest, whereby the agency CONASUPO and its affiliates is seeking to make greater quantities of basic foodstuffs available through special retail outlets. The intention is for this range of foods to be available at lower prices through control of production costs and packaging costs. Such a scheme will obviously influence the type and quantity of packaging used for food products.

MILK

PRODUCTION

The production of milk in Mexico has increased in recent years but at a decreasing rate as the figures in the table show.

TABLE 3.1 PRODUCTION OF MILK IN MEXICO 1975-1979

tonnes

1975	1976	1977	1978	1979
153,971	152,440	190,370	213,214	234,109

Source: Bank of Mexico Yearbook

Following a drop of 1% in production in 1975/76, production rose by 24.9% in the following year, but this rate of increase had fallen to 9.8% between 1978/79. These figures include powdered, whole and non-fat milk, also condensed and evaporated milk. The production of fresh milk is limited by a number of factors; the general lack of milk-producing livestock, unfavourable climatic conditions, the increased prices of such foods and competition from sales of dehydrated milk by CONASUPO (the State food agency). Despite an increased production of fresh milk and dairy products, Mexico is continuing to import powdered, evaporated and condensed milk. In 1979, these imports reached 115 thousand tonnes, an increase of 230% from the previous year. The Government controls the price of milk and producers are often reluctant to raise production when they feel prices are being kept artificially low.

PACKAGING

It has not been possible at this stage to estimate the quantity of fresh milk that is sold, broken down into direct sales usually glass bottles for doorstep delivery, and sales through retail outlets usually using some form of waxed board carton such a Purepak. However, as far as processed milk products are concerned, CEMIQ/LANFI in their tinplate study gave estimates of the volume and value of tinplate used for a range of processed milk products.

TABLE 3.2 ESTIMATED CONSUMPTION OF TINPLATE FOR PACKAGING OF PROCESSED MILK PRODUCTS 1974-1978, VOLUME AND VALUE

	1974	1975	1976	1977	1978
Volume (tonnes)	51,172	52,689	41,603	67,620	63,490
Value (million pesos)	197.0	274.6	304.0	589.9	677.4

Source: CEMIQ/LANFI

These figures include cans for dried milk, condensed and evaporated milk and other milk-derived products, and the tinplate figures can be broken down further.

TABLE 3.3 ESTIMATED VOLUME OF TINPLATE FOR PACKAGING PROCESSED MILK PRODUCTS 1974-1979

tonnes

	1974	1975	1976	1977	1978
Dried milk	14,681	16,142	12,596	17,917	16,965
Condensed milk	5,368	4,789	4,429	7,500	7,245
Evaporated milk	17,084	17,052	13,740	22,474	21,250
Other	14,039	14,706	10,806	19,729	18,030

Source: CEMIQ/LANFI

The proportions of these different milk-based products have not changed significantly over recent years, and it is likely that these trends will continue in the foreseeable future. In broad terms it can be stated that of these volumes of tinplate being used, that used for condensed and evaporated milk will be converted into open-top cans, and that for dried and other milk products will be converted to general tin containers.

OUTLOOK

With the development of the food aid programme of CONCANACO, efforts will be made to expand the production of milk and milk products. There will be opportunities for developments of packaging as this end-use grows. The CEMIQ study forecast an average annual growth rate in excess of 8% for the use of tinplate in milk product packaging. In addition, there will be developments of plastics bottles for fresh and powdered milk, laminate bags and folding cartons for dried milk products, and improved plastic lined board cartons also for fresh milk, using LDPE or HDPE films to replace wax as the proofing agent.

EDIBLE OILS

PRODUCTION

This industry suffers from the inadequate supply of raw materials, and this has been the case for some years past. Partly this results from the state of Mexican agriculture which cannot produce sufficient oil seeds to meet domestic demand. In 1979 this shortfall had to be made up, with imports of oil seeds reaching almost 800 thousand tonnes. Since the problems of agriculture are deeply ingrained (see Part I), they are not susceptible to drastic solutions and it is unlikely that the supply situation will improve in the near future. The 70 plants producing edible oils will continue to be affected by structural problems, such as the Government price control system; the competition from the Federal Government and its agencies, eg CONASUPO, in the manufacture and sales at retail level of some types of edible oils; and lastly, the increase in operating costs.

TABLE 3.4 PRODUCTION OF EDIBLE OILS AND VEGETABLE LARDS IN MEXICO 1976-1979

tonnes

	1976	1977	1978	1979
Edible oils	299,493	298,630	271,482	299,987
Oil blends	86,082	73,661	70,120	69,983
Vegetable lard	186,931	184,443	179,000	182,694
Margarine	13,153	14,044	15,903	16,725

Source: Direccion General de Estadistica, SPP

The total of edible oils shown in the table comprises cotton seed, sesame seed, coconut, safflower and soybean oils.

PACKAGING

This product range uses most of the main types of packing: vegetable oils are packed in glass and PVC bottles, with tinplate cans and drums for the larger sizes; margarine uses aluminium foil, greaseproofed papers and in some cases PE tubs; solid vegetable fats are packed in a range of flexible materials, paper or foil-based.

Unfortunately, there is insufficient data available to estimate the quantities of most of these packaging materials used. However, it is apparent that PVC bottles are taking a growing share of the liquid oil market and are growing at 12% per year. PE tubs for margarine are increasing their rate of use at slightly more than 10% per year.

Data on the usage of the tinplate packaging for these products is available from the CEMIQ/LANFI tinplate study.

MEAT

PRODUCTION

The production of meat and meat products has not grown in recent years and has suffered from the lack of capital investment which has hampered the whole agricultural industry in Mexico. However, livestock production is an important part of the agricultural programme initiated by the Administration, and emphasis is being laid on the need to increase production to meet consumer needs.

TABLE 3.6 PREPARATION, CONSERVATION, PACKAGING AND CANNING OF MEAT BY VOLUME AND VALUE 1975-1979

	1975	1976	1977	1978	1979
Volume (thousand tonnes)	155.3	175.3	149.[illegible]	147.5	130.7
Value (million pesos)	-	-	[illegible]	6.0	6.8

Source: Direccion General de Estadistica, Estadistica Industrial Anual

These figures show that, although the value of meat and meat products continues to increase, volume has been declining for the last three years. Higher prices resulting from this will inevitably put meat beyond the income of the majority of Mexicans, and other forms of protein have to be substituted.

PACKAGING

CEMIQ/LANFI in their study of tinplate estimated the consumption of tinplate for meat canning to be as follows:

TABLE 3.7 ESTIMATED TINPLATE CONSUMPTION FOR MEAT PACKAGING 1975-1978 VOLUME AND VALUE

	1975	1976	1977	1978
Volume (tonnes)	229	139	196	200
Value (thousand pesos)	1190	1020	1710	2055

Source CEMIQ/LANFI

This shows the relative movements which have resulted in a doubling of the price of tinplate for this end-use.

TABLE 3.5 ESTIMATED CONSUMPTION OF TINPLATE FOR PACKAGING EDIBLE OILS AND VEGETABLE FATS 1974-1978, VOLUME AND VALUE

	1974	1975	1976	1977	1978
Volume (000 tonnes)	21.2	17.5	12.1	16.8	16.0
Value (million pesos)	81.7	91.0	88.8	147.2	168.5

Source: CEMIQ/LANFI

From these figures it appears that during the period 1974/78, usage of tinplate for packaging cooking oil and vegetable fats fell by over 25%. Tinplate costs rose sharply and in addition tinplate was having to face increased competition from other packaging media. Unfortunately, there is currently no data available on this total tinplate use broken down by container type and size.

OUTLOOK

The market for cooking oils and vegetable fats is not likely to see any rapid growth in the forecast period, but nevertheless there will be the continuation of packaging developments. Increasing use will be made of plastics materials, particularly PVC bottles for oil and PE tubs for margarine. In addition, there will be developments in laminate materials employing paper, aluminium foil and films, mainly LDPE.

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	1975	1976	1977	1978	1979
Volume (thousand tonnes)	155.3	175.3	149.8	147.5	130.7
Value (million pesos)	-	-	4.6	6.0	6.8

Source: Direccion General de Estadistica, Estadistica Industrial Anual

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This shows the relative movements which have resulted in a doubling of the price of tinplate for this end-use.

OUTLOOK

At present the structure of the industry militates against meat becoming available to a larger proportion of the population. Since food-grade tinplate is mostly imported and therefore relatively expensive, it is only used for quality products. Canned foods, and meats are a good example, and therefore beyond the budget of poor people. However, there is certainly an opportunity for the development of alternative forms of meat packaging in order to preserve more and allow for a better distribution system. Behind all this there remains the need to produce more meat. Then primal jointing and film packaging can be introduced.

FISH AND SEAFOOD

PRODUCTION

Mexico has very considerable potential for fishing, but currently only a very small percentage is being exploited. This industry has, until recently, not been receiving adequate capital investment from either private or Government sources and hence annual catches have fallen well below target. In addition, a large part of the total fishing fleet did not operate for 30 months up to mid-1979 which further curtailed the catch. Figures for the processing of fish and seafood products are collected by the Direccion General de Estadistica and these are shown below.

TABLE 3.8 CONSERVATION, PACKAGING AND CANNING OF FISH AND SEAFOOD 1975-1979, VOLUME AND VALUE

	1975	1976	1977	1978	1979
Volume (tonnes)	148,435	75,738	31,563	37,407	36,035
Value (million pesos)	488.3	584.5	1256.2	1810.1	2053.2

Source: Direccion General de Estadistica, Estadistica Industrial Anual

In spite of the continuous fall in production in this industry since the peak of 148.4 thousand tonnes in 1975, the Administration sees development opportunities here, and a considerable assistance in feeding the country's expanding population, which will involve greater use of packaging.

PACKAGING

The volume of packaging used in the preserving of fish and seafood products also reflects this recent decline in volume throughput.

TABLE 3.9 TINPLATE USED IN PACKAGING OF FISH AND SEAFOOD PRODUCTS 1974-1978, VOLUME AND VALUE

	1974	1975	1976	1977	1978
Volume (tonnes)	14,624	17,175	9,999	10,564	9,090
Value (million pesos)	56.2	86.7	73.1	92.3	95.7

Source: CEMIQ/LANFI

These figures reflect the same trend in output of fish and seafood products and at the same time indicate the doubling in price of the principal packaging material. The most part of this food-grade tinplate is imported, since tinplate produced in Mexico is of lower grade.

There is clearly a requirement to improve the quality of tinplate which is produced in Mexico. This requirement becomes even more urgent since the

Administration is promoting high protein products, such as fish, through the Systeme Alimentario Mexicano to make basic foodstuffs available through low price outlets.

OUTLOOK

Increasing the harvest of the fishing industry will offer many opportunities for developing processing and packaging methods. Currently most processed fish and seafood products are packaged in tinplate cans with a limited amount in glass jars. If these products are to be mainly for domestic consumption then efforts must be made to get unit costs down unless the Government provides massive subsidy support. One method which is currently at a trial stage is the use of two-piece shallow cans. Because they are shorter, the problems of wall strength during processing are insignificant, which results in savings in raw material when compared with the traditional three-piece can.

FRUIT AND VEGETABLES

PRODUCTION

Figures for total preparation, conservation and packaging of fruit and vegetables in volume and value terms are available from the Direccion General de Estadistica.

TABLE 3.10 PREPARATION, CONSERVATION AND PACKAGING OF FRUIT AND VEGETABLES 1975-1979, VOLUME AND VALUE

	1975	1976	1977	1978	1979
Volume (000 tonnes)	197,560	224,469	216,121	225,298	226,121
Value (million pesos)	475.1	2889.9	3259.7	3819.3	5554.6

Source: Direccion General de Estadistica: Estadistica Industrial Anual

Volume throughput in this sector of the total food processing industry has remained fairly stable for some time with output between 200 and 225 thousand tonnes a year. However prices, and therefore the value of output, have soared, resulting from inadequate supply and general inflation.

PACKAGING

The only figures available on the usage of packaging in this sector are those contained in the CEMIQ/LANFI tinplate report.

TABLE 3.11 ESTIMATED CONSUMPTION OF TINPLATE FOR FRUIT AND VEGETABLES 1974-1978, VOLUME AND VALUE

	1974	1975	1976	1977	1978
Fruit					
volume (tonnes)	31,027	24,373	21,932	35,082	36,150
value (million pesos)	99.7	127.2	160.3	308.4	380.8
Vegetables					
volume (tonnes)	62,545	52,511	44,557	57,127	59,072
value (million pesos)	210.7	266.6	325.7	501.3	615.8

Source: CEMIQ/LANFI

Overall, the usage of tinplate for packaging fruit and vegetables has increased only 2% over the period 1974/78, but this disguises a fall in use of vegetables and an increase in usage for fruit.

OUTLOOK

The total production of processed, canned fruit and vegetables is unlikely to expand very much in the period to 1985. Government initiative in agriculture will be mainly directed towards producing basic foodstuffs rather than the high-value fruit and vegetable products which are mainly for export. The bulk of fruit and vegetables consumed in Mexico is fresh rather than processed, and there is currently very little frozen produce.

SOFT DRINKS/CARBONATED BEVERAGES

PRODUCTION

The soft drinks industry includes mineral water, effervescent and purified water and cola drinks, and other carbonated beverages. Following the slump of 1976, when the industry was caught between slow market growth and increasing production and distribution costs, there has been a positive development of both production and sales. For 1979, total output was 5.3 billion litres which was 16% more than the figure for 1978. Of that total output, cola drinks continue to be most popular with 55% of the market, and other flavoured drinks making a further 24%. There had been fears that cola drinks would take the entire market and this would lead to the disappearance of Mexican companies from the national market, leaving only the foreign patent bottlers since they manufacture the cola drinks. There are still problems with regard to the visible competition of foreign companies in the soft drinks industry, the higher cost of sugar and the arguments over prices.

TABLE 3.12 PRODUCTION OF SOFT DRINKS AND PURIFIED WATER 1975-1979 VOLUME AND VALUE

	1976	1977	1978	1979
Volume (million litres)	3685.1	3939.1	4552.2	5314.4
Value (million pesos)	7658.2	11213.3	13153.6	15785.4

Source: Direccion General de Estadistica, Estadistica Industrial Anual

PACKAGING

The bulk of these products are packaged in glass bottles, though there is a growing proportion of carbonated beverages and fruit juices being marketed in cans.

TABLE 3.13 PURCHASES OF PACKAGING MATERIALS BY THE SOFT DRINKS AND PURIFIED WATER BOTTLERS 1974-1978

	1974	1975	1976	1977	1978
Bottles (million units)	10756.7	12386.8	10916.1	12372.1	14645.0
Boxes (million units)	473.9	548.4	485.4	551.0	651.8
Value (million pesos)	6890.5	7907.2	9494.5	14115.4	16944.6

Source: ANPAE AC (Asociacion Nacional de Productores de Agnas Envasadas AC)

The breakdown of glass containers by size is estimated to be as follows:

TABLE 3.14 GLASS CONTAINERS BY SIZE AS USED IN THE SOFT DRINKS INDUSTRY

	%
up to 300 cc	14
301 to 470 cc	66
471 to 600 cc	6
601 to 1000 cc	13
1000 cc and above	1
	100

Source: Industry estimates

In addition, the past five years have seen a number of the major bottlers changing from wooden to plastic crates, and where this has not occurred then the changeover will be completed in the forecast period to 1985.

The main challenge to the tranditional glass bottle will be the can. Tinplate has been used for many years for the manufacture of closures, but there will be increasing use of metals for soft drinks packages.

TABLE 3.15 APPARENT CONSUMPTION OF TINPLATE FOR SOFT DRINKS PACKAGING

tonnes

	1974	1975	1976	1977
Packs	295	335	300	273
Closures	3132	3197	3420	3659
Total apparent consumption	3427	3532	3720	3932

Source: CEMIQ/LANFI

OUTLOOK

The soft drinks industry is estimated to continue growing at approximately 9.5% per year up to 1985, and thus forms a very buoyant market for packaging. The bulk is currently marketed in bottles, and this will remain a major packaging form. However, with the changes taking place in retail patterns and the development of self-service outlets, it is most likely there will be considerable innovations. These will include: lighter weight glass bottles, possibly with some form of plastic shield; greater use of cans, this will mainly be felt in the 301-470 cc bottle size; and the introduction of the PET bottle for larger sizes. Indeed some bottlers are already experimenting with these possibilities.

BEER

PRODUCTION

The Mexican beer industry is continuing a growth trend which started in 1977, increased production keeping pace with increased demand which has recovered its vitality after a drop in 1974/76. The slump in demand during those years is ascribed to the initial impact of table wines, and there is still some caution expressed about the continuing competition from wines in the future. In addition, beer producers are also having to face growing costs, especially for tin cans, glass bottles, board boxes and raw materials and labour, as well as increased Federal taxes.

Industry figures indicate that canned beer tends to be the most dynamic category, compared with bottled and draught. Strangely, canned beer also happens to have the highest production costs, but this is partly compensated for by the fact that distribution and marketing present fewer problems.

TABLE 3.16 PRODUCTION AND SALES OF BEER IN MEXICO 1975-1980

millions of litres

	1975	1976	1977	1978	1979	1980
Production	1968	1936	2161	2263	2501	
Sales	1937	1892	2199	2314	2615	

Source: Direccion General de Estadistica
Asociacion Nacional de Fabricantes de Cerveza

The brewing industry is very concentrated in Mexico, with three large breweries - Cerveceria Cuauhtemoc SA (part of the VISA group), Cerveceria Moctezuma SA and Cerveceria Modelo - and if anything the industry is becoming more concentrated. Capacity, currently at 2750 million litres is expected to continued expanding to 3600 million litres by 1985.

PACKAGING

The bulk of the beer produced in Mexico is packaged in bottles or cans; there is very little draught beer and it seems unlikely that this sector will alter very much during the forecast period.

Glass bottles are a firmly entrenched packaging form and their use will continue to grow at about 8% per year during the forecast period. However, the most dynamic sector will be canned beer, with usage growing by over 10% per year.

TABLE 3.17 BEER: CONSUMPTION BY TYPE OF PACKAGING 1975-1979

	1975 %	1976 %	1977 %	1978 %	1979 %
Bottle 940 ml	19.5	19.5	20.8	20.9	20.1
325 ml	52.3	51.2	49.6	48.8	47.8
90 ml	12.0	11.2	10.4	10.3	9.7
Can 340 ml	14.2	16.1	17.3	18.3	20.9
Draught	2.0	2.0	1.9	1.7	1.5

Source: Asociacion Nacional de Fabricantes de Cerveza

At the moment, the bulk of these cans are traditional three-piece tinplate cans, but increasingly the emphasis will be on two-piece drawn and wall-ironed cans, most likely of aluminium.

TABLE 3.18 PRODUCTION, IMPORTS AND APPARENT CONSUMPTION OF TINPLATE FOR BEER PACKAGING

tonnes

	1975	1976	1977	1978	1979
Production	49,000	50,833	66,526	67,724	72,357
Imports	2,325	1,896	2,275	1,779	2,058
Consumption	51,325	52,729	68,801	69,503	74,415

Source: Asociacion Nacional de Fabricantes de Cerveza
Anuario Estadistica del Comercio Exterior de los Estudos Unidos Mexicanos SPP

In a forecast of these figures, carried out by CEMIQ/LANFI, it was estimated that consumption of tinplate for beer packaging would increase by 30% to 103,884 tonnes in 1985. Since canned beer sales are expected to increase by 50%, it suggests that not only less tinplate will be used per can, ie thinner gauge, but also that much of this growth will be taken by aluminium containers.

OUTLOOK

The primary packaging of beers is unlikely to alter with the bulk going in glass bottles and cans, though the balance in favour of cans will place emphasis there. Bottles are likely to get lighter in weight and may incorporate an easy-open feature such as the rip-top aluminium closure. Cans will change over to two-piece construction, which allows for better decoration and less use of raw materials in the container. Most new capacity will be two-piece production machinery.

Secondary packaging will see the switch from wooden to plastics crates for glass bottles completed in the period to 1985. Closures for bottles will keep mainly to crown corks, although there may be a limited introduction of wide-mouth bottles with easy-open tops.

Multiples of cans of beer will be held mainly by shrink films, chiefly of HDPE.

Currently, it is estimated that 25% of bottles for beer are returnable and, unless Government intervenes, it is unlikely that this proportion will alter significantly.

Currently, there does not seem to be any pressure to increase the rate of reuse or recycling, either for resource-saving or protecting the environment. However, if raw materials or energy prices escalate, the package manufacturers and users themselves may look more closely at the more economic use of these packages.

WINES AND OTHER ALCOHOLIC BEVERAGES

PRODUCTION

This industry, despite general price increases (including heavier Federal taxes), continues to benefit from increased demand. Both imported and domestically produced wines and spirits, however, are still relatively expensive in relation to the average income. In some cases, domestic wine brands are only slightly less expensive than imports from Chile and Argentina, which benefit from LAFTA low tariffs.

Production of all alcoholic beverages in Mexico is estimated at 62.4 million litres, 18% increase over the 52.9 million litres produced in 1978.

The industry is very concentrated, with the bulk of the market being held by Pedro Domecq, Bacardi and Vinicola del Vergel, covering all wines and spirits.

PACKAGING

The traditional pack for these products is the glass bottle, which has the desired containing properties and high clarity which is associated with quality products. There have been supply problems of both bottles and the corrugated cases for transit packaging, but these have now been largely overcome. The industry therefore only imports small quantities of packaging materials, eg some cork from Portugal and wooden casks from the USA.

TABLE 3.19 CONSUMPTION OF PACKAGING FOR WINES AND SPIRITS IN MEXICO 1975, 1980, FORECAST 1985

	million units		
	1975	1980	1985
Bottles	100	175	300
Corrugated boxes	8.3	14.6	25.0
Individual cartonboard boxes	na	40	69

Source: Estimates

OUTLOOK

This is another industry that will continue to expand both in its domestic market and overseas. Since the products have a high inherent value, cost of packaging is not so crucial, but the glass bottle will remain the container for wines and spirits. Possibly, some plastic bottles will be used in the cheaper ranges of wines. The main innovations will be in the form of closures, plastic caps for wines and tamper-proof roll-on aluminium closures for spirits. High quality labelling will continue to be important, as will special cartonboard presentation boxes for the top ranges of spirits.

Another possible innovation will be the use of moulded, expanded PS as packing and separators in the corrugated board cases for wines and spirits.

CIGARETTES

PRODUCTION

The cigarette industry has been performing very erratically in the last few years, showing marked ups and downs which have bewildered planners and forecasters. To some extent these fluctuations are caused by the variable weather conditions, but also the industry has structural problems which have recently become chronic. In particular, there is considerable state intervention. Tabamex, the state agency that controls the purchase of raw tobacco, has been late in payment to growers and as a consequence some traditional tobacco farms have converted to growing other products. In addition, the Mexican tobacco industry is in the hands of two multinational companies - Tabacalera Mexicana and Cigarrera la Moderna - which control 70% of the market. Finally, the Government authorises the prices for the sale of the finished products.

The industry has also complained in recent years of its high operating costs in relation to the price structure of the final product - specifically labour and packaging costs. In addition, the unit demand for cigarettes has not been particularly dynamic, due largely to the steeper domestic sales prices and the illegal importation of cigarettes from the USA.

However, the industry is cautiously optimistic about the future, following successful efforts to improve output and productivity, as well as more efficient marketing.

TABLE 3.20 PRODUCTION OF CIGARETTES IN MEXICO 1975-1980

million packs

1975	1976	1977	1978	1979	1980
2338	2333	2497	2529	2617	

Source: Direccion de Estadistica

PACKAGING

The packaging of cigarettes in Mexico follows standard practice, with most cigarettes being primarily wrapped in aluminium foil and a board container or paper packet, overwrapped with film. There is some evidence of a change from aluminium foil to metallised paper and from regenerated cellulose film to polypropylene, but it has not been possible to quantify these substitutions.

TABLE 3.21 ESTIMATED CONSUMPTION OF MAJOR PACKAGING MATERIALS FOR CIGARETTES 1980

Folding cartonboard	1370 tonnes
Fibreboard boxes	3.7 million units
Paper	2300 tonnes
Cellophane	1450 tonnes
Aluminium foil	1100 tonnes

Source: Industry estimates

OUTLOOK

The next few years will show steady growth, since many of the difficulties that have troubled the industry have been resolved. Unless the Government intervenes with further legislation to control the advertising and marketing of tobacco and cigarettes, sales should continue to grow at up to 5% per year. The Government finds the tax a very useful source of revenue and therefore may be unwilling to take any action that will seriously affect demand. The last efforts to control advertising and marketing of consumer products, has had remarkably little effect on the tobacco and cigarette industry.

RETAILING

Developments in retailing patterns are a prime influence on trends in packaging, since the development of self-service outlets was only possible after the development of more sophisticated packaging.

It has not been possible to investigate all types of retail operations in Mexico, but by looking at the main food-based hypermarket chains, it has been possible to estimate the growth of packaging usage in that area. The main competitors here are Gigante, Todo, Commercial Mexicana and Aurrera which have the bulk of the market - these are the main self-service operations. Other non-self-service groups such as Liverpool and Sears have not been investigated at this stage.

PACKAGING

There has been a distinct trend in recent years away from traditional paper based wrappings and bags towards plastics, and this trend is expected to continue.

TABLE 3.22 ESTIMATED CONSUMPTION OF PACKAGING MATERIALS FOR SELF-SERVICE RETAILING 1977-1980, 1985

	million pesos				
	1977	1978	1979	1980	1985
Paper bags	10	22	28	60	100
PE bags	34	82	122	250	440
PE film	8	20	26	40	60
Expanded PS trays (for meat)	-	-	24	32	40

Source: Industry estimates

OUTLOOK

Without a comprehensive study of possible future developments in retailing, it is only possible to make rough estimates of future packaging requirements. However it can be reliably expected that self-service operations will increase their share of the total retail market, especially in food and household products. The change to self-service has in most countries resulted from a desire to cut total costs by saving on labour. In Mexico, the labour element is not so important, but there is still the wish to improve efficiency of retailing and maximise the sales per square area of the store.

Primary packaging of most foods now allows self-service retailing systems and the retail packaging required is confined mainly to overwrapping of perishable goods, and the provision of bags and carrier bags.

DETERGENT, HOUSEHOLD CLEANERS, SOAP, SHAMPOO ETC

PRODUCTION

Figures for the manufacture of soaps, detergents and similar products for domestic use and cleaning are available in value terms only from the Direccion General de Estadistica.

TABLE 3.23 MANUFACTURE OF SOAPS, DETERGENTS ETC 1975-1979
VALUE

million pesos

1975	1976	1977	1978	1979
5962.8	3643.6	10667.8	11969.3	14255.3

Source: Direccion General de Estadistica

Even though these are value figures and do not truly reflect the physical quantities involved, it is clear from industry sources that sales of these products are expanding and it is estimated they will continue growing at 12% per year for the period up to 1985.

PACKAGING

There is wide variety in these products, powders, pastes, liquids and solids, and the packaging of these products utilises the full range of materials from traditional paper wrappings for soap to flexible plastics for detergents.

Powdered detergents are mainly sold in PE film bags and sacks. The market is growing by approximately 6% per annum and this rate is expected to continue in the forecast period.

TABLE 3.24 PACKAGING MATERIALS USED FOR POWDERED DETERGENTS
1975, 1980, 1985

	1975	1980	1985
PE bags (tonnes)	3404	4864	6324
PE sacks (000 units)	9480	15600	21080

Source: Industry estimates

Liquid domestic cleaners are packaged in a range of plastics bottles, mainly HDPE but some pigmented PVC. These types of bottles are also used for liquid detergents and usage of these packs is estimated below.

TABLE 3.25 PACKAGING USED FOR LIQUID DOMESTIC CLEANERS AND LIQUID DETERGENT

	1975	1980	1985
HDPE bottles (000 units)	17,000	57,000	96,800

Source: Industry estimates

These markets are anticipated to grow at 14% per year to 1985.

Powdered domestic cleaners, are currently packed almost exclusively in spirally-wound board containers with metal ends. This market is expanding at approximately 9% per annum and is forecast to continue at the same rate. It is possible that competition in packaging will arise from the plastic bodied container within the forecast period.

TABLE 3.26 PACKAGING USED FOR POWDERED DOMESTIC CLEANERS 1975, 1980, 1985

	units		
	1975	1980	1985
Spirally-wound drums	12,000	21,200	30,750

Source: Industry estimates

Household and toilet soaps use mainly traditional packs made from paper and board, although some plastic films, mainly LDPE, are being used for multi-packs.

TABLE 3.27 PACKAGING USED FOR TOILET AND HOUSEHOLD SOAPS 1975, 1980, 1985

	1975	1980	1985
Cartonboard (tonnes)	470	850	1000
Wrapping paper (tonnes)	550	900	1200

Source: Industry estimates

There does not appear to be much growth in this market, and it is likely that only in high value toilet soaps will there be much packaging innovation, involving more decoration.

Toothpaste is almost entirely packaging in collapsible aluminium tubes with folding carton outers. Growth in this area will be approximately 10% per year in the forecast period.

TABLE 3.28 PACKAGING USED FOR TOOTHPASTE 1975, 1980, 1985

	1975	1980	1985
Collapsible aluminium tubes (000 units)	73,500	150,000	225,000
Folding cartons (000 units)	73,000	150,000	225,000

Source: Industry estimates

Shampoo is packaged in a range of bottles of glass, clear and pigmented PVC and HDPE with great variety of size and shape. Unfortunately, in the case of clear PVC and HDPE, it has not been possible to estimate what proportion of the total of bottles is used for shampoo. In the case of pigmented PVC, these are currently using approximately 80 million bottles a year which is expected to grow to 160 million by 1985.

OUTLOOK

Industry sources suggest that many of the products in this sector are likely to experience considerable increase in the period to 1985. There is also very aggressive competition in many of these markets which calls for high quality and well differentiated packaging to assist in their selling. With the continued development of self-service retailing there is need for the product to sell itself, and attractive packaging is used for this purpose. Therefore, it is to be expected that these products will provide a buoyant market for packaging in the period to 1985.

PHARMACEUTICALS

PRODUCTION

The Pharmaceutical Industry Intersecretarial Committee subdivides the industries of this sector into three groups: mixing and conditioning of products, production of raw materials and active ingredients, and manufacture of both these. It is the first of these sectors which is primarily the pharmaceuticals industry, and is comprised of about 300 companies; there are about 40 in the second category and 30 in the third, but these last are the big vertically integrated companies. The pharmaceutical formulation and packaging industry produces over 95% of the medicines consumed in Mexico, and local manufacturers of raw materials supply 40% of domestic needs. Estimated growth in 1979 was 8-10% and this rate of growth is expected to increase. Price movements vary greatly; in 1979 prices to the public rose 18%, but this average figure covers a range from a 135% rise to a 15% reduction in prices.

Given the development of Federal health programmes through the Institute Mexicano del Seguro Social (IMSS) and the continued demand from the public, it is anticipated that this industry will experience an annual average growth rate of 15%, which will keep it operating at near full capacity.

Of the total market for pharmaceuticals in Mexico, it is estimated that 76% is sales in the private sector and 24% through Government health agencies.

Longer term trends of the pharmaceutical industry show that, although the industry has seen considerable expansion, its percentage share of Gross Domestic Product has fallen from 1.22% in 1960 to 0.80% in 1977, the latest year for which figures are available; and in addition consumption of pharmaceuticals per capita has risen from 52.66 pesos in 1960 to 216.52 pesos in 1977, the percentage of total income spent on pharmaceuticals has fallen from 1.2 to 0.8% in the same period.

Of total production, it is estimated that 75% is in the hands of Mexican subsidiaries of international companies and 25% in wholely Mexican-owned companies. To a considerable extent, the Government health agencies support the national drug companies, whereas the public tends to favour products from the international companies.

TABLE 3.29 PHARMACEUTICAL MARKET BY SECTOR 1977

	Private sector	Government sector	Total
Total sales (million pesos)	10,473	3,300	13,773
International companies	83.3%	43.9%	73.9%
National companies	16.7%	56.1%	26.1%

Source: Memoria del Premier Congreso Nacional de la Industria Quimica y Farmaceutica

PACKAGING

There are currently no figures available on the consumption of packaging materials by the pharmaceuticals industry in Mexico. However, it is estimated that packaging materials and packs represent about 17% of costs of raw materials.

OUTLOOK

Glass is traditionally the most important packaging material in the pharmaceuticals industry, including ampoules, bottles (both large for syrups, lotions etc, and small for pills), and jars for creams. The use of pre-filled syringes, especially for expensive injections, will be introduced, the savings in losses during syringe-filling and administering of the injection, more than covering the extra cost of the pre-filled syringe.

Plastics have made and will continue to make advances both in small bottles, eg for ear, nose and throat drops, and larger size bottles for jars for products for external use.

This transfer from glass to plastic permits the use of lighter weight outer packaging either corrugated or fibreboard boxes, and in some cases the individual folding carton for bottles may be dispensed with.

Aluminium collapsible tubes are used for medications in paste form and they have the advantage of being airtight, and the foil can be treated to ensure compatibility with the product. Plastics tubes will not have as much impact here as in cosmetics, since there are problems of reactions with products and inadequate gas barrier properties. In addition, there will be increased use of aluminium foil and bubble packs for tablets and other products for unit dosing. The film is usually thermoformed PVC or PVC/PVDC laminate sheet of 250 microns covered with aluminium foil of 25 microns. It seems probable that further medications will use this pack type with high filling speed, as well as convenience in distribution and patient use.

Other packaging will continue to be important, since many products need the extra protection of an extra cushioning layer. In addition, there is frequently the need for detailed instructions, which cannot always be fitted into the label of a bottle or printed on a tube. Finally, since about 65% of products are sold through retail outlets, there is need for a promotional aspect with the outer wrapping conveying a sales message.

In all, this industry will provide a growing and wide-ranging market for packaging of all sorts.

PAINT

PRODUCTION

The production of paints, varnishes, lacquers and similar products has varied widely in recent years.

TABLE 3.30 PRODUCTION OF PAINTS AND SIMILAR PRODUCTS 1974-1979

million pesos

1974	1975	1976	1977	1978	1979
1107.9	2528.4	1575.1	4513.3	5631.0	7539.6

Source: Direccion General Estadistica, Estadistica Industrial Anual

These value figures represent in volume terms, 181,783 thousand litres of production in 1978 and 191,500 thousand litres in 1979. Total capacity of the industry is estimated to be 225 million litres a year. Currently the sales are being affected by the level of inflation and also there are a number of substitute wallcoverings available which are taking some traditional paint markets. The industry is very concentrated. The main companies being Comercial Mexicana de Pinturas SA, Compania Sherwin Williams SA, Sanchez y Compania and Inmont de Mexico SA de CV and it is unlikely that this structure will alter.

PACKAGING

Most of the products of this industry are packaged in metal containers, mainly tinplate.

TABLE 3.31 ESTIMATED CONSUMPTION OF TINPLATE FOR PACKAGING OF PAINTS ETC 1974-1977

tonnes

1974	1975	1976	1977
7600	6450	7149	7460

Source: CEMIQ/LANFI

Using these figures, CEMIQ in their tinplate study made forecasts of tinplate for paint packaging; 9,500 tonnes by 1982 and 10,163 by 1985.

However, it is likely that owing to the high cost of tinplate, there will be substitution by plastics containers of HDPE, pails and small drums for some applications.

OUTLOOK

It is estimated that demand for paint and related products will grow at approximately the same rate as the economy overall. If production costs can be kept down, the export market, at present quite small, will expand, especially to Central and South America. The demand for these products overall is a combination of many sub-parts, there is the building industry, ie new buildings to be decorated, redecoration of buildings, automobiles trucks ano buses, electrical appliances etc and without analysing each of these separately, and the types of paints they use, a more detailed analysis is not possible.

DOMESTIC ELECTRICAL APPLIANCES

PRODUCTION

Production figures for durable household electrical appliances are shown below:

TABLE 3.32 PRODUCTION OF HOUSEHOLD DURABLE ELECTRICAL APPLIANCES

thousands of units

	1975	1976	1977	1978	1979
Television sets	565	644	651	786	911
Radios	1229	768	851	1115	1282
Stores	570	637	642	669	735
Refrigerators	418	461	435	560	625
Washing machines	322	358	376	389	468
Sewing machines	210	220	222	231	246
Vacuum cleaners	63	71	81	89	106
Irons	1260	1390	1463	1594	1720
Blenders	516	585	654	752	895
Heaters	275	265	269	293	340

Source: General Statistics Bureau

In 1977 the market for consumer durables suffered slow growth, following the devaluation, but in 1978 there was rapid growth with refrigerators increasing by 29%, radios 31%, television 21% and irons 15%. In the period 1978/79 experience was more steady growth of all products with an average rate of 14%. During 1980 production continued at high levels, but sales response was more mixed following the introduction of IVA (value-added tax).

PACKAGING

This sector has a heavy consumption of packaging, which must protect the product until it is delivered to the consumer and is unpacked. Packaging varies according to the product, but the materials used do not change; wood, corrugated board, LDPE film, expanded PS and other cushioning materials. There are few changes in this demand, except for a trend towards more protective packaging, with greater use of plastics for cushioning and overwrapping.

From the point of view of packaging, these products may be divided into two groups, large and small appliances.

For large items, stoves, washing machines, refrigerators etc, the number of units is approximately 3.5 million units per year. Smaller items, such as irons, radios, blenders etc, represent a further 3.9 million units a year.

It has not been possible to estimate the packaging for all these products, but preliminary figures suggest that the packaging requirements for blenders and irons are approximately 25 and 22.4 million pesos respectively.

OUTLOOK

The total demand for packaging in this user market is dependent on levels of production. For most of these products there is still a considerable first purchase market, since none are at saturation point. In addition, there is a buoyant replacement market. In view of this, it can be expected that this market will continue expanding at 8-10% per year, maintaining the level of demand for packaging materials.

APPENDICES

LIST OF COMPANIES AND ORGANISATIONS APPROACHED FOR ADDITIONAL INFORMATION

LIST OF COMPANIES AND ORGANISATIONS APPROACHED
FOR ADDITIONAL INFORMATION

1 MATERIALS MANUFACTURE

PAPER AND BOARD

Compania de las Fabricas de Papel de San Rafael y Anexas, SA

PLASTICS

Petroleos Mexicanos (PEMEX)
Folmex, SA
Manufacturas y Envases Plasticos, SA (MAPLA)
Pyn, SA
Celulosa y Derivados, SA (CYDSA)
Industrias Resistol, SA

METALS

Altos Hornos de Mexico, SA (AHMSA)
Alcan Aluminio, SA

2 MATERIALS CONVERTERS

PAPER AND BOARD

Cartonajes Estrella, SA
Papelera Iruna, SA
Empaques de Carton Titan, SA
Carton y Papel de Mexico, SA (Carton Division)

PLASTICS

Nova Pack, SA
Compania Industrial de Plasticos, SA
Manufacturas y Envases Plasticos, SA (MAPLA)
Carton y Papel de Mexico, SA (Plastics Division)
Regio Plast, SA
Celloprint, SA
K S Morelos, SA
Envases Industriales de Plastico, SA
Polietileno Nacional, SA
Sacos Valvulados, SA
Polycel de Mexico, SA

METALS

Bliss & Laughlin Latinoamericana, SA
Isabel, SA
Nueva Modelo, SA
Crown Cork de Mexico, SA
Tubos de Estano, SA
Fabricas Monterrey, SA (FAMOSA)

GLASS

Vidriera Mexico, SA
Panamericana de Vidrio, SA
Fabrica Nacional de Vidrio, SA
Vidriera los Reyes, SA

3 MATERIALS END-USERS

FOOD

Herdez, SA
Alimentos Balanceados de Mexico, SA de CV (ALBAMEX)
Compania Nestle, SA
Gerber Products, SA de CV
Productos de Maiz, SA
Aceite Casa, SA de CV
Anderson Clayton & Co SA
Panificacion Bimbo, SA
Industrias Conasupo, SA de CV
Organizacion Pando, SC
Kraft Foods de Mexico, SA de CV
Lance, SA
Productos de Leche, SA
Sabritas, SA de CV
Productos Pesqueros Mexicanos, SA de CV
General Foods de Mexico, SA
Union Nacional de Productores de Azucar, SA de CV (UNPASA)

DRINK

Cerveceria Moctezuma, SA
Cerveceria Modelo, SA
Industria Embotelladora de Mexico, SA (Coca-Cola)
Compania Embotelladora Nacional, SA (Pepsi-Cola)
Bacardi y Compania, SA
Pedro Domecq de Mexico, SA
Compania Vinicola del Vergel, SA
Articulos Mundet para Embotelladores, SA

TOBACCO

Cigarros la Tabacalera Mexicana, SA (CIGATAM)
Cigarrera La Moderna, SA de CV

CHEMICALS

Du Pont, SA de CV
Union Carbide Mexicana, SA

AGRICULTURE

Fertilizantes Mexicanos, SA (Fertimex)
Purina, SA

HORTICULTURE

Union Nacional de Productores de Hortalizas (UNPH)

ELECTRICAL GOODS

Friem, SA de CV

PHARMACEUTICALS/TOILETRIES

Ciba-Geigy Mexicana, SA de CV
Compania Medicinal la Campana, SA de CV
Colgate Palmolive, SA

RETAIL/DISTRIBUTION

Aurrera, SA
Comercial Mexicana, SA
Sears Roebuck de Mexico, SA de CV

OTHER MISCELLANEOUS

Oneida (H Steele y Compania, SA)
Manufacturas Plasticas, SA (Plastimarx)
Mennen de Mexico, SA
Avon Cosmetics, SA de CV
Cannon Mills, SA
Empresas Tolteca de Mexico, SA
Kimberly Clark de Mexico, SA
Fernandez Editores, SA

4 OTHER ORGANISATIONS

Camara Nacional de la Cerveza y de la Malta
Camara de Productos Alimenticios Elaborados con Leche
Asociacion Nacional de la Industria del Cafe, AC
Asociacion de Tecnicos en Alimentos de Mexico, AC
Asociacion Nacional de Industrias del Plastico, AC
Asociacion Nacional de Fabricantes de Pinturas y Tintas, AC
Instituto del Aluminio, AC
Instituto del Aerosol
Asociacion Nacional de Fabricantes de Cerveza
Camara Nacional de la Industria del Hierro y del Acero
Camara Nacional de la Industria de Aceites, Grasas y Jabones
Camara Nacional de la Industria Perfumera y Cosmetica
Asociacion Nacional de la Industria Quimica, AC
Asociacion Nacional de Productores de Aguas Envasadas, AC
Asociacion Nacional de Fabricantes de Cajas y Empaques de Carton Corrugado y Fibre Solida, AC
Camara Nacional de las Industrias Derivadas de la Silvicultura
Camara Nacional de la Industria del Vestido
Centro de Investigacion y Asistencia Technica del Estado de Guanajuato
Centro Mexicano de Desarrollo e Investigacion Farmaceutica
Camara Nacional de la Industria de Transformacion
Camara Nacional de la Industria de la Celulosa y del Papel

LETTER OF INTRODUCTION AND INTERVIEW SCHEDULES USED FOR DATA COLLECTION

A FORECAST OF THE PRODUCTION AND CONSUMPTION OF PACKAGING
IN THE UNITED MEXICAN STATES 1980-1990

Dear

Pira* jointly with the Mexican counterpart LANFI** seek your assistance in providing informed comment and data from which to prepare a scenario of packaging production and consumption in Mexico (see attachment 1).

It is necessary that we visit your company, a significant manufacturer/user of packaging materials to obtain your expert opinion in order to complete the study.

Your company is one of a number of organisations to be visited by the project team.

The result of this study will be a report entitled: "Short- and Medium-Term Forecasts for the Consumption of Packaging in the United Mexican States" (see attachment 2). It is hoped that this report will set the format and methodology, establish contact with industry and identify information sources to enable this work to be undertaken annually so that detailed statistics and economic commentary of Mexico's packaging industry will be available to all companies through LANFI.

The development of these reports over the coming years will help individual companies in the preparation of their corporate plans and provide an adequate level of information from which to identify market opportunities and undertake market research.

In many of the major marketplaces of the world today, eg North America, Europe and Japan, information from Government, trade associations and even from private companies is becoming more available rather than less so, since managers at all levels need basic information in order to make their decisions. It is anticipated that this report will become the single authoritative data source for managers of Mexican packaging industries.

Companies need not fear concerning the confidentiality of any information provided for this report. Companies will not be identified and company-specific information will not appear in the report. Data provided will be aggregated and adjusted to represent total industry figures. Commercially sensitive information, eg prices, can be indexed. Data provided for the report will be treated in the strictest confidence by Pira/LANFI personnel and will not be available to Government agencies.

We hope you will be able to meet and aid us with this project, of major importance to the growth of the Mexican economy and packaging industries, financed by the United Nations Development Programme.

Yours etc

* Pira is the United Kingdom Research Association for the Paper and Board, Printing and Packaging Industries, Commissioned by UNIDO to undertake this study (see attachment 3)

** LANFI is the Mexican Laboratorios Nacionales de Fomento Industrial

THE STUDY

The Government of Mexico, the United Nations Development Programme (UNDP) and the United Nations Industrial Development Organisation (UNIDO) have concluded an agreement and are co-operating to carry out a project entitled "Mexican Institute for Assistance to Industry". An objective of this project is to draw up a comprehensive programme for the development of Mexico's packaging industries.

One input to this study are forecasts of the short- and medium-term production and consumption of packaging in the United Mexican States, to be undertaken by Pira and LANFI. These forecasts will be used to calculate Mexico's productive capacity, to maximise the utilisation of domestic raw materials and to investigate the need for new packaging production units and distribution centres.

The scope of the study will include:

- An analysis of Mexico's economic background and likely future developments

- An assessment for each individual packaging material of:
  Capacity
  Production
  Imports and exports
  Consumption
  Prices
  Competition from alternative media
  Market and technical development

- An assessment of the evolution of the Mexican consumer markets

- An assessment of the growth of Mexican exports

The packaging materials and their conversion, to be covered in this study include:

Paper and paperboard:

Wrapping papers; bags and carrier bags; boxes and cartons; tubes (spiral and straight wound); fibreboard cases and fittings; multiwall sacks; fibreboard drums.

Metal:

Cans and boxes (including aerosols); aluminium foil, collapsible tubes; closures, metal strapping and banding - pails, kegs and drums; crates and boxes.

Glass:

Bottles, jars, vials and ampoules.

Plastics (including regenerated cellulose film):

Films, laminates and sheets; bags, pouches, sachets etc; sacks (film and woven tape); moulded bottles, jars, pots etc; thermoformed trays, pots, blisters and fitments etc; cushioning materials and fittings; caps and closures; drums; crates; boxes.

Timber (including plywood):

Boxes and crates, casks and kegs, pallets and containers; baskets and punnets.

UNIDO PROJECT
DRAFT
A SHORT- AND MEDIUM-TERM FORECAST FOR THE CONSUMPTION OF PACKAGING IN THE UNITED MEXICAN STATES

Final Report - Contents

V. Metal packaging

5.1	Cans and containers mainly of tinplate		
5.1.1	Open-top cans	a	
5.1.2	General-line cans	b	as in 2.1
5.2	Aerosols		
5.3	Steel drums	a	
5.4	Aluminium foil	b	as in 2.1

(Other possible materials for inclusion:

Wood
Textiles
Laminates

Pira is the United Kingdom's Research Association for the Paper and Board, Printing and Packaging Industries and was established in 1939. Pira's function in common with all United Kingdom research associations is to:

"Apply scientific research to and for, the profitability and social benefit of industry".

Currently Pira employs 190 persons within five divisions, namely - paper & board, printing, packaging, information, training & techno-economics, and administration. UNIDO has contracted Pira techno-economics group to undertake this forecast study. This group, established five years ago and headed by Dr W Manning, has earned a reputation as an authoritative source of well researched reports and studies into new and emerging technologies, and as an effective and reliable interpreter of economic and statistical data.

UNIDO PROJECT
DRAFT
INTERVIEW SCHEDULE - PACKAGING PRODUCERS

Introduction - taken from letter

I. Total industry:

What is the structure of the industry?

How many large firms?

What changes were taking place in the structure of the industry? more or less concentrated?

Impact of import?

Level of exports?

Are there any substitutions or new products which will significantly alter the position?

What is total market size? 10 years ago .....
5 years ago .....
currently .....
forecast 5 years .....
forecast 10 years .....

Estimated total national capacity? 10 years ago .....
5 years ago .....
currently .....
forecast 5 years .....
forecast 10 years .....

II. Individual company

What % of total market does your company have? .....%

What is the capacity utilisation of your company? .....%

What % of total capacity of industry does your company represent? .....%

What are % shares of major competitors?

What changes are occurring in the economy likely to affect demand for the firm's products?

What changes are occurring in materials or production methods likely to reduce the need for the firm's products?

What changes are occurring in users industries likely to result in a change of demand?

III. Company statistical data

What is the capacity of company (in volume terms) - units

10 years ago .....
5 years ago .....
currently .....
forecast 5 years .....
forecast 10 years .....

Level of production	Volume ( )	Value ( )
10 years ago	.....	.....
5 years ago	.....	.....
currently	.....	.....
forecast 5 years	.....	.....
forecast 10 years	.....	.....

What is distribution of your total sales between consuming industry sectors?

Who are main consuming companies?

Are there any particular geographic variations in the demand for your firm's products?

Can you provide an index of prices for your firm's products?
1970 = 100 for the years 1975 and 1980

UNIDO PROJECT
DRAFT
INTERVIEW SCHEDULE - PACKAGING USERS

Introduction - taken from letter

I. General

What changes are occurring in the economy likely to affect demands for the firm's products?

What changes are occurring in the firm's products and processes likely to cause a change in the demand for packaging?

What substitutions are likely to be made from one material to another?

II. Company information

What is the current level of exports and developments 2 and 5 years ahead?

What will packaging requirements be for any new products currently being developed?

Can your provide a more detailed breakdown of consumption of packaging materials and pack types currently and forecast?

Can you break down your consumption of main packaging materials into volume and/or value?

	Volume (unit)	Value ($ m)
5 years ago	.....	.....
currently	.....	.....
5 years forecast	.....	.....

Do your import any of your packaging?

If so, what? and how much? 5 years ago .....
currently .....
5 years forecast .....

What is the proportion of the packaging used by the company returnable? .....%

What has been the trend in prices of packaging purchased by the company - indexed 1970 = 100 for the years 1975 and 1980?

UNIDO PROJECT
DRAFT
INTERVIEW SCHEDULE: TRADE ASSOCIATIONS/CAMARAS: PACKAGING USER INDUSTRIES

Introduction - taken from letter

I. General

1 What changes are occurring in the economy likely to affect demand for the industry's products?

2 What changes are occurring in the industry's products likely to affect the demand for packaging materials?

3 What substitutions/innovations are likely in the packaging systems which will alter demand for packaging materials?

II. The industry

4 What is the structure of the industry?

5 Which are the largest firms?

6 What changes are taking place in the structure of the industry? Is it becoming more or less concentrated?

7 What is the total capacity of the industry?

1970 1975 1980 1985

8 What is the level of production of the industry (ie capacity utilisation) approximate percentages?

1970 1975 1980 1985

9 What is the market size for the products of the industry?

1970 1975 1980 1985

10 What percentage of the output of the industry is for export?

11 Is this percentage likely to change in the 5-10 year forecast period?

12 Will this have any effect on the demand for packaging?

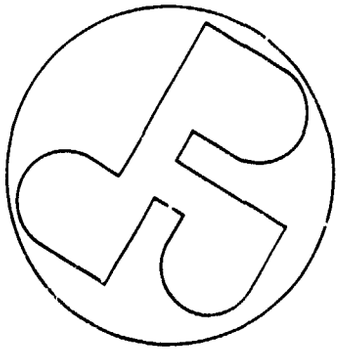
13 Does the industry currently import any packaging?

If so what? and how much?

14 Is this level likely to increase/decrease/stay the same in the 5-10 year forecast period?

15 Do you have any index figures for the price of packaging consumed by the industry?

1970 = 100 1975 1980 1985



Pira

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