The Plastics Industry in Israel

Current Economic Status and Future Alternate Economic Outlook

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THE PLASTIC INDUSTRY IN ISRAEL - CURRENT ECONOMIC STATUS AND FUTURE ALTERNATE ECONOMIC OUTLOOK

SECTION 1. INTRODUCTION, OBJECTIVES, SCOPE AND METHODOLOGY

This study is part of an investigation carried out by the Samuel Neaman Institute on the Future Alternatives of the Plastics and Polymers industries in Israel.

A previous study "The Polymer Industry in Israel and the World" was prepared by H.D.Frenkel, and was published by the S. Neaman Institute in November 1990. The objective of that study was to review the status of the monomer and polymer industries in Israel and in the world and to analyze the effect of these industries on the plastics industries. Forecasts and alternatives for the next decade -toward the year 2000- are presented.

The objectives of the present study are :

1. To present the economic status of the Plastic Industrial Sector in Israel.

2. To analyze and study the Processing Technologies sub-sectors and End-Use Sub-Sectors of the Plastics Industry.

3. To compare the economic status of the Plastic Industrial Sector to Other Industrial Sectors in Israel.

4. To compare the economic status of the Plastic Industrial Sector in Israel to that of other countries.

5. To present global trends and forecast for the current decade.

6. To present trends and alternate forecasts -for the plastics industry in Israel for the current decade.

Consequently the study includes the following sections:

* Section 2 - Overall Economic Data for the Plastics Industry. Compilation, review and analyses of economic factors for the Israeli Plastics Industrial Sector, at the beginning of the 1990s. This includes analyses of production, sales , exports,imports, local market consumption, manpower engaged in the industry, new investments, research and development expenses, and other financial and economic data.

Factors such as percent exports on sales, estimated unit value sales, sales per employee, per-capita consumption, investment on sales and others, were calculated and compared on a year to year basis between 1986 and 1989. Yearly variations -increases and sometimes decreases are shown.

All analyses are shown in current New Israeli Shekels (NISh(n)), current dollars ($(n)),constant New Israeli Shekels (NISH (CON) as well as constant dollars ($(CON)), translated from NISH(CON); i.e. Dollars adapted to the Israeli Economy.

* Section 3. Economic Data analyzed per Sub-Sectors.
Analysis of the Plastics Industrial Sector by sub-sectors.
The breakdown into sub-sectors and corresponding analyses is as follows :

a. By Processing Technologies; i.e. type of conversion process. Economic data are grouped and analyzed separately for injection molding, extrusion for film, sheets, piping,profiles and filaments; blow molding,calendaring,vacuum forming,coating,lamination,etc.

b. By end-use applications- Data and factors are presented for the major end-user groups : packaging, agriculture, building and construction, consumer products, industrial applications,furniture, etc.

For each sub-group, economic data is presented for two or more years (mainly 1987 and 1988- as not all information was available for 1989) showing sales, exports, manpower, new investments. Factors of growth rates, sales per employee,investment on sales are presented for each sub-group and sub-sector analyses are discussed.

Figures are given in Current and Constant Monetary Values.

* Section 4- Comparison of Economic Data for the Plastics Industrial Sector to other industrial sectors in Israel.
Comparison and analyses of major economic data and various calculated economic factors of the Plastic Industrial Sector to other industrial sectors in Israel. These include the Rubber Goods and Tire Industries, Chemical Industrial Sector, as well as the industrial sectors manufacturing products potentially replaceable by plastics; i.e. glass, paper and cardboard, wood and metal. Comparisons are made in current monetary values.
Total sales, exports, local market,number of employees,investments, and other factors are compared for the years 1986 to 1989.

* Section 5 -Comparison of Economic Data for the Plastics Industrial Sector in Israel to other Countries.
Comparison and analyses of major overall economic data of the Israeli Plastic Industrial Sector to two groups of six countries each. Comparisons are made in Current Dollars.
Group I consists of large developed economies -The United States, Germany, Japan, United Kingdom, France and Italy - while Group II is composed of six European countries of 4-10 million people; i.e. in Israel`s population group; this group includes Belgium, Austria, Switzerland, Denmark, Finland and Norway.

Data compared - for 1987, 1988 and 1989- includes number of establishments operating, production, consumption, per-capita consumption, sales , employees , sales per employee, size of plants, sales distribution by end-uses and sales of plastics processing machinery.

* Section 6- Global Forecasts and Trends for the current Decade.
Discussion of Macro-economic projections for the 1990s for major developed countries and for the regions in development; discussion of factors influencing the global trends of plastics consumption and discussion of growth pattern of plastics by major applications.

Expected forecasts of annual average growth factors for the 1990-1995 period and for the 1996 to year 2000 period are presented for each major end-use application on a global basis. Forecasts of overall plastics consumption growth are also shown for each major geographical region.

Discussions and forecasts presented in this section are based on the most recent information from World Bank reports, various other reports appearing in 1990 and 1991 periodicals such as Modern Plastics and European Chemical News (ECN), global forecast reports by various marketing research organizations such as SRI and Chem - Systems, and in recent reports by the writers.

All trends and forecasts have been adjusted to the post Gulf War expected environment, including the socio-economic changes of Eastern Europe.

* Section 7- Alternate Forecasts and Trends of the Israeli Plastics Industry.

Discussion of local and external factors affecting the growth of plastics consumption in Israel. This includes the overall economic environment, new and wider applications, the effect of increasing immigration, export competitive potential and the effect of local polymer production.

Forecasts as to expected consumption - for each major end-use application - over the next decade are presented for a number of varying growth scenarios -optimistic, realistic and pessimistic outlooks- each, combined to two different immigration rate alternatives - one at a high rate (as predicted in 1990), and the other at a moderate rate.

The effect of increasing consumption due to new immigration is presented on a year to year projection; average annual rates of growth are shown for the 1990-1995 and the 1996-year 2000 periods for each major application end-use, and resulting consumption forecasts are presented for each alternative for the years 1995 and 2000.

Correspondent polymer consumption requirements for some of the major alternatives were estimated, based on polymer distribution according to end-uses.

A comparison is also made between the rates of annual growth for each major end-use application between the global forecasts - as discussed in Section 6- and the ranges calculated for Israeli consumption, at the various alternatives.

*Section 8 presents the conclusions and summarizes the study.

The following sources of information have been used in preparing the present Study:

1. The information presented in Sections 2 and 4- Overall Industry Data was compiled from the Statistical Abstracts - from the Central Bureau of Statistics(1987-1989) and from the Tables for Industry- from the Ministry of Industry and Trade (1986-1989). This information was analyzed and factors calculated.

2. The information presented in Section 3 - is based on information available on Data Base at the at the S. Neaman Institute. This information - obtained originally from the Plastics and Rubber Department of the Chemical Division of the Ministry of Industry and Commerce, was supplemented from time to time by Mr. Zeev Berl, head of the Department.

3. The information presented in Section 4 - is primarily based on the International Status Reports, published by The British Plastic Federation, (1988 and 1989) as well as other reports from this organization.

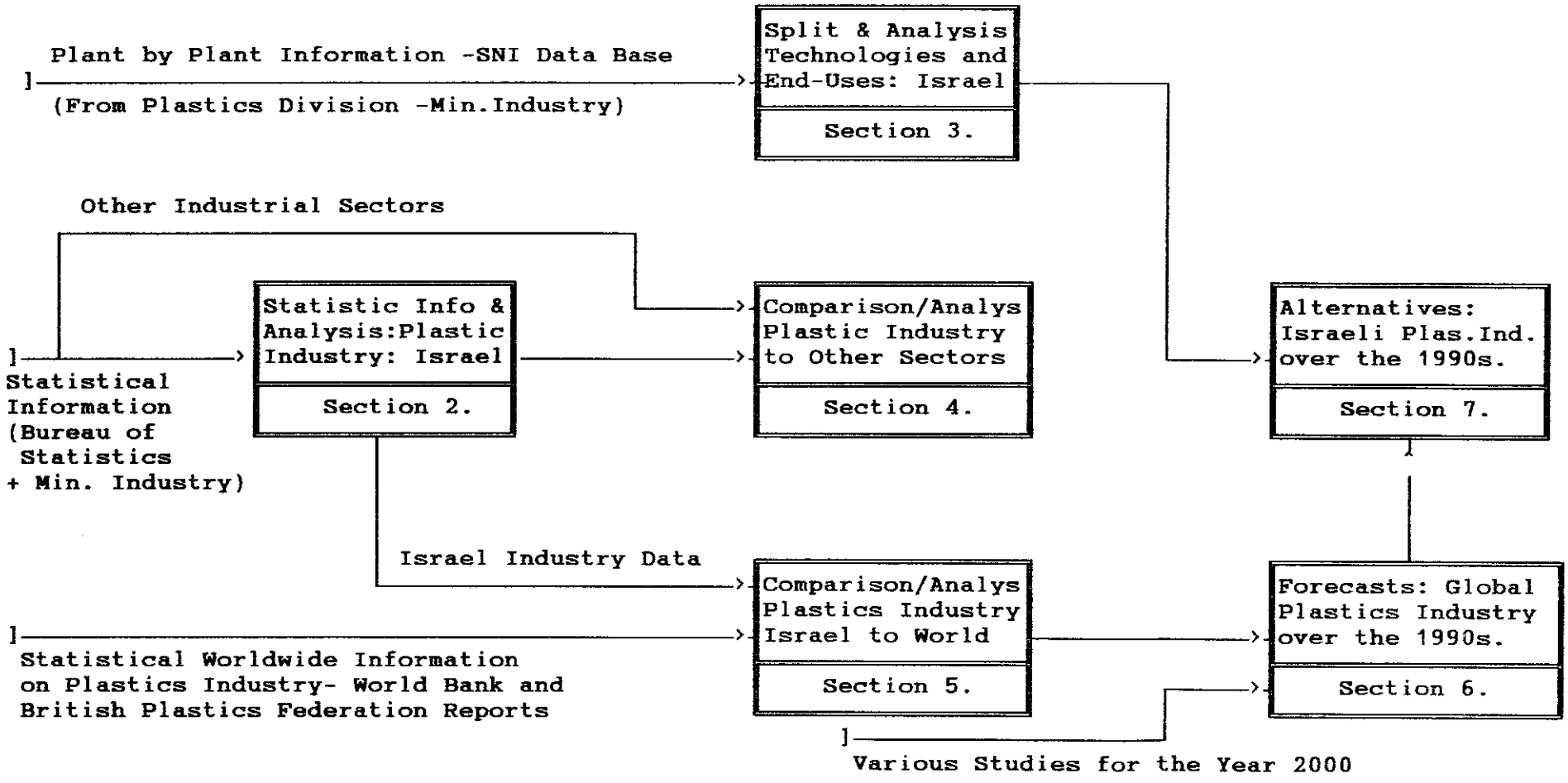
4. The information in Section 6- on International Forecasts and Trends is a composite analyses prepared by the writers from recent World Bank reports, articles in periodicals and information from SRI and Chem Systems reports. All these forecasts have been adjusted to present conditions.

5. The forecasts in Section 7 are entirely prepared by the writers, based on the data and inputs in Sections 1-5 and on the global forecasts in Section 6.

During the preparation of this Study several meetings were held with Ms. Tamar Ben-Joseph, Deputy Director (Planning and Economics) of the Ministry of Industry and Commerce, Mr. Howard Ross of the same department, and Mr. Zeev Berl - Head of the Plastics and Rubber Department. Their great assistance is highly appreciated.

Meetings were held with the Steering Committee guiding the Study on The Polymer and Plastics Industry in Israel.

ECONOMIC OUTLOOK OF THE PLASTICS INDUSTRY IN ISRAEL AND COMPARISONS TO THE GLOBAL PLASTICS INDUSTRY



SECTION 2
THE PLASTICS INDUSTRY IN ISRAEL (1986-1989)-ECONOMIC STATUS

2.0 General

This section presents overall statistical data related to the plastics industrial sector in Israel for the years 1986-1989, based on statistical information, primarily from the Tables "Industry in Israel", published yearly by the Ministry of Industry and Trade, as well as data and information obtained from the yearly "Statistical Abstract of Israel", published by the Central Bureau of Statistics. The information, data and factors presented in this Section, while not broken down by processing techniques, end products or raw materials consumption, can be considered complete for the whole industrial sector, and is therefore comparative to similar data and information on other industrial sectors in Israel and to similar information on plastics industrial sectors in other countries.

More detailed data, broken down by processing techniques and end products is presented in Section 3. Such information, data and factors -as presented in Section 3- is incomplete, representing only 55-60% of the total plastics industrial sector. This information - based on a factory to factory survey - received from the Plastic Department of the Chemical Division of the Ministry of Industry and Trade, relates only to exporters, reporting to the Ministry.

The overall information, presented in this section is in most cases, specific to the the Plastics Industry Sub-Sector; however, since the plastics industry is considered a sub-sector, being part of Sector 19- "Rubber and Plastic Products", in some cases - such as Investments, capital stock, and various economic factors, etc. - the data presented is for the combined Rubber and Plastics Industrial Sector. Since the plastics industry accounted -during the period 1986-1989- for over 80% of the sales and manpower employed in the combined sector, the data presented, and especially the factors, can be assumed applicable to the Plastics Industrial Sub-Sector, per-se. (Table # 4.1. presents comparative data and factors, between the plastics industry per-se and the combined Sector).

This section presents information and data on sales, exports, imports, local market consumption, employment, wages, investments and capital stock, as well as other economic/financial data for the overall plastics industry sector.

2.1 Production and Sales

2.1.1. Production - Tonnage

Information regarding the plastics industry does not include production tonnage. An approximate form of estimating the total tonnage of production is based on the tonnage of polymer materials consumed in Israel; this includes local polymer production and imports. Since polymer component represents a large part of plastics production - in addition to fillers, stabilizers, plasticizers, colors and other materials, they are arbitrarily assumed to be 90 % of plastics production. Table # 2.1.1 and Figure 1 show the results for such assumptions for the years 1986, 1987, 1988 and 1989.

TABLE # 2.1.1 PLASTICS INDUSTRY SECTOR - ISRAEL ESTIMATE OF PRODUCTION VOLUME (rough estimate)				
YEAR	1986	1987	1988	1989
Polymers-KTons	237	271	280	302
Est. additives+	24	27	28	30
Plastics-KTons	261	298	308	332
Value-RawMat*M$	267	280	330	360
Notes : K=Thousand . M = Million * Rough estimate + assumes 10% additives (fillers, plasticizers, colors, etc)				
Source: The Polymer Industry -Israel and the World. H.D.Frenkel -The S.Neaman Institute - 1990.				

2.1.2 Production - Sales

The statistics presented in the Tables of "Industry in Israel", which are based on the data of the Government of Israel Central Bureau of Statistics show the data for the Plastics Industry (Sub-Sector 193).

Sales as presented in the following tables include purchase tax, excise duties and "Value Added Tax" paid by the establishment. It does not include subsidies and export incentives.

The revenues from sales in Current Values are shown in Table 2.1.2 and Figure # 2; while the same data is shown in Constant 1989 values in Table 2.1.2.1 and Figure # 2.

TABLE # 2.1.2 PLASTICS INDUSTRY SECTOR - ISRAEL SALES IN CURRENT VALUES				
YEAR	1986	1987	1988	1989
SALES-M NISh	1,118.5	1,541.1	1,751.2	2,046.2
%@IL industry	3.82%	4.19%	4.00%	3.95%
equivalent M$	750.6	963.2	1,094.5	1,065.7
Basis:avgNISh/$	1.49	1.6	1.6	1.92
Notes : K=Thousand . M = Million				
Source: The Industry in Israel - Tables for 1987 and 1989. Ministry of Industry and Trade - August 1988 and 1990				

TABLE # 2.1.2.1 PLASTICS INDUSTRY SECTOR - ISRAEL SALES IN CONSTANT 1989 DOLLARS				
YEAR	1986	1987	1988	1989
SALES-M NISh	1,938.5	2,178.8	2,061.2	2,046.2
equivalent M$*	1,010	1,135	1,074	1,066
Notes : K=Thousand . M = Million *=Converted at 1.92 NISh/$				
Source: Table 2.1.2 converted to 1989 constant values .				

2.1.3 Industrial Production/Sales Analyses

Table # 2.1.3 combines the information shown in Table # 2.1.2 on Sales values (in NISh and $) with the estimated data on tonnage produced, and raw materials consumed. This table # 2.1.3 and Figure # 3 present yearly average "Sales Unit Values" . "Sales Unit Value" is the average unit price per ton of plastics sales, resulting by dividing yearly revenues by tons sold. Table # 2.1.3 also shows rates of variation from year to year of tonnage produced, and sales in current and constant NISh and $.

TABLE # 2.1.3 PLASTICS INDUSTRY SECTOR - ISRAEL INDUSTRIAL PRODUCTION/SALES ANALYSES

YEAR	1986	1987	1988	1989
SALES UNIT VALUE -in Current Values				
in NISh/ton *	4,285	5,171	5,686	6,163
in $/ton *	2,877	3,232	3,555	3,210
SALES UNIT VALUE -in Constant 1989 Values				
in NISh/ton *	7,427	7,311	6,692	6,163
in $/ton *	3,868	3,808	3,485	3,210
RAW MATER. COST- basis: Current $ Values				
%of Sales Value	35.6 %	29.1 %	30.1%	33.8 %

Variations- %	1987/1986	1988/1987	1989/1988
Tonnage	+14.2 %	+3.2 %	+7.8 %
Sales-NISh (n)	+37.8 %	+13.7 %	+16.8 %
Sales in $ (n)	+28.2 %	+13.7 %	- 2.6 %
Sales-NISh(con)	+12.4 %	- 5.4 %	- 0.7 %

Notes : *=Rough estimate (n)=nominal (con)=constant 1989 value

Source: Calculated from Tables 2.1.1, 2.1.2 & 2.1.2.1

Discussion and Comments

The following points can be drawn from Table # 2.1.3 :

1. The average unit sales value expressed in current dollars increased steadily from 1986 to 1988, from $ 2877/ton in 1986,to $ 3,555 in 1988; however, it returned in 1989 to the 1987 value (<3,200 $/ton).

2. There has been a continuous degradation in unit sales value expressed in constant 1989 values. The decrease is by 20.5% over the last three years, equivalent to a yearly average decrease of ~ 6.4 % unit sales value (in constant 1989 NISh).

3. In spite of the increases in raw materials cost during the last years, it's cost compared to product sales value decreased from 35% in 1986, to about 29-30% in 1987 and 1988. However, it increased considerably during 1989 (to~34%).

4. It appears that there was a relatively large increase in production tonnage between 1987 and 1986 (~14%), a very moderate increase between 1988 and 1987 (~3 %) and an above average increase between 1989 and 1988 (< 8%).

5. The increase in nominal sales income between 1986 and 1987 (~28 % in $) is considerably higher than the tonnage increase for the same period(~14%). This increase in sales income, coupled with a decreased ratio of raw materials would indicate that 1987 was a profitable year for the plastics industry.

This means sales at high nominal unit sales values. This was also the case during 1988, as sales value increased by almost 14 %,while there was little increase in tonnage of sales (3%).

However, the opposite is true between 1988 and 1989. While there is an apparent increase of about 8% in tonnage produced, sales income decreased by 3 % in Dollars. -
The average yearly increase in sales income in nominal dollars between 1986 and 1989 amounted to about 12.4% per annum.

6. In constant 1989 values, the sales income increased between 1986 and 1987 by over 12 %, but decreased by over 6 % during the period 1988-1989. The net increase from 1986 to 1989 amounted to a cumulative 5.5 % in constant 1989 values, which averages to less than 2% per annum in real values.

7. On a nominal dollar basis it would appear that 1987 and 1988 were profitable years for the industry -due to tonnage growth, and price increases, while 1989 was a poor year, during which the industry faced a reduction in unit sales value, expressed in nominal dollars.
However, on a constant 1989 value basis, the industry showed only an increase in 5.5 % in real sales income, between 1986 and 1989, while the tonnage output increased by 27 % over the same period. This means a deterioration, as evidenced by the real unit income per ton of product sold (refer to point 2).

8. From Table # 2.1.2 it can be seen that the percentage of sales for the plastic industrial sector on total industrial sales is slightly on the decrease between 1987 and 1989. (~ 4.2 % in 1987, to < 4 % in 1988, 1989).

2.2 Exports Sales

2.2.1 In Current Dollars

The export statistics for the Plastics Industry Sub-Sector are presented in current dollar values are shown in Table # 2.2.1., and Figure # 4, based on figures obtained from the Plastics Department of the Chemical Division of the Ministry of Industry and Trade.

This table also compares this data for the Plastics Industrial Sector to similar data for industrial exports -as a whole - in Israel; including variations from year to year on total exports.

It should be pointed out that these export figures are higher than the export figures reported in the Tables of "Industry in Israel", (Sub-Sector 193) and in the Statistics Abstracts. Since the Plastics Department receives actual export figures from the factories, these are used in this Section.

2.2.2.In Constant 1989 Equivalent Dollars.

There are two different methods that can be considered for converting the current dollars (nominal value) into constant 1989 dollars:

a). Conversion Based on US Consumer Price Index Adjustment.
The usual form is to convert the current dollars into constant 1989 dollars based on the US average Consumer Price Index.

b). Conversion Based on Local Economy Adjustment.
An alternate form is to convert the dollars into local currency (NISh) - during the year in which they were earned; the current NISh are then converted into constant 1989 basis NISh, and the equivalent earnings in NISh (1989 basis) are then re-converted into 1989 Dollars at the average 1989 rate of exchange.
The second alternative is the one used throughout this study, for two reasons:

1. The earnings from exports in $ are basically utilized within the national economy, and are therefore subject to Israeli inflation (corrected for changes in the rate of exchange).

2. The various tables compare exports to total sales income. Sales income is presented in current NISh, converted to constant 1989 NISh, using the above methodology; for proper comparison on a consistent basis, the same methodology should be used.

Table # 2.2.2 and Figure # 4 present the export statistics for the Israeli Plastics Industry between 1986 and 1989, on an equivalent 1989 $ basis. For the sake of comparison,the two methods of calculating 1989 $ equivalent for export income are shown. However, the comparisons and analyses are made on the real 1989 "Local Economy Adjustment" basis (alternative b).

TABLE # 2.2.1 PLASTICS INDUSTRY SECTOR - ISRAEL
VOLUME OF EXPORT SALES IN CURRENT DOLLARS

YEAR	1986	1987	1988	1989
EXPORTS - M $	138.8	187.6	230.3	254.9
%@IL industry*	1.8 %	2.2 %	2.6 %	2.6 %
Exports/Sales**	18.5%	19.5 %	21.0 %	23.9 %
Basis:avgNISh/$	1.49	1.6	1.6	1.92
COMPARISON TO THE ISRAELI INDUSTRY - AS A WHOLE				
Tot.Ind.exp/sal	37.9 %	37.7 %	32.3 %	36.0 %
F=Plast/Industr	*** 0.49	0.52	0.65	0.66

Variations-n%	1987/1986	1988/1987	1989/1988
Exports in $(n)	+35.2%	+22.8 %	+10.7 %
ISRAELI INDUSTRY AS A WHOLE			
Total Industry	+14.1 %	+ 1.8 %	+10.0 %
F=Plast/Industr	*** 2.5	12.7	1.07

Notes : K=Thousand . M = Million . (n) = Nominal (current)
* =% Value of Exports Plastic/Value of Total Industrial Exports
**=% Value of Exports Plastics/Value of Plastics Sales (in$)
***= Comparative Factor Plastics Industry on Overall Industry

Sources:Department of Plastics and Rubber.Min.Industry & Trade
and The Industry in Israel - Tables for 1987, 1988, 1989.
Ministry of Industry and Trade - August 1988,1989,1990

TABLE # 2.2.2 PLASTICS INDUSTRY SECTOR - ISRAEL VOLUME OF EXPORT SALES IN EQUIVALENT 1989 DOLLARS				
YEAR	1986	1987	1988	1989
EXPORTS - M $				
Current (n)	138.8	187.6	230.3	254.9
1989 equiv.(a)	156.7	204.5	241.2	254.9
1989 equiv.(b)	186.7	221.0	226.0	254.9
Variations- %	1987/1986		1988/1987	1989/1988
Exports in $(b)	+18.4 %		+ 2.3 %	+12.8 %
ISRAELI INDUSTRY AS A WHOLE				
Total Industry (b)	+ 7.5 %		- 2.1 %	+ 9.2 %
Notes : K=Thousand . M = Million . (n) = Nominal (current) a= 1989 equivalent dollars, adjusted by US Consumer Price Index b= 1989 equivalent dollars, based on Local Economy Adjustment				
Source:Calculated based on Table # 2.2.2,using USCPIndex and Israeli Plastics Branch Price Index adjusted by exchange rates				

Table # 2.2.3. presents data on to the development of the export markets, split into exports to the European Economic Community, to the United States and to Other Areas, for the combined Rubber and Plastics Industrial Sector, compared to overall Israeli industrial exports. Variations between year and year are based on nominal dollars of exports.

TABLE # 2.2.3 RUBBER AND PLASTICS INDUSTRY SECTOR - ISRAEL VOLUME OF EXPORT SALES IN CURRENT DOLLARS DEVELOPMENT OF EXPORTS PER MAJOR AREAS ^- % Variations			
Variations-n%	1987/1986	1988/1987	1989/1988
RUBBER AND PLASTIC PRODUCTS INDUSTRIAL SECTOR			
European EC	+31.9 %	~ +44.0 % c.	+ 7.6 %
United States	+ 9.8 %	- 0.3 % c.	+20.2 %
ISRAELI INDUSTRY AS A WHOLE			
European EC	+30.7	~ +23.0 % c.	+ 5.9 %
United States	+29.8 %	~ -11.1 % c.	+13.3 %
Other Areas	-19.1 %	~ +16.0 % c.	+13.6 %
Notes : ^=Based on exports for Rubber+Plastics. c.=calculated			
Source: The Industry in Israel - Tables for 1987, 1988, 1989. Ministry of Industry and Trade - August 1988,1989,1990			

Discussion/Comments

The following points can be drawn from Tables # 2.2.1, 2.2.2, 2.2.3, and Figure # 4 :

1. Although the ratio of plastics sales over total industrial sales has slightly decreased between 1987 and 1989, this has not been the case for exports; on the contrary, there has been a continuous increase in the percent of plastics exports on total industrial exports from 1.8 % in 1986 to over 2.6 % in 1989.

2. Value (in $) of Exports/total sales for the Israeli plastics sector has increased between 1986 and 1989. Income from exports represented about 18.5 % of total sales of the plastics industry in 1986 while value of exports increased to almost 24 % of total sales for 1989.

3. There has been continuous and marked increase in exports of plastics products between 1986 to 1989. Exports in 1986 accounted for an income of 139 million dollars, while in 1989 such income increased to 255 million dollars (expressed in current $). The increase has been more marked in exports to the EEC (~27% average/year) than to the USA (~9.5% average/yr)

4. On a constant 1989 equivalent dollar basis, the increase is particularly marked in 1989 in comparison to 1988: an increase of almost 13%; such increase should be compared to 9.2% increase in constant dollars, for total industrial exports for the same period. The total cumulative increase in constant dollars of plastics exports accounted for almost 37% between 1986 and 1989,compared to about 15% for industrial products from Israel.

5. From the above it can be concluded, that while the plastics industry - as a whole - faced a slump during 1989, and showed decreased sales income (in constant Dollars) during 1988, exports have been continuously on the increase.

2.3 Plastic Industry Sales in the Local Market.

Local market sales of locally produced plastic products, in current and constant values for the years 1986, 1987, 1988 and 1989 are shown in Table # 2.3.
The sales are the differences between the total sales income -and exports, as presented in Table # 2.2.1 and 2.2.2.

As explained in Section # 2.2 the figures shown in this Section -for Local Market Consumption- are based on the export information -factory by factory -as received by the Department of Rubber and Plastics Products of the Chemical Division of the Ministry of Industry and Trade and not on the export figures shown in the the Tables of "Industry in Israel", (Sub-Sector 193), and in the Statistical Abstracts of the Central Bureau of Statistics.

Since the official statistical export data -as presented in the Tables "Industry in Israel" and in the Statistical Abstract - is lower than the ones received by the Department, the corresponding local market sales from local production (calculated by difference) obtained from the official statistics would be higher than the ones shown in Table # 2.3.

TABLE # 2.3 PLASTICS INDUSTRY SECTOR - ISRAEL INTERNAL MARKET SALES OF LOCALLY PRODUCED PLASTIC PRODUCTS				
YEAR	1986	1987	1988	1989
LOCAL MARKET SALES -in Current Values				
in CurrentMNISh	911.6	1,241.0	1,382.9	1,556.8
equivalent M$	611.8	775.6	864.3	810.8
% of IL industr *	6.34%	6.51%	6.67%	6.14%
Local/TotalSale **	81.5%	80.5 %	79.0 %	76.1 %
Basis:avgNISh/$	1.49	1.6	1.6	1.92
LOCAL MARKET SALES -in Equivalent 1989 Constant Values				
inCON1989 MNISh	1,579.9	1,754.5	1,628.6	1,556.8
equivalent M$	822.9	913.8	848.2	810.8
COMPARISON TO THE ISRAELI INDUSTRY - AS A WHOLE				
Tot.Ind.loc/sal	63.6 %	63.1 %	64.4 %	60.2 %
F=Plast/Industr ***	1.28	1.28	1.23	1.26

Variations- %	1987/1986	1988/1987	1989/1988
LOCAL MARKET SALES - PLASTIC INDUSTRY			
in current NISh	+36.1%	+11.4%	+12.6%
in current $	+26.8%	+11.4%	- 6.2%
inCON 1989value	+11.1%	- 7.2%	- 4.4%
ISRAELI INDUSTRY AS A WHOLE			
Total Industry $	+16.2%	+21.4 %	- 8.0 %

Notes : M= Millions. (n) = Nominal CON=Constant 1989 basis
*=%Value local sales of plastics/value local sales Total Indust
**=% Revenue of Local Sales/Total Revenue -Plastics Industry
***= Comparative Factor Plastics Industry on Overall Industry

Source: Tables 2.1.2 and 2.2.1 and 2.2.2 of this study.

Discussion and Comments

Table # 2.3 - which display the income of local sales (difference between the total sales and the export sales) shows the following

1. Sales from plastics products -sold in the local market- represents over 6 % of the total local market industrial sales.

2. Local market sales represented about and over 80 % of the income for the plastics industry until 1988; in 1989, the proportion from local market sales decreased to 76 %, due to increased exports, as already discussed previously.

3. 1987 was an outstanding year for the plastics industry as local market sales increased by almost 27 % in comparison to the previous year, in current dollars.
   For the same year, overall israeli industrial sales for local market consumption increased only by about 16 % in current dollars.

   However, in 1988, plastics industry sales for the local market increased by only ~11% in current values, while plastic product price index and overall industrial products sale in the local market, increased by over 20%.

4. Local market sales -over 1989 - decreased for the whole industry (by 8% over the previous year, expressed in current dollars); the decrease of income from local market sales for the plastics industry was somewhat lower (~6 % over the previous year, expressed in dollars).

5. 1987 was the only year, for the 1986-1989 period, during which there were actual increases in local market sales of plastics products -expressed in constant values (basis 1989). The increase in real sales during 1987 was above 11 % over the preceding year. During 1988 and 1989, the real growth for sales of plastics products for the local market was negative (about 6% per annum decrease in real values).
The overall cumulative effect resulted in bringing back the 1989 real value income from local market sales to somewhat below the 1986 real income value.

2.4 Local Market Plastic Products Consumption.

Section 2.3 presents the value of sales of locally produced plastics products in the internal market; however this represents only part of the local consumption, as there are imports of plastic products in semi-finished form - sheets and tubes - and especially as finished products.

2.4.1 Imports of Plastics Products

Table # 2.4.1 and Figure # 5 present data on plastics products imported into Israel during the 1986-1989 period, and compares the values and yearly changes to total industrial imports to Israel.

TABLE # 2.4.1 PLASTICS INDUSTRY SECTOR - ISRAEL
VOLUME OF IMPORTS OF PLASTIC PRODUCTS

YEAR	1986	1987	1988	1989
IMPORTS OF PLASTICS				
Semi-finished	M$ 45.3	55.3	74.8	81.4
Finished Goods	M$ 69.8	90.2	73.5	77.3
Total imports	M$ 115.1	145.5	148.3	158.7
=Current MNISh	171.5	232.8	237.3	304.7
=CON. 1989MNISh	* 268.3	329.1	279.3	304.7
%@Total Imports	1.2%	1.2%	1.2%	1.2%

Variations- %	1987/198	1988/1987	1989/1988
Semi-finished-$	(n) +22.1 %	+35.3 %	+ 8.8 %
Finished Goods$	(n) +29.2 %	-18.5 %	+ 5.2 %
TotalImports $	(n) +26.4 %	+ 1.9 %	+ 7.0 %
=CON. 1989MNISh	+22.7 %	-15.1 %	+ 9.1 %
ISRAELI INDUSTRY AS A WHOLE			
Total Industry$	(n) +23.6 %	+ 8.7 %	+ 1.9 %
=CON. 1989MNISh	+12.1 %	- 7.5 %	+ 1.0 %

Notes : M= Millions. (n) = Nominal CON=Constant 1989 basis
* = % of Plastics imports/total industrial imports

Sources:Department of Plastics and Rubber.Min.Industry & Trade and Abstracts of Central Bureau of Statistics -1988,1989,1990

Discussion and Comments:
The following comments can be made from the above table:

1. Imports of Plastics consistently correspond to 1.2% of total israeli industrial imports.

2. Imports of Plastics to Israel have increased between 1986 and 1989. During 1987 the major increase was in the form of finished goods; however, since 1988 the increase of plastics was primarily for intermediates; i.e. semi-finished sheets, tubes and profiles, for further manufacturing and value added by the local plastics industry. The increase over the 1986 - 1989 period can be summarized as follows :

IMPORTS OF PLASTICS	in current $		in const.1989NISh	
	1986-1989 average/		1986-1989 average/	
	cumulative	year	cumulative	year
*Semi-Finished components	79.7%	21.6%/a	33.6%	+10.2%/a
*Finished Products	10.7%	3.3%/a	-17.7%	- 5.6%/a
*Total Plastics Imports	37.9%	11.3%/a	+13.6%	+ 4.3%/a

3. Total imports of industrial products to Israel increased in the same period as follows:

TOTAL INDUSTRIAL IMPORTS	in current $		in const.1989NISh	
	1986-1989 average/		1986-1989 average/	
	cumulative	year	cumulative	year
*Total Industrial Imports	36.8%	11.0%/a	+ 4.7%	+ 1.5%/a

4. Trade balance of plastic semi-finished components and finished goods is positive (as income from exports is higher than costs of imports) every year between 1986-1989. (see section 2.10).

2.4.2 Annual Plastics Consumption.

Table # 2.4.2 presents the annual internal market plastics consumption in current and constant money values, for the period 1986-1989, including year by year variations. This table represents the cumulative value of local production for the internal market (Table # 2.3) and the value of imports (Table # 2.4.1)
Consumption in tons is not available. Since it is important to have an estimate as to tonnage consumed - especially for calculating the per capita consumption-a rough exercise will have to be done, to convert money values into tonnage.
The exercise is based on formula derived from the unit sales values presented in Table # 2.1.3; and three basic assumptions :

* Imports of finished products are at the same unit value than the average obtained for local production (in Table # 2.1.3)
**Imports of semi-finished components are at 67% of the above.
** Export unit sales values are 10% lower than the average unit value for local market sales.

By this formula the average unit price factors are as follows:
Average Unit Value Total Plastics Production : factor= 1.0
Average Unit Value of Imported finished goods: factor= 1.0
Average Unit Value of Imported semi-finished : factor= 0.67
Average Unit Value of Exports : factor= ~0.92
Average Unit Value for internal markets : . factor= ~1.02
These are arbitrary assumptions, so as to perceive an indication of the local market consumption in tons.

TABLE # 2.4.2 PLASTICS INDUSTRY SECTOR - ISRAEL INTERNAL MARKET PLASTICS CONSUMPTION				
YEAR	1986	1987	1988	1989
LOCAL MARKET CONSUMPTION IN MONEY VALUES				
Local ProductM$	(n) 611.8	775.6	864.3	810.8
IMPORTS				
Semi-finishedM$	45.3	55.3	74.8	81.4
FinishedGoodsM$	69.8	90.2	73.5	77.3
Total M$(n)	726.9	921.1	1.012.6	969.5
=CON. 1989MNISh	* 1,877.1	2,083.6	1,908.1	1,861.4
Unit Value $/t				
Local Product	2,931	3,391	3,631	3,289
Imp.Semi-finish	1,928	2,165	2,382	2,151
Imp.Finishgoods	2,877	3,325	3,555	3,210
LOCAL MARKET CONSUMPTION IN TONNAGE -Thousands Tons/year				
Local Product	209	229	238	247
IMPORTS				
Semi-finished	24	26	31	38
Finished Goods	24	27	21	24
LocMarktConsum	257	282	290	309
Variations- %	1987/1986	1988/1987	1989/1988	
in Money Values n$	+26.7 %	+ 9.9 %	- 4.3 %	
in CON. 1989equ	+11.0 %	- 8.4 %	- 2.4 %	
in Tonnage	+ 9.7 %	+ 2.8 %	+ 6.6%	
Sources:Tables 2.1.1, 2.1.3, 2.3, and 2.4.1 of this study.				

Comments and Discussions:

This table repeats and confirms previous comments regarding the local market consumption -supplied from local production and imports, to the effect :

1. Local market consumption - based on money values - increased considerably from 1986 to 1987, but decreased -in real values- thereafter, the net effect being that the value spent in plastic products in the local market in 1989 was similar to the value spent in 1986 (in 1989 constant NISh values).

2. Quantities (in tons) did increase every year between 1986 to 1989; the increase was large in 1987, but small in the years thereafter. Total cumulative increase -over the 1986-1989 period- was 20.2%, corresponding to an average annual increase of 6.3 %.

2.4.3 Per Capita Consumption

An important factor of comparison between Plastics Industries in various countries is the "Per Capita Plastics Consumption". Yearly growth per capita consumption is indicative of new applications and/or wider market penetration.

Table # 2.4.3 and Figure # 6 present the calculated total overall "per-capita production" (including exports) based on the Tonnages shown in Table # 2.1.1, as well as the calculated "per-capita consumption" for the local market only, including imports -as presented in Table # 2.4.2.
Table # 2.4.3 also presents for informative purposes,the breakdown of per capita consumption of major polymers in Israel.

TABLE # 2.4.3 PLASTICS INDUSTRY SECTOR - ISRAEL
PER CAPITA CONSUMPTION OF PLASTICS IN ISRAEL

YEAR	1986	1987	1988	1989
POPULATION-K	4,331.3	4,406.5	4,476.8	4,559.5
TotalProduction	KT 267	280	330	360
/CapitaProductn	61.6 kg	63.5 kg	73.7 kg	79.0 kg
LocMarktConsum	KT 257	282	290	309
/CapitaConsumpt	59.3 kg	64.0 kg	64.8 kg	67.8 kg
PLATICS PRODUCTS OF MAJOR POLYMER PER CAPITA CONSUMPTION				
L.D.Polyethylen	16.0 kg	17.7 kg	17.7 kg	17.8 kg
H.D.Polyethylen	7.1 kg	8.0 kg	8.1 kg	8.2 kg
Polystyrene	4.3 kg	5.5 kg	6.1 kg	5.5 kg
Polyvinylchlord	10.4 kg	11.2 kg	9.1 kg	8.9 kg
Polypropylene	8.4 kg	10.0 kg	8.1 kg	9.4 kg

Variations-n%	1987/1986	1988/1987	1989/1988
in Population	+ 1.7%	+ 1.6%	+ 1.8%
in PER -CAPITA Production	+ 3.1%	+16.1	+ 7.2%
Consumption	+ 7.9%	+ 1.3%	+ 4.6%
in PLATICS PRODUCTS OF MAJOR POLYMER PER CAPITA CONSUMPTION			
L.D.Polyethylen	+10.6%	-	-
H.D.Polyethylen	+12.6%	+ 1.2%	+ 1.2%
Polystyrene	+28.0%	+10.9%	- 9.8%
Polyvinylchlord	+ 7.7%	-18.7%	+ 2.2%
Polypropylene	+19.1%	-19.0%	+16.0%

Notes : KT = Thousands Tons

Sources:Tables 2.1.1, and 2.4.2 of this study and Figure 3.1 of "The Polymer Industry -Israel and the World".H.D.Frenkel The S. Neaman Institute - 1990.
Population from "The Statistical Abstract of Israel" -1990

Discussion and Comments

1. After an 8 % increase in per-capita plastics consumption in Israel, in 1987 there has been a stabilization, over 1988 and 1989, indicating market saturation.

2. Such saturation - over 1988 and 1989 - can be further confirmed in analyzing the per capita consumption of major polymers; Polystyrene shows the maximum average increase over the last four years,(~8.% average per year) followed by High Density Polyethylene(<5%). PVC consumption decreased by ~5%p.a. L.D.Polyethylene and Polypropylene increased modestly (< 4%p.a.)

2.5 Employment and Sales Income per Employee

The employment statistics for the Plastics Industry Sub-Sector are presented in the Tables of "Industry in Israel", (Sub-Sector 193), in Table # 2.5 and Figure # 7.
This table and Figure # 7 also show sales income per employee, and compare employment statistics -including income per employee -of the plastics industry to Israel`s industry as a whole.

Information on Average Yearly Wages per employee and total yearly wages, as well as comparisons to Overall Industry in Israel are shown in Table # 2.6 on Page #. 2.14.

TABLE # 2.5 PLASTICS INDUSTRY SECTOR - ISRAEL
NUMBER OF EMPLOYEES AND YEARLY SALES INCOME PER EMPLOYEE

YEAR	1986	1987	1988	1989
EMPLOYEES (#)	10,141	10,820	11,028	10,785
% on total ind.	3.1 %	3.3 %	3.4 %	3.6 %
Sales Income /Employee				
in curr.KNISh/e	110.3	142.4	158.8	189.7
in curr.K$/empl	74.1	89.0	99.3	98.8
in Tons/employe	25.7	27.5	27.9	30.8
in cons.KNISh/e	191.2	201.4	186.9	189.7
in cons.K$/empl	99.6	104.9	97.4	98.8
COMPARISON TO THE ISRAELI INDUSTRY - AS A WHOLE				
Ind.currKNISh/e	* 90.5	111.2	136.5	172.3
Ind.currK$/empl	* 60.7	69.5	85.3	89.7
Ind.Con.KNISh/e	** 152.4	158.2	165.2	172.3
F=Plas/Ind.KNIS	*** 1.25	1.27	1.13	1.10

VARIATIONS (n)%	1987/1986	1988/1987	1989/1988
PLASTICS INDUSTRY			
in # employees	+ 6.7 %	+ 1.9 %	- 2.2 %
in Sales Income/Employee			
in NISh/empl(n)	+29.1 %	+11.5 %	+19.5 %
in$/employee(n)	+20.1 %	+11.6 %	- 0.5 %
in tons/employ	+ 7.0 %	+ 1.5 %	+10.4 %
in CON NISh/emp	+ 5.3 %	- 7.2 %	+ 1.5 %
ISRAELI INDUSTRY AS A WHOLE			
in # employees	+ 2.2 %	- 3.0 %	- 6.3 %
in CON NISh/emp	*** + 3.8 %	+ 4.4 %	+ 4.3 %

Notes : K=Thousand . (n) = Nominal CON=Constant 1989 basis
* =Sales income/employee for the industry;curr.KNISh&K$/employ.
**=Sales income/employee for the industry;Constant NIKSh/employ
***=Increase in Constant sales income/employee for Industry

Sources:The Industry in Israel - Tables for 1987, 1988 + 1989
Ministry of Industry and Trade - August 1988,1989 &1990
Statistical Abstract of Israel-1988, 1989 and 1990

Discussion/Comments

The following points can be drawn from Table 2.5 :

1. The labor force employed by the plastics industry represented, in 1989,about 3.6 % of the total persons employed in Industry. The proportion has increased consistently over the last years, from 3.1 % in 1986, to 3.6 % in 1989.

2. In absolute numbers of employees, there has been an overall total increase between 1986 and 1989 from 10,141 employees to 10,785 employees; i.e a 6.4% total increase. The increase was primarily between 1986 and 1987 (6.7 %); from 1987 to 1988 the increase in labor force was less than 2 %. The labor force decreased in 1989 by 2 %, returning to the 1987 level.

3. Although the yearly sales revenue of the plastics industry, per employee shows a marked increase between 1986 and 1989- from 74 thousand dollars to about 90 thousand dollars per employee- expressed in current values, this is not the case, when translated to constant values; in constant values the income per employee is in the neighborhood of 100 thousand dollars per employee throughout the 1986-1989 period.

4. On a tonnage output basis, there has been an increase from about 25 tons/employee/year in 1986 to about 30 tons/employee per year in 1989.
   This corresponds to a cumulative increase of 20 % for the 1985-1989 period,equivalent to an average of about 6.2% per annum.

5. The yearly sales per employee for the plastics industry is considerably higher than the sales income per employee for the Israeli industry as a whole. During 1986 and 1987, the income to the plastics industry per employee was over 25 % higher than for total industry in Israel; however, there has been a marked narrowing of the gap, as in 1989, the difference was only 10%.

2.6 Average Annual Wages

The previous subsection refers to number of employees, and relates employment to sales. The ratio sales per employee is an important comparative factor as to efficiency and earning power per employee, and for determination of labor intensiveness of this particular industrial sector in comparison to others, and/or to the same industries in other countries. Its importance is in showing year to year variations as to efficiency and earning power. It does not, however, present a complete picture as to competitive standing, due to labor.
Thus, the percentage of labor costs on sales income is also a very important factor; generally, the percentage of labor costs are higher in a country of high labor wages - even if the number of employees per sales income is low; this would mean high efficiency, but higher manpower cost - as is the case of the United States, Switzerland, Germany , and most western economies. On the other hand, in low-wage economies, the number of employees may be much higher, but the wage package lower; thus, the product is manufactured at a lower manpower per ton cost - although more employees are used, and the product may be more competitive in the international markets, although more employees are used.

Table # 2.6 presents information on "average wage per man-year", Total yearly wages, and Percentages of Wages per Sales Income. The average wage per man-year has been calculated for the combined rubber and plastics industry, and applied to the plastics industry number of employees. Since the plastics industrial sector represents over 80 % of the combined sector, utilizing such average wage information for the combined sector, on the plastics industry only, would appear valid.
Wages, as used in Table # 2.6 are defined as all payments on which income tax is due (before deducing taxes), appearing in the payrolls, including:basic salaries, cost of living, professional, seniority and family allowances including fare, premiums, bonuses and payment for overtime, absence,professional literature, "13th month" salary;but excludes social benefits and other labor costs.

TABLE # 2.6 PLASTICS INDUSTRY SECTOR - ISRAEL
AVERAGE ANNUAL WAGES AND PERCENT WAGES ON SALES INCOME

YEAR	1986	1987	1988	1989
EMPLOYEES (#)	10,141	10,820	11,028	10,785
% on total ind.	3.1 %	3.3 %	3.4 %	3.6 %
Average Yearly Wages (Exc. Social Benefits & other labor costs)				
PerEmpl.NISh/yr	^ 9,366	13,103	14,306	16,926
PerEmpl.$/yr.	^ 6,286	8,189	8,941	8,816
PerEmpl.CON.NIS	^ 15,772	18,642	17,353	16,926
Tot.Wages MNISh	95.0	141.8	157.8	182.6
Tot.Wages MN$/y	63.7	88.6	98.6	95.1
Percent Total Wages/ Sales Income				
% NIS/NIS($/$)	8.5	9.2	9.0	8.9
COMPARISON TO THE ISRAELI INDUSTRY - AS A WHOLE				
Average Yearly Wages (Exc. Social Benefits & other labor costs)				
PerEmpl.NISh/yr	13,711	17,754	21,079	25,489
PerEmpl.$/yr.	9,202	11,096	13,175	13,275
PerEmpl.CON.NIS	23,089	25,258	25,511	25,489
F=Plast/Industr	* 0.68	0.74	0.68	0.66
Percent Total Wages/ Sales Income				
% NIS/NIS($/$)	12.8	16.0	12.8	14.8
F=Plast/Industr	* 0.66	0.58	0.59	0.60

VARIATIONS (n)%	1987/1986	1988/1987	1989/1988
in AVERAGE WAGE/EMPLOYEE			
PLASTICS INDUSTRY			
in NISh/empl(n)	+40.0 %	+ 9.2 %	+18.3 %
in$/employee(n)	+30.3 %	+ 9.2 %	+ 1.4 %
in CON NISh/emp	+18.2 %	- 6.9 %	- 2.5 %
ISRAELI INDUSTRY AS A WHOLE			
in CON NISh/emp	+ 9.4 %	+ 1.0 %	-<0.1 %
in Percent Total Wages/ Sales Income			
Plastics Indust	+ 8.2 %	- 2.2 %	- 1.1 %
Total Industry	+25.0 %	-20.0 %	+15.6 %

Notes : K=Thousand . (n) = Nominal CON=Constant 1989 basis
^ =Based on unit yearly average wages for Rubber+Plastics Ind.
***=Factor in Constant NISh average wage plastics/industry
Source: Statistical Abstract of Israel-1988, 1989 and 1990

Discussion/Comments from Table 2.6

1. Average annual wages

Average wages for plastics industry employees (based on combined Rubber and Plastics Industrial Sector) increased by about 81% in nominal Shekels between 1986 and 1989.

1.1 Such an increase should be compared to the following related increases over the same period:

* 73.4% inflation of plastics products prices to the consumer,
* 68.4% overall inflation for the same period,
* 85.9% of average increase in wages of the whole labor population employed in industry.

1.2. Expressed in dollar terms, average wages in the plastics industry increased by over 40 % during the 1986-1989 period (corresponding to an annual average of about 12% per year); while the average israeli worker in industry increased his income by over 44% over the same period (or about 13% average per annum).

1.3 On a real Shekel basis (corrected for inflation) this corresponds to an increase of 7.7% in real terms, (yearly average of 2.5%) for the average annual wages for employees in the plastics industry, compared to 10.4% (or ~3.3% annual average) of the industrial labor force.

1.4 Although there was an increase in average wages per year in real terms during the 1986-1989 period, the sizable increase occurred in 1987 (by over 18%); in 1988 there was a considerable decrease (by about 7%), with a further decrease -in real terms in 1989 (by about 2.5%).

2. Comparison to Overall Industrial Wages

2.1 The average yearly wages of workers in the Plastic Industry are considerably below the overall industrial wages. In 1989, the average wage per person in the Plastics Industry was almost 17,000 NISh/year,(1410 NISh/month) while for the industry -as a whole-it was about 25,500 NISh/person-year (2,124 NISh/month). This represents 2/3 of the average industrial wage. Such low average wage probably stems from the fact that almost half of the plastics factories are owned by Cooperatives (Kibbutzim), which utilize a low labor rate in their cost accounting, and that the plastics industry in Israel utilizes mainly semi-skilled and unskilled workers, with a minimum of skilled personnel and technicians and hardly any engineers.

2.2 The ratio of average plastics industry wage/overall industry wage, was also 66% in 1986, but increased to 74% in 1987, deteriorating back to 66% last year.

2.3 From the discussion in item 1 above, it can also be seen, that while the average wages of employees in the Plastics industry were above the rate of inflation and the rate of increase of plastics product prices, during the 1986-1989 period, the wage increases have been considerably below the rate of wage increases for the industry as a whole.

3. Total Wages/ Sales for the Plastics Industry.

3.1 The percent of total wages on total sales for the plastics industry has practically remained constant at about 9 % since 1987. (In 1986, it was 8.5%). While the number of employees have slightly decreased from 1987`s figures, average wages have increased.

3.2 The percent of total wages on total sales income - for industry as whole- is considerably higher; ranging from 12.8-16% for the period analyzed.

4. Overall Comment.

From the above analyses it would appear, that there has been a standstill status for the plastics industry labor force: "No improvement in efficiency, and little improvement in employee`s wages".

2.7 Gross Investments, Investment Deterioration and Capital Stock

Table # 2.7 (on pages # 2.18 and 2.19) presents the Gross Investments, the Investment Deterioration and the Capital Stock for the Rubber and Plastics Industrial Sector for the years 1986 to 1989, and compares them to the Gross Investments, Investment Deterioration and Capital Stocks for the Overall Industry in Israel for the same years.

Gross Investment - as presented in Table 2.7 is the total investment made in the Rubber and Plastics Products industrial Sector, (and in Overall Industry in Israel) either in new projects, and/or in the expansion and/or refurbishing of existing plants and facilities. Gross investments do not include investments made in Research and Development activities, which are shown in Table # 2.8.

Investment Deterioration- This item includes all decreases in the the total Capital Stock for the Rubber and Plastics Industrial Sector(and in Overall Industry in Israel) stemming from depreciation, obsolescence of equipment and facilities, closure of plants and/or other reasons.

Capital Stock - Are total assets in the Rubber and Plastics Industrial Sector (and in Overall Industry in Israel) capitalized, including investments made during the year in course less any Investment Deterioration.

Table # 2.7 - in addition to showing the absolute figures -in nominal NISh and in $ - of Gross Investments, Investment Deterioration and Capital Stock for the Rubber and Plastics Industrial Sector, and comparing these figures to the ones for Overall Industry in Israel for the years 1986-1989 -also presents percentages of of New Investment and Investment Deterioration on the Capital Stock of the immediate previous year, as well as factors of

Sales Income on Capital Stock
and Capital Stock on Employee

The last section of Table # 2.7 (on page 2.18) shows year to year percentage changes in Gross Investments, Investment Deterioration and Capital Stock - for the Rubber and Plastics Industrial Sector, and compares these percentages changes to the average percentage variations of the Overall industry in Israel.

GENERAL NOTE

Separate statistical information for Investments and Capital Stock for the Plastics Industry does not exist.
Although the information shown in this Table relates to the Rubber and Plastics Products Industrial Sector, it can be considered as valid for the Plastics Industrial Sub-Sector, as the plastics manufacturing industries account for over 80 % of the sales income and employment of the combined sector. Investments over the last years have primarily been in the plastics industries, and not in the tire and rubber products industries.

This General Note also applies to Statistical Information in the remaining subsections of this Section 2.

TABLE # 2.7 RUBBER AND PLASTICS INDUSTRY SECTOR - ISRAEL
GROSS INVESTMENTS, INVESTMENT DETERIORATION AND CAPITAL STOCK

YEAR		1986	1987	1988	1989
GROSS INVESTMENT (in Current Million NISh and $)					
in Million NISh		127.6	187.9	119.4	116.1
equivalent M$		85.6	117.4	74.6	60.5
% on total ind.		6.7%	7.8%	5.4%	4.7%
INVESTMENT DETERIORATION (in Current Million NISh and$)					
in Million NISh		50.2	52.2	51.6	51.4
equivalent M$		33.7	32.6	32.3	26.8
% on total ind.		4.4%	4.4%	4.1%	3.9%
CAPITAL STOCK (in Current Million NISh and $)					
in Million NISh		1,047.7	1,356.5	1,626.5	1,962.3
equivalent M$		703.2	847.8	1,016.6	1,022.0
% on total ind.		4.7%	4.9%	5.2%	4.7%
% NEW INVESTMENT,% DETERIORATION ON PREVIOUS YEAR CAPITAL STOCK					
RUBBER+PLASTICS					
%New Investment		13.2%	17.9%	8.7%	7.1%
% Deterioration		5.2%	5.0%	3.8%	3.2%
COMPARED TO OVERALL INDUSTRY					
%New Investment		8.6%	9.1%	8.0%	7.9%
% Deterioration		5.3%	5.3%	4.6%	4.2%
FACTORS RUBBER + PLASTICS INDUSTRY/OVERALL INDUSTRY					
%New Investment		1.53	1.97	1.09	0.90
% Deterioration		0.98	0.94	0.83	0.76
CAPITAL STOCK PER EMPLOYEE (in Current Thousand NISH and $)					
in KNISh/employ		76.0	95.4	118.6	149.8
in K$/employee		51.0	59.6	74.2	78.0
empl./Cap.Stock	#/M$	19.6	16.8	13.5	12.8
CAPITAL STOCK - COMPARISON TO THE ISRAELI INDUSTRY - AS A WHOLE					
Tot.Ind.KNISh/e	*	69.0	83.3	97.9	125.0
Tot.Ind.K$/empl		46.3	52.1	61.2	65.1
in K$/employee	#/M$	21.6	16.9	16.3	15.4
F=Plast/Industr	**	1.10	1.14	1.21	1.20
SALES INCOME ON CAPITAL STOCK (in Percentage of Capital Stock)					
Rubber+Plastics		135.3%	136.5%	121.5%	120.3%
Total Industry		120.9%	120.2%	122.6%	123.8%
F=Plast/Industr	**	1.12	1.14	0.99	0.97

Table 2.7 continues on next page

TABLE# 2.7(contin.)RUBBER AND PLASTICS INDUSTRY SECTOR - ISRAEL
GROSS INVESTMENTS, INVESTMENT DETERIORATION AND CAPITAL STOCK

VARIATIONS (n)%	1987/1986	1988/1987	1989/1988
PLASTICS INDUSTRY	($ basis)		
in Gross Invest	+37.1%	-36.5%	-18.9%
in Invest.Deter	- 3.3%	-<1.0%	-17.0%
in CapitalStock	+20.6%	+19.9%	+ 0.5%
in Cap.Stk/empl	+16.9%	+24.5%	+ 5.1%
SalesInc/CapStk	+ 0.8%	-11.0%	- 1.0%
ISRAELI INDUSTRY AS A WHOLE	($ Basis)		
in Gross Invest	+19.7%	- 7.5%	- 7.4%
in Invest.Deter	- 2.5%	+ 5.8%	-13.0%
in CapitalStock	+14.9%	+14.1%	- 0.3%
in Cap.Stk/empl	+12.5%	+17.5%	+ 6.4%
SalesInc/CapStk	- 0.6%	+ 2.0%	+ 1.0%

Notes : K=Thousand . M = Million . (n) = Nominal
* =Capital Stock/employee for the whole industry-NISh/employee
**=CapitalStock/employee Plastic Industry/Whole Industry-Israel

Sources:The Industry in Israel - Tables for 1987,1988 and 1989.
Ministry of Industry and Trade - August 1988,1989, 1989
Statistical Abstract of Israel-1988,1989,1990

Discussion/Comments :

The following comments can be made from Table 2.7.:

1. Gross Investments in the Rubber and Plastics Industrial Sector increased between 1986 and 1987 by some 30 million dollars, or 37 %, then decreasing from a total of 117 million dollars in 1987 to about 75 and 60 million dollars, respectively in 1988 and 1989. This followed the trend of the industrial investments in Israel during those years.

2. Investment deterioration - stemming from depreciation and lost investments (closure of factories,etc) remained steady at about 50 million New Shekel per year between 1986 and 1989. In equivalent dollar values, this corresponds to a yearly decrease of 3% from 1986 to 1987; practically no change from 1987 to 1988, and a 17 % decrease during 1989.

3. Investments in the Rubber and Plastics Industrial Sector represented about 7% in 1986, almost 8 % in 1987, over 5 % in 1988 and less than 5 % in 1989, of the total industrial investments in Israel in those years.

4. Notwithstanding the decreasing investments in the Rubber and Plastics Industrial Sector, over the last years, capital stock of the Rubber and Plastics Industrial Sector -expressed in dollars- has increased by 20 % per year over 1987 and 1988 and by 5% during 1989. Capital stock in israeli industry -expressed in dollars- increased by over 14 % per year during 1987 and 1988. During 1989, there was no increase in the industry`s capital stock, on the contrary a slight decrease.

5. The present (1989) capital stock per employee for the Rubber and Plastics Industrial Sector in Israel is about 150 thousand New Shekel; or equivalent to 78,000 $/employee. This is about 20% higher than the average for overall industry in Israel. Since there has been a continuous capital stock increase, while the number of employees have not increased (actually decreased in 1989), there has been an improvement in this factor (dollar basis) for the rubber and plastics industries, from 51 thousand dollars per employee in 1986 to 78 thousand dollars in 1989. While the average capital stock/labor factor has also increased for the Israeli industry as a whole, the increase was more moderate (from 46 thousand dollars/employee in 1986, to 65 thousand dollars per employee in 1989).

6. The above means that the rubber and plastics industries - as well as overall industry in Israel have become somewhat less labor intensive. This can best be seen by translating the above figures to people employed/capital stock. While in 1986 the Rubber and Plastics Sector employed almost 20 people per million dollar investment, the employment factor per million dollar investment -for the Rubber and Plastics Sector- decreased to less than 13 persons by 1989. Industry - as a whole utilized 21.6 employees per million dollars capital stock in 1986, decreasing to 15.4 people by million dollar capital stock by 1989.

7. Sales per capital stock decreased for the rubber and plastics industries between 1986 and 1989 from 135% sales/capital stock in 1986, to 120% in 1989. Industry - as a whole- did show a very modest average sales income per capital stock from 120 % in 1986 to almost 124 % in 1989.

2.8 Research and Development.

Table # 2.8 presents information on Research and Development in the Rubber and Plastics Industrial Sector, for the year 1985/86 (budget year) in comparison to 1987 calendar year.

Table # 2.8 presents information on the number of establishments and persons engaged in Research and Development in the Plastics industry, as well as their composition of the personnel according to training and education.

The same information is also presented for Research and Development in Israeli industry as a whole, for comparative purposes.

Research and Development expenses in the Rubber and Plastics Industrial Sector are shown for the years 1985/86, and 1987, in nominal NISh , $ and in equivalent constant 1989 NISh figure. Also shown is the split of Research and Development expenses into major components.

Comparative Research and Development expenses, and their respective splits are also shown - in Table 2.8 - for Israeli Industry as a whole.

Table # 2.8 presents percentage changes from one year to the other.

TABLE # 2.8 RUBBER AND PLASTICS INDUSTRY SECTOR - ISRAEL
RESEARCH AND DEVELOPMENT

	1985/86	1987	% Change
ESTABLISHMENTS AND EMPLOYED PERSONS IN RESEARCH AND DEVELOPMENT			
RUBBER AND PLASTICS INDUSTRIAL SECTOR			
Establishments engaged in R&D	18	18	-
Persons employed in R&D	97	108	+11.3%
Percent on Total Employees	0.7%	0.8%	
Graduates	47	53	+12.8%
Percent on Total Persons in R&D	48.4%	49.0%	
Practical Engineers& Technicians	50	55	+10.0%
COMPARISON TO THE ISRAELI INDUSTRY - AS A WHOLE			
Establishments engaged in R&D	193	205	+ 6.2%
Persons employed in R&D	6,400	5,813	- 9.2%
Percent on Total Employees	2.0%	1.8%	
Graduates	3,772	3,450	- 8.5%
Percent on Total Persons in R&D	58.9%	59.3%	
Practical Engineers& Technicians	2,628	2,343	-10.8%
R&D CURRENT EXPENSES			
RUBBER AND PLASTICS INDUSTRIAL SECTOR			
in current MNIS	4.52	5.41	+19.7%
in current M$	3.03	3.38	+11.6%
in constant MNIS (1989 equiv.)	7.83	7.64	- 2.4%
R&D CURRENT EXPENSES/SALES INCOME	0.32%	0.29%	- 9.4%
COMPARISON TO THE ISRAELI INDUSTRY - AS A WHOLE			
in current MNIS	419.8	478.2	+13.9%
in current M$	262.4	298.9	+10.5%
in constant MNIS (1989 equiv.)	706.7	680.1	- 3.8%
R&D CURRENT EXPENSES/SALES	1.21%	1.30%	+ 7.4%%

SPLIT OF R&D EXPENSES	1985/1986		1987		%
	KNIShn nominl	%@R&D CurEx	KNIShn nominl	%@R&D CurEx	Vari-ation
RUBBER AND PLASTICS INDUSTRIES					
Wages and other Labor expenses	2,080	46.0%	2,839	52.5%	+36.5
Materials and energy	897	19.8%	785	14.5%	-12.5
Other expenses includ.Overhead	220	4.9%	679	12.6%	+209%
Contract and Commission Works	1,322	29.2%	1,103	20.4%	-16.6
Investment Buildings/Equipment	676		318		-53.0
R&D Financed by Government	506	11.1%	1,195	22.1%	+136%
COMPARISON TO THE ISRAELI INDUSTRY - AS A WHOLE					
Wages and other Labor expenses	220013	52.4%	271197	56.9%	+23.3
Materials and energy	93350	22.2%	82506	17.3%	-11.6
Other expenses includ.Overhead	80121	19.1%	98051	20.6%	+22.4
Contract and Commission Works	27325	6.5%	26451	5.6%	- 3.2
Investment Buildings/Equipment	22288		39762		+78.4
R&D Financed by Government	39319	9.4%	97721	20.5%	+149%

Source: Statistical Abstract of Israel-1988, 1989 and 1990

Discussion/Comments :

The following are comments drawn from the data presented in Table # 2.8:

1. There are only 18 factories on record as undertaking Research and Development in the Rubber and Plastics Industrial Sector; this means that only 3.5% of the establishments in the Rubber and Plastics Industrial Sector undertake Research and Development. Only about 100 people in the industry worked in Research and Development, which corresponds to less than 1% of the total employees in the Rubber and Plastics Industrial Sector.

These figures compare poorly to employment in Research and Development for the overall Israeli industry, as about some 2% of the total industrial labor force were engaged in Research and Development, although R&D activities were performed in only 2.8% of the total industries in the country.

2. Statistics for 1986 and 1987 show that less than half of the personnel engaged in Research and Development in the Rubber and Plastics Industrial Sector were graduates, the rest were practical engineers and technicians. During the same years, about 60% of the personnel engaged in research and development in israeli industry on the whole, were graduates.

3. Research and Development expenses in the Rubber and Plastics Industrial Sector amount to about 0.3% on sales income, while for the whole industry the percentage of R&D expenses on total sales income was 1.3 % on total sales income.

4. Wages and other labor expenses, and subcontracting constitute over 70% of Research and Development expenses for the Rubber and Plastics Industrial Sector; overhead expenses -which were relatively low in 1985/85 (less than 5%),jumped to 12.6% in 1987.

5. While Research and Development personnel and expenses decreased between 1987 and 1986 for the Israeli industry as a whole, this was not the case for the Rubber and Plastics Industrial Sector, as the number of persons in R&D increased by over 10% between 1987 and 1986; and expenses increased in nominal value, and only decreased by 2.4% in constant value.

The important question is what happened to Research and Development activities during 1988 and 1989; if there was a continued increase, a standstill or a drop, in light of the decreased sales income (by about 5 % in constant values).

2.9.The Industry: Breakdown by Ownership and by Size of Factories

Table # 2.9 and Figure # 8 present the breakdown of the Rubber and Plastics Industrial Sector by ownership and by size of factories. Size of factories breakdowns are usually available for the Plastic Industrial Sectors in other countries, and is therefore an interesting factor of comparison.

The breakdown of ownership is between Private Industry and Labor Federation associated industries (Histadrut), which in the case of the Plastics industries are primarily plastics factories owned by Cooperatives; i.e. Kibbutzim.

TABLE # 2.9. RUBBER AND PLASTICS INDUSTRY SECTOR - ISRAEL
BREAKDOWN BY OWNERSHIP AND SIZE OF FACTORIES (AS TO EMPLOYMENT)

YEAR	1987		1988		1989		VARIATIONS#	
YEAR	#	%	#	%	#	%	88/87	89/88
TOTAL FACTORIES	509		494		478		- 15	- 16
DIVISION BY OWNERSHIP								
Private	288	56.6	294	59.6	281	58.9	+ 6	- 13
Labor Confeder*	221	43.4	200	40.4	197	41.2	- 21	- 3
SPLIT BY SIZE OF FACTORIES -AS TO EMPLOYMENT								
1-99 employees	326	64.0	325	65.7	316	66.0	- 1	- 9
100-299 employ.	90	17.6	104	21.1	108	22.6	+ 14	+ 4
300-499 employ.	93^	18.4	41	8.3	27	5.7	- 28^	- 14
>500 employees			24	4.9	27	5.7		+ 3

Notes: # =Variations in number of factories; not in percentages
* Israel Federation of Labor (Histadrut) associated factories, mainly owned by Kibbutzim. ^ Factories above 300 employees

Sources: The Industry in Israel - Tables for 1987, 1988 + 1989
Ministry of Industry and Trade - August 1988,1989 &1990
Statistical Abstract of Israel-1988, 1989 and 1990

Comments and Discussions Regarding Table # 2.9 and Figure # 8.

1. There has been an apparent decrease in rubber and plastics factories in the country. There has been a net decrease of 31 enterprises between 1987 and 1989; several of them possibly in the rubber goods sub-sector. Of the net decrease of 31 factories, 13 were in the private sector in 1989, after an increase of 6 new plants in 1988; (thus leaving a net decrease of 7 private plants) and a decrease of 24 cooperative owned factories. Part of the decrease was due to factories merging.

2. Plastics factories, in Israel are split almost equally between private ownership, and those owned or associated with the Israel Federation of Labor (Histadrut). Since 1985, there are more private owned than Cooperative (Kibbutz) owned plastics factories and the trend continues to be toward a higher percentage of private owned enterprises. In 1986 about 56 % of the factories were privately owned, in 1989, about 59%.

3. The Rubber and Plastics Industrial Sector in Israel is made up by a large cluster of small factories. This is characteristic of the Plastic industry all over the world, it`s diversification and low investment requirements.
About 2/3 of the plastics factories in Israel employ less than 100 people; there has been an increase of medium sized factories, having between 100 and 200 employees, while there is an apparent tendency of decrease in larger (over 300 employees) factories. It would appear that small factories are increasing their manpower, while larger factories (above 300 employees) are trying to cut manpower; the effect of both of these directional trends results in a larger percentage of medium sized (100-200 employee) factories. In parallel, the number of factories having more than 500 employees has increased from 24 in 1988 to 27 in 1989. Such an increase may well be the result of mergers and rationalization

2.10 Imports of Processing Machinery and Molds.

An important and interesting factor to be be compared on a yearly basis is the import of Processing Equipment and Molds for the Plastics Industry in Israel. Table # 2.10 presents the value of imports of such processing machinery and molds for 1988 and 1989.

TABLE # 2.10 PLASTICS INDUSTRY SECTOR - ISRAEL
VALUE OF IMPORTS OF PROCESSING MACHINERY AND MOLDS - K$

ITEM	1988	1989	% VAR.
Injection Molding Mach.	8,932	6,273	-29.8
Extruders	3,675	1,925	-47.6
Blow Molding Extruders	1,338	1,684	25.8
Vaccum Forming Machines	530	393	-25.8
Other Molding Machines	814	693	-14.9
Other Machines	9,778	4,647	-52.5
Parts,Spares&Replacemts	4,153	3,291	-20.7
TOTAL MACHINES + PARTS	29,220	18,906	-35.3
% Machines+Parts/Invest	* 24.5%	16.3%	-33.5%
Inj.Molds-over 1.5 tons	5,056	3,986	-21.2
Inj.Molds-under 1.5 ton	5,998	9,694	61.6
Other Molds-over 1.5ton	798	273	-65.7
Other Molds-under 1.5 t	3,058	2,102	-31.3
TOTAL MOLDS	14,910	16,055	7.7
% Molds/Total Invest.	* 12.5%	13.8%	10.4%
TOTAL MACHINES + MOLDS	44,130	34,961	-20.8
%Machines+Molds/Invest.	* 37.0%	30.1%	-18.6%

NOTES: K$= Thousands US $. *=% imports of machinery/molds for Plastics Industry on Investments in Rubber + Plastics Sector.

Source: Department of Plastics, Chemical Division; Ministry of Industry and Trade; based on Customs Statistical information.

Conclusions:

From Table # 2.10 it can be concluded:

1. The value of imports of machinery and replacement parts for the plastics industry decreased considerably (by ~-35%) between 1989 and 1988. The decrease was higher in extruders (by ~-48%) than in injection molding machinery/parts (by ~-30%). Blow Molding factories were the only sub-sector which experienced an increase in value of imports between 1989 over 1988 (by ~+26%).
2. There was an increase by almost 8% in the value of imports of molds between 1988 and 1989.
3. In 1988, the value of imports of machinery and replacement parts for the plastics industries, represented about 25 % of total investments in the Rubber and Plastics Industrial Sector; molds represented about 12.5%. During 1989, there was a decrease in the percentage of value of imports of machinery and parts to about 16 % on total investment; but an increase for molds imports to about 14 % on total investments.On the whole, 37% of the total investments in the Rubber and Plastics Sector were for machinery, parts and molds for plastics factories, while in 1989 the percentage for machinery/molds decreased to ~30 %.

2.11 Economic Factors.

In analyzing and comparing different industries, there are a number of economic factors - in addition of the ones already discussed in previous sections - which should be evaluated, some of these are tabulated in Tables # 2.11, and are discussed hereunder.

2.11.1 Value Added - or Census Domestic Product

Is the difference between gross output (total sales + addition of value of change in stock of finished product and unfinished products at market prices) and consumption of materials.
By this definition "Value Added" includes wages and salaries, net indirect taxes,depreciation,general expenses,interest and profit.
"Percent Added Value" - an important comparative factor, is the percentage of Value Added on Sales Income.

Table 2.11.1 and Figure # 9 present the "Value Added" and the "Percent Value Added" and the factor "Value Added per Person Employed" for the Rubber and Plastics Industrial Sector for 1986 and 1987, and compares these factors to the ones for overall industry in Israel. Information for later years is not yet available. Variations between 1987 and 1986 are also presented.

TABLE # 2.11.1 RUBBER AND PLASTICS INDUSTRY SECTOR - ISRAEL
VALUE ADDED (CENSUS DOMESTIC PRODUCT)

YEAR	1986	1987	1988	1989
VALUE ADDED (CENSUS DOMESTIC PRODUCT)				
RUBBER AND PLASTICS PRODUCTS INDUSTRIAL SECTOR				
in currentMNISh	421.8	611.5		
in current M$	283.1	382.2		
eqval.CON MNISh	731.0	864.5		
% VALUE ADDED	37.7%	39.7%		
Val.Add/person	KSh/p 30.8	43.0		
Val.Add/person	K$/p 20.7	26.9		
COMPARISON TO THE ISRAELI INDUSTRY - AS A WHOLE				
in currentMNISh	8,450.7	12,486.2		
in current M$	5,671.6	7,803.9		
% VALUE ADDED	39.9%	42.3%		
Val.Add/person	KSh/p 26.1	37.8		
Val.Add/person	K$/p 17.5	23.6		

VARIATIONS (n)%	1987/1986	1988/1987	1989/1988
RUBBER AND PLASTICS PRODUCTS INDUSTRIAL SECTOR			
in currentMNISh	+45.0%		
in current M$	+35.0%		
eqval.CON MNISh	+18.3%		
in %ADDED VALUE	+ 5.3%		
COMPARISON TO THE ISRAELI INDUSTRY - AS A WHOLE			
in currentMNISh	+47.8%		
in current M$	+37.6%		
eqval.CON MNISh	+24.8%		
in %ADDED VALUE	+ 6.0%		

Notes : M=Million . (n) = Nominal CON=Constant 1989 basis
*=Factor % for Rubber and Plastics Industry/Overall industry

Statistical Abstract of Israel-1988, 1989 and 1990

From Table 2.11.1 and Figure # 9 it can be seen:
1.That the "Percent Value Added" for the years 1986 and 1987 for the Rubber and Plastic Products Industrial Sector was somewhat below the overall industrial Percent Value Added for the same period. In comparison to 1986, the comparative ratio decreased somewhat (from 0.95 to 0.94).
2."Percent Value Added" for the Rubber and Plastics Industrial Sector increased by 5.3% between 1987 and 1986; the average increase for the whole industry over the same years was 6%.
3. The "Added Value per Person Employed" is higher for the Rubber and Plastics Industrial Sector than for the Israeli Industry as a whole; this factor increase between 1988 and 1989.

2.11.2 Gross Domestic Product. -GDP
"Gross Domestic Product" is defined as the difference between the gross output less consumption and materials less general expenses; i.e. it is the "Value Added" less the General Expenses -i.e. advertising, insurance, travelling, etc.
"Percent Gross Domestic Product" is the percentage of Gross Domestic Product divided by Sales Income.

Table 2.11.2 and Figure # 10 present the "Gross Domestic Product" and the "Percent Gross Domestic Product" for the Rubber and Plastics Industrial Sector for 1986 and 1987, and compares these factors to the ones for overall industry in Israel. Information for later years is not yet available. Variations between 1987 and 1986 are also presented.

TABLE # 2.11.2 RUBBER AND PLASTICS INDUSTRY SECTOR - ISRAEL
GROSS DOMESTIC PRODUCT (GDP)

YEAR	1986	1987	1988	1989
GROSS DOMESTIC PRODUCT (GDP)				
RUBBER AND PLASTICS PRODUCTS INDUSTRIAL SECTOR				
in currentMNISh	361.5	519.1		
in current M$	242.6	324.4		
eqval.CON MNISh	626.5	733.9		
% GDP/sales inc	32.3%	33.7%		
COMPARISON TO THE ISRAELI INDUSTRY - AS A WHOLE				
in currentMNISh	6,960.0	10,598.8		
in current M$	4,671.1	6,624.3		
eqval.CON MNISh	11,720.6	15,078.9		
% GDP/sales inc	32.9%	35.9%		
F=Ru+Pl/Industr	* 0.98	0.94		

VARIATIONS (n)%	1987/1986	1988/1987	1989/1988
RUBBER AND PLASTICS PRODUCTS INDUSTRIAL SECTOR			
in currentMNISh	+43.6%		
in current M$	+33.7%		
eqval.CON MNISh	+17.6%		
in %ADDED VALUE	+ 3.3%		
COMPARISON TO THE ISRAELI INDUSTRY - AS A WHOLE			
in currentMNISh	+52.3%		
in current M$	+41.8%		
eqval.CON MNISh	+28.7%		
in %ADDED VALUE	+ 9.1%		

Notes : M=Million . (n) = Nominal CON=Constant 1989 basis

The following comments can be made from Table # 2.11.2 and Figure # 10:

1. In 1986, the %GDP of the Rubber and Plastics Industrial Sector was very similar to the average %GDP of Overall Industry in Israel; i.e. 32.3% compared to 32.9%. However, there was a sizable improvement for the %GDP for industry as a whole - to 35.9%; while for the Rubber and Plastics Industrial Sector the increase was only from 32.3% to 35.9%. This corresponds to a yearly variation for the Rubber and Plastics Industrial Sector by 3.3%, while the corresponding variation for industry as a whole was 9.1%.
2. The reason for lower increase in GDP for the Rubber and plastics Industrial Sector is that the General Expenses for this sector increased by about 11%, while for industry as a whole in Israel there was a decrease of 8.6%; this can best be seen from Table # 2.11.2A.

TABLE # 2.11.2.A RUBBER AND PLASTICS INDUSTRY SECTOR - ISRAEL
PERCENT GENERAL EXPENSES ON SALES

YEAR	1986	1987	1988	1989
PERCENT GENERAL EXPENSES ON SALES				
Rubber+Plastics	5.4%	6.0%		
Whole Industry	7.0%	6.4%		
F=Ru+Pl/Industr	* 0.77	0.94		

VARIATIONS (n)%	1987/1986	1988/1987	1989/1988
in PERCENT GENERAL EXPENSES ON SALES			
Rubber+Plastics	+11.1%		
Whole Industry	+ 8.6%		

Notes : M=Million . (n) = Nominal CON=Constant 1989 basis
*=Factor % for Rubber and Plastics Industry/Overall industry

2.11.3 Balance of Trade.

Balance of Trade is the difference between exports and imports, and reflects the contribution of a particular industrial sector to the overall trade balance.

Excluding Exports/Imports of Polymers.

Table 2.11.3.1 presents the Balance of Trade of the Plastics Industrial Sector for the years 1986-1989 and compares them with the Balance of Trade figures for total industry in Israel for the same period. The export and import figures shown in this table do not include export and import of polymers.

TABLE # 2.11.3.1 PLASTICS INDUSTRY SECTOR - ISRAEL
BALANCE OF TRADE - Excluding Polymers as Such

YEAR	1986	1987	1988	1989
Exports M$ (n)	138.8	187.6	230.3	254.9
Imports M$ (n)	115.1	145.5	148.3	158.7
Balance M$ (n)	23.7	42.1	82.0	96.2
=in CON.1989 M$	31.9	49.6	80.5	96.2
% of Exports	17.1%	22.4%	35.6%	37.7%
Total Industry	-2,490.5	-3,441.0	-3,198.4	-2,459.4
=in CON. 1989M$	-3,254.7	-4,079.6	-3,225.9	-2,459.4

Variations- %	1987/198	1988/1987	1989/1988
Plastics-Balan.	(n$) +77.6%	+94.8%	+17.3%
=CON. 1989 $	+55.5%	+62.2%	+19.5%
Total Industry	(n$) -38.2%	+ 7.0%	+23.1%
=CON. 1989 $	-25.3%	+20.9%	+23.8%

Notes : M= Millions. (n) = Nominal CON=Constant 1989 basis

Sources: Tables # 2.3 and 2.4.1 of this study.
Abstracts of Central Bureau of Statistics -1988,1989,1990

Comments and Discussion :

The following comments can be drawn from the above Table :

1. The Plastics Industry Sector has had a positive Balance of Trade; i.e. exports are higher than imports, every year between 1986 and 1987. There has been a continuous increase in the balance of trade -every year from 1986 to 1989 . In 1986 the positive balance represented only 17% of plastics exports increasing to almost 38% of plastics exports in 1989.

2. Such positive Balance of Trade compares favorably with overall israeli industry,which shows a consistent negative trade balance.

3. The Balance of Trade for the Plastics Industrial Sector has increased by 306% in current dollars, over the 1986-1989 period, which corresponds to an average yearly increase of almost 60% in current dollars. In equivalent 1989 values (Israeli Economy basis) this corresponds to a cumulative increase of over 200% over the 1986-1989 period, or a yearly average of about 45 %.

4.During the same period, the negative balance of trade for total israeli industry has improved by about 24.4 % for the 1986-1989 period, or about 7.6% average per year in constant 1989 equivalent values (adjusted to the israeli economy).

Including Exports/Imports of Polymers.

Table 2.11.3.2 and Figure # 11 present the combined Balance of Trade of plastics and polymers for the years 1986-1989 and compares them with the Balance of Trade figures for total industry in Israel for the same period.
The export and import figures shown in this table include export figures of polymers by Israel Petrochemicals and Israel Electrochemicals- Frutarom and import of polymers - as reported by the Chemical Division of the Ministry of Trade and Commerce.

TABLE # 2.11.3.2 PLASTICS AND POLYMERS BALANCE OF TRADE

YEAR	1986	1987	1988	1989
EXPORTS- M$ (n)				
Plastics	138.8	187.6	230.3	254.9
Polymers	95.0	133.0	142.3	151.3
Total Exports	233.8	320.6	372.6	406.2
IMPORTS- M$ (n)				
Plastics	115.1	145.5	148.3	158.7
Polymers	122.8	178.9	225.9	245.6
Total Imports	237.9	324.4	374.2	404.3
Balance M$ (n)	- 4.1	- 3.8	- 1.6	+ 1.9
=in CON.1989 M$	- 5.5	- 4.5	- 1.6	+ 1.9
% of Exports	- 1.7%	- 1.2%	- 0.4%	+ 0.5%

Notes : M= Millions. (n) = Nominal CON=Constant 1989 basis

Sources:Tables# 2.11.3.1. Various previous studies on Polymers Abstracts of Central Bureau of Statistics -1988,1989,1990

From the above table it can be seen that that the Balance of Trade of the combined exports of plastics products and polymers is basically balanced against their correspondent imports.

The trend has been slightly improving, from a very small negative balance, toward a very small positive balance.

A considerable improvement is expected toward 1992/93, as polypropylene will be manufactured locally. The production of polypropylene in Israel should turn the Balance of Trade into a positive 50 - 60 million dollars; this will correspond to about 12-15% positive balance of trade on exports.

2.11.4 Consumption of Electric Power

Although not in the same category than the previous factors, it is also of interest to compare the consumption of electric power of the Rubber and Plastics Industrial Sector with the consumption of industry as a whole. Table #2.10.4 presents such a comparison, and shows variations from year to year.

TABLE # 2.11.4 RUBBER AND PLASTICS INDUSTRY SECTOR - ISRAEL
VARIOUS ECONOMIC FACTORS : ELECTRIC POWER CONSUMPTION

YEAR	1986	1987	1988	1989
CONSUMPTION OF ELECTRIC POWER				
RUBBER AND PLASTICS PRODUCTS INDUSTRIAL SECTOR				
Total MKWH/year	216.6	246.9	238.7	244.3
in KWH/ton *	755	753	730	675
inKWH/KNISsales	153	133	121	104
COMPARISON TO THE ISRAELI INDUSTRY - AS A WHOLE				
Total MKWH/year	14,763	16,318	17,874	18.853
inKWH/KNISsales	426	444	337	364
F=Ru+Pl/Industr	** 0.36	0.30	0.36	0.29

VARIATIONS (n)%	1987/1986	1988/1987	1989/1988
GROSS DOMESTIC PRODUCT (GDP)			
RUBBER AND PLASTICS PRODUCTS INDUSTRIAL SECTOR			
in Total KWH/yr	+14.0%	- 3.3%	+ 2.3%
in KWH/ton	- 0.3%	- 3.1%	- 7.5%
in KWH/NISsales	-13.1%	- 9.0%	-14.0%
COMPARISON TO THE ISRAELI INDUSTRY - AS A WHOLE			
in Total KWH/yr	+10.5%	+ 9.5%	+ 5.5%
in KWH/NISsale	+ 4.2%	-24.1%	+ 8.0%

Notes : M=Million K=Thousands n=nominal
*=Calculated from Table 2.1.1 + tons of tires+tubes statistics
**=Factor Kwh/sales income Rubber+Plastics Ind/Overall industry

Statistical Abstract of Israel-1988, 1989 and 1990

Comments and Discussion:

1. Unit electric power consumption -expressed in KWH/sales for the Rubber and Plastics Industrial Sector has decreased considerably over the 1986-1989 period, which is a positive sign. On the other hand, while the KWH/ton factor has also decreased during the same period, such decrease was not as large than the one expressed in KWH/Sale revenue. The reasons for this may be: a. Increased raw materials costs b. Increased profits. c. Decrease in tire/rubber products production and increased of plastic products instead, as tire and rubber manufacturing requires a higher input of electric power than plastics products manufacturing.

2. The Rubber and Plastics Industrial Sector is less electric power intensive, compared to the average requirement for israeli industry. Unit electric power consumption -expressed in KWH/sales revenue for the Rubber and Plastics Industrial Sector is about 1/3 of the average for overage industry in Israel.

2.12 Economic Industrial Account

The Statistical Abstract of Israel presents Economic Industrial Accounts for Israeli Industry as a whole, and for various major industrial sectors. Plastics industry is shown jointly with the Rubber Industry. The last presentation (appearing in 1990) is for 1987. Since the plastics industrial sector constitutes over 80% of the Plastics + Rubber products sector, the figures(at least in percentages) can be assumed as representative for the plastics industry. Table # 2.12 shows the Economic Industrial Account for the Plastics + Rubber Industrial Sector, and compares the figure to israeli industry as a whole for 1985/86 and 1987.

TABLE # 2.12 PLASTICS INDUSTRY SECTOR - ISRAEL
ECONOMIC INDUSTRIAL ACCOUNT COMPARED TO OVERALL INDUSTRY

YEAR	1985/86					1987				
	OVERALL		PLASTICS*		%/f pl/ovr	OVERALL		PLASTICS*		%/f pl/ovr
	MNISh^	%i	MNISh^	%i		MNISh^	%i	MNISh^	%i	
INCOME										
1.Local Sales	13,532	66	618	67	4.6	19,571	67	1,008	69	5%
2.Exports Sales	6,366	31	298	32	4.7	8,809	30	458	31	5%
3.Work+repairs	422	2	3			639	2	3		
4.For own use	54	<1				93	<1	1		
5.Total income	20,373		919		4.5	29,112		1,470		5%
6Non-ind.income	810		20			385		14		
7.INCOME-total	21,183		939		4.4	29,497		1,484		5%
INVENTORIES										
8+product stock	324		27			82		15		
9+materialstock	81		21			111		18		
PURCHASED INPUT										
10.Input outlay	14,143		611			19,100		998		
11.Consumption	14,224	70	589	61		18,990	65	979	67	
OUTPUT										
12.Gross Output	21,507		966			29,580		1,498		
DOMESTIC PRODUCT										
13.Gross Domest Product	7,283	34	377	39	1.2	10,590	36	519	35	=
14.Wages+Salar.	4,871	23	168	17	0.7	7,862	27	284	19	0.7
15.Rentals	202	1	10	1		278	<1	14	<1	
16.Profit+Capit Return	2,210	10	199	21	2.1	2,450	>8	221	15	1.8
17.Less net financing+Linkg	3,415	16	336	35	2.2	1,613	<6	158	11	
18.Net Profit + OwnCaptl.return	-1,205	-6	- 137	-14	2.3	837	<3	63	>4	1.5

NOTES: * Figures shown are for Platics and Rubber Industry
^MNISh= Figures in Millions NISh at average prices of the year
%i= % on income from industrial operations
%/f pl/ovr = % or factor of plastics industry/overall industry

Sources:The Industry in Israel - Tables for 1987 and 1989.
Ministry of Industry and Trade - August 1988 and 1990
Sources:Statistical Abstract of Israel-1987, 1988 and 1989

SECTION 3

THE PLASTICS INDUSTRY IN ISRAEL (1980-1989) - ECONOMIC ANALYSES BY SUB-SECTORS, END USES AND MARKETS

3.1 General

The previous section presents statistical data of the plastics industry in Israel for the years 1986-1989, based on overall published statistical information.
This section presents financial and economic information and calculated factors, analyzing the Plastic Industry by Processing Methods, End Use Applications, Ownership, Raw Materials, Size of the Plant and other criteria, based on detailed data -on a factory to factory basis-received from the Plastic Department of the Chemical Division of the Ministry of Industry and Trade.

It should be noted that in the data base only exporters, reporting to the Ministry are included. In the data base appears information for over 180 plastic conversion factories, which -by sales volume-represents over 60 % (~61% in 1987, 62 % in 1988) of the total sales of the plastics industries operating in Israel; however, it is believed that the detailed information -as herein presented - can be considered valid for the whole sector.

The detailed data - utilized in this study - was set-up on a Data Base at the S. Neaman Institute - without including the names of the factories, so as to assure confidentiality. However, the data base permits to assign each factory to the relevant processing method and also according to product end use.

Since many of the factories analyzed utilize two or more processes -for example: injection molding and blow molding - in most cases an even split has been used in the analyses. The same is the case for product end-uses; if the factory manufactures products which include packaging, agriculture and industrial components, their sales, exports, manpower, etc. was split into these three components.
In a few instances some exceptions were made to this rule, especially -whenever a factory was specifically identified based on its volume of sales, amount of employees, etc. and a better judgment of the split could be made.

In dividing the exports it was assumed that blow molding and vacuum forming articles - made in Israel- could not compete in the international market place, therefore, export sales from the factories operating such processes - in addition to other major conversion processes - injection molding or extrusion processes- were credited primarily to the major -more export oriented- conversion processes.

The above described rules for splitting, between two or more processing methods and various end products, as well as the exceptions to the rule are somewhat arbitrary; however, this was considered as the best alternative.

A partial print-out from the data base is available on request. Such print-out includes the pertinent information used for the 184 factories which serve as the basis for the detailed analyses in this study. This corresponds to only 37 % of all the Rubber and Plastics Establishments, reported in the Statistical Abstracts (for 1988), but they do represent over 60% of the total sales and 100% of exports for the Plastics Industrial Sub-Sector.

The basic data-base has also been used for the preparation of subsidiary individual data base/spread-sheets showing factory by factory splits of sales, exports, new-investments, employment and other information, categorized by

a). Processing Methods
and b). Product's end -uses.

Such spread sheets -available on request are not presented in this study on a factory by factory basis, but only in the form of summary tables.

3.1 Comparison Between Overall and Partial Detailed Information

Table # 3.1 presents a comparison of various data between the complete overall industrial information, for the Plastics Industry (or for the Rubber and Plastics Products Industrial Sector- in some cases), as presented in the previous section, which is based on statistical information published in " Tables - The Industry in Israel", of the Ministry of Industry and Trade",and in the "Statistical Abstracts of Israel", published by the Central Bureau of Statistics; compared to the partial detailed information, as used in this section, based on factory by factory information, as received by the Plastics Department of the Chemical Division of the Ministry of Industry and Trade; compiled on data base by the S. Neaman Institute.

Such comparison is made -for the purpose of validating the detailed information, -so as to show it`s applicability from analyses standpoints on the industry as a whole. Such comparison will permit inter-relation between Sections 2 and 3 of this Study.

In Section 2, data is presented in Current and in equivalent 1989 Constant New Shekels and Dollars. Since the factors will be the same for current and constant values, all data and information in this section 3 is presented only in CURRENT SHEKELS AND DOLLARS.

Since no information is available for 1986, the comparison is only made for the years 1987-1989.

TABLE # 3.1. PLASTICS INDUSTRY SECTOR - ISRAEL COMPARISON BETWEEN OVERALL PUBLISHED STATISTICAL DATA AND DETAILED -FACTORY TO FACTORY INFORMATION

YEAR	1987	1988	1989
SALES IN CURRENT VALUES			
Plastics Industry -MNISh	1,541.1	1,751.2	2,046.2
Equivalent in M$	963	1,095	1,066
Partial Factories Info-MNIS	936.1	1,088.2	n.a.
Equivalent in M$	585.1	680.1	n.a.
Representing % of Total	60.7%	62.1%	
SALES FROM EXPORTS			
Plastics Industry - M$ *	187.6	230.3	254.9
% Exports on Total Sales	19.5%	21.0%	23.9%
Partial Factories Info-M$	187.6	230.3	254.9
% Exports on Total Sales	32.1%	33.9%	n.a.
Representing % of Total	100 %	100 %	100 %
LOCAL MARKET SALES			
Plastics Industry -MNISh	1,241.0	1,382.9	1,556.8
Equivalent in M$	775.6	864.3	810.8
Local Market/Total Sales	80.5%	79.0%	76.1%
Partial Factories Info-MNIS	636.0	719.7	n.a.
Equivalent in M$	397.5	449.8	n.a.
Local Market/Total Sales	67.9%	58.3%	
Representing % of Total	51.2%	66.1%	
NUMBER OF EMPLOYEES IN PLASTICS INDUSTRY			
Plastics Industry - #	10,820	11,028	10,785
Partial Factories Info - #	6,509	6,757	6,488
Representing % of Total	60.1%	61.3%	60.2%
Sales/Employee - in K $/employee			
Total Industry in K$/emloy.	89.0	99.3	98.8
Partial Factories Info-K$/e	89.9	100.7	
GROSS INVESTMENT (in Current Million NISh and $)			
Rubber+Plastics Indust.MNIS	187.9	119.4	116.1
Equivalent in M$	117.4	74.6	60.5
Gross Investment/TotalSales	12.2%	6.8%	5.7%
Partial Factories Info-MNIS	137.8	99.2	
Equivalent in M$	86.1	62.0	
Gross Investment/TotalSales	14.7%	9.1%	
Representing % of Total	73.3%	83.1%	

Notes : K=Thousand . M = Million
* Export figures for the total industry,as reported in the Tables on The Industry in Israel - Ministry of Industry and Trade- appear to be low; the partial factories information from the Plastics Department of the Ministry seems to be more complete. Since sales in the local market are obtained by difference, these will be affected also. See discussion.

Sources: 1.Plastics Industry information from Tables Industry in Israel -Tables for 1987,1988 and 1989; published by the Ministry of Industry and Trade- August 1988,1989,and 1990.
2.Partial Factory Info: from detailed data-on a factory to factory basis-received from the Plastic Department of the Chemical Division of the Ministry of Industry and Trade- compiled on Data Base by the S.Neaman Institute.

Discussion and Comments.
From Table # 3.1 the following comparisons and comments are pertinent:

1. The detailed data compiled represents information accounting for a total sales income of 60.7% of the total plastics industry in 1987; and 62% in 1988. Total Sales information is not available for 1990.

2. Export sales information is identical as the one presented in Section # 2; as the same source of information is used; i.e. the Rubber and Plastics Department of the Chemical Division of the Ministry of Industry and Trade.

3. Local Market sales are calculated by difference between total sales and exports. The local market information - on a factory to factory basis - represents about 68 % in 1987 and 58% in 1988 of total local market sales; local market sales is only for exporting enterprises.

4. The factories for which the detailed information is available employ about 60 % of the total personnel employed in the Plastics Industry. The factors of sales income per person employed are almost similar for the overall information, as well as for the factories partial information.

5. The gross investment information -shown for the partial factories information corresponds to 73.3 % of the total gross investment in the Rubber and Plastics Products Industrial Sector for 1987, and over 83 % for 1988. The factors of sales income/ gross investments are higher for the specific factories for which details are available (14.& % in 1987, 9.1 % in 1988) than the ones obtained from the published figures for the Rubber and Plastics Products Sector. (12.2% in 1987, and 6.8% in 1988).

3.2 Distribution According to Processing Methods.
Tables # 3.2.1 to 3.2.4 present the partial factories detailed data distributed by major Processing Methods.

3.2.1 Sales
Table # 3.2.1 and Figure # 12 present Sales according to Processes Methods. As stated previously, the division is for about 60 % of the total plastics industry.

TABLE # 3.2.1 SALES DISTRIBUTION BY PROCESSING METHODS

Processing Technology	% in 1987	% in 1988	% in 1989
Sales - M$	585	680	n.a.
1. Injection Molding	31.2	31.4	
2. Extrusion - Total	37.9	38.0	
2.1 Film	13.4	13.0	
2.2 Sheets	7.8	7.8	
2.3 Profiles	7.9	7.7	
2.4 Pipes + Conduits	7.2	8.0	
3. Coating + Lamination	7.3	6.9	
4. Blow Molding	5.5	5.5	
5. Vacuum Forming	3.4	3.7	
6. Foam -Expandable	3.6	3.2	

3.2.2 Export sales

Table # 3.2.2 presents distribution of exports per Conversion Processes. As stated, exports shown in this table represents 100% of the Plastics Industry.

TABLE # 3.2.2 EXPORT DISTRIBUTION BY PROCESSING METHODS			
Processing Technology	% in 1987	% in 1988	% in 1989
Total Exports income M$	187.6	230.3	254.9
1. Injection Molding	40.5	40.0	39.6
2. Extrusion - Total	41.2	42.0	43.5
2.1 Film	11.0	10.5	10.0
2.2 Sheets	13.0	11.8	12.7
2.3 Profiles	7.5	8.3	9.0
2.4 Pipes + Conduits	7.3	9.3	9.7
2.5 Fibers+Filaments	2.4	2.1	2.1
3. Coating + Lamination	6.7	6.6	5.5
4. All other processes	11.6	11.4	11.4

3.2.3 Employment Distribution

Table # 3.2.3 presents employment distribution for about 60 % of the labor force in the plastics industries into the various Processing Methods.

TABLE # 3.2.3 EMPLOYMENT DISTRIBUTION BY PROCESSING METHODS			
Processing Technology	% in 1987	% in 1988	% in 1989
Total Employment #	6,509	6,757	6,488
1. Injection Molding	33.7	33.1	34.3
2. Extrusion - Total	37.6	34.2	32.2
2.1 Film	14.6	14.0	13.3
2.2 Sheets	5.2	5.2	5.1
2.3 Profiles	9.4	7.4	6.9
2.4 Pipes + Conduits	5.4	5.1	4.5
2.5 Fibers+Filaments	3.0	2.5	2.4
3. Coating + Lamination	5.4	5.3	5.5
4. Blow Molding	5.3	6.0	6.2
5. Recycling	5.4	5.3	5.5
6. Vacuum Forming	2.7	4.2	4.3
7. All other processes	9.9	11.9	12.0

3.2.4 Investments

Table # 3.2.4 presents distribution of investments by Processing Methods. The partial information accounts for over 70% in 1987 and over 80% in 1988 of the total investments in the combined Rubber and Plastics Products Industrial Sector.

TABLE # 3.2.4 INVESTMENT DISTRIBUTION BY PROCESSING METHODS

Processing Technology	% in 1987	% in 1988	% in 1989
Total Investments MNISh	138	99	
1. Injection Molding	35.6	46.0	
2. Extrusion - Total	35.8	28.3	
2.1 Film	15.9	8.9	
2.2 Sheets	7.5	9.3	
2.3 Profiles	7.6	4.2	
2.4 Pipes + Conduits	3.7	5.4	
2.5 Fibers+Filaments	1.1	0.5	
3. Foam + Expandable	10.8	8.0	
4. Coating + Lamination	4.1	2.0	
5. Blow Molding	3.5	4.9	
6. Compounding	3.7	2.8	
7. All other processes	6.5	8.0	

3.2.5 Rate of Growth by Processing Methods.

Table # 3.2.5 presents the changes in Sales , Exports, Employment and Investment from year to year for the various Processing Methods.

TABLE #3.2.5 RATE OF GROWTH DISTRIBUTION BY PROCESSING METHODS

PROCESSING METHOD	%increase 1988/1987				%increase 1989/1988			
	Sale Inc* NISh	Xprt Inc. $	Empl * #	New* Invs NISh	Sale Inc* NISh	Xprt Inc. $	Empl * #	New* Invs NISh
Plastics Industry	16.2	22.7	3.8	-28		10.7	-4.0	
1. Injection Molding	17.0	21.3	1.8	-7.1		9.8	-0.3	
2. Extrusion - Total	16.6	25.2	-5.9	-43		14.4	-9.3	
2.1 Film	13.5	16.7	-0.5	-60		3.3	-8.7	
2.2 Sheets	16.3	10.8	2.9	-11		19.2	-6.0	
2.3 Profiles	12.4	36.3	-19	-61		19.7	-10	
2.4 Pipes + Conduit	29.0	56.9	-2.3	23.3		15.2	-14	
2.5 Fibers+Filament	9.2	11.8	-14	-67		8.9	-7.2	
3. Vacuum Forming	23.6	n.s.	67.1	-76		n.s.	0	
4. Blow Molding	18.0	18.9	17.1	2.1		13.8	-0.7	
5. Die Casting	41.3	25.3	5.4	-21		-5.7	-8.7	
6. Compounding	10.6	-11	2.5	-44		32.8	4.8	
7. Coating+Lamination	10.6	20.4	0.3	-65		-7.5	0.6	
8. Calendaring	8.1	2.3	-4.5	-64		-27	-9.5	
9. Recycling	>100	-	24.0	>100		-	-3.2	
10.Foam + Expanded	4.8	n.s.	>100	-47		n.s.	4.7	
10.Rotational Molding	-13	n.s.	16.4	n.s.		n.s.	-12	
11.All other processes	27.2	59.8	14.5	10.7		20.7	-5.9	

Notes : * Plastics Industry refers to the compiled totals of the partial factory by factory data.Not total for the industry. n.s= Although % variation may be high; the absolute figures are non-significant.% are not presented to avoid mis-representation

Analyses and Discussion

Based on the Summary Table on the previous page, and especially from Table # 3.2.5 the following analyses can be made -based on the partial factory to factory detailed information received through the Plastics Department of the Ministry of Industry and Commerce. It should be borne in mind that such information is applicable to exporters only.

a. The industry as a whole:

a.1 An increase of 16 % in sales at current NISh (or in current $, as the rate of exchange between the NISh and $ remained constant) between 1987 and 1988. This is in comparison to an increase of 13.7% for the whole (100%) Plastics Industrial Sector -in Table # 2.1.3 (page 2.3). In constant 1988 NISh this corresponds to a decrease of 3.2%.

a.2 Export of plastics products has been continuously on the increase; this is shown in Table # 2.2.1 (page 2.5), as well as in Tables # 3.2.2 and 3.2.5 in this Section. Increase has been by over over 16 % in 1988, and nearly 11 % in 1989 in current dollars.

a.3 Employment increased by about 4% between 1988 and 1987, but returned to 1987 levels in 1989. This is basically consistent with the overall employment data shown in Table# 2.5(page 2.13).

a.4 There was a sizable drop in gross investments in the Plastics Industry (by 28% in current values, 40% in constant 1988 values) between 1987 and 1988. This is consistent with the overall published data shown for the combined Rubber and Plastics Industrial Sector in Table # 2.6 (page 2.15).

b. The injection molding sub-sector

Sales in current values grew by 17 % between 1988 and 1987, while manpower increased by 1.8 % only. In constant 1988 NISh, there is an actual decrease in sales of 2.6%.
Exports in 1988 increased by over 21% in comparison to 1988, with a further increase of nearly 10% in 1989; (combined 33% for the 1987-1989 period). Such export growth was consistent with the average figures for the whole plastics industry. Injection molded articles represent over 40% of total plastics exports. However, injection molded articles are loosing its export preponderance to extrusion products.
Investments decreased by 7% (in current values, 23% in constant 1988 values) between 1987 and 1988, which was less than the decrease in investments for the whole industry.

c. The extrusion sub-sector

Sales for the whole extrusion sub-sector increased by 16.6% from 1987 to 1988 -equivalent to a 3 % decrease in constant 1988 values. Employment decreased by about 6 % for the same period; and investments in extrusion processes decreased by 43 % in current values (equivalent to 52% in constant values).
Employment decreased by a further 9 % between 1989 and 1988.
Exports for the combined extrusion processes increased by 25 % in current dollars between 1987 and 1988 and by over 14 % in the next year. Extrusion products have shown an interesting export increase between 1987 and 1989, (combined 43% for 1987-1989).
Extruded products represented about 41% of plastic products exports in 1987,increasing to over 43% in 1989.

An overview of the various extrusion processes, based on the data presented in these tables, follows.

c.1 Film Extrusion

Accounts for about 35% of sales income from extrusion processes. Sales increased by 13.5 % in current values between 1987 and 1988 (equivalent to a 5.5% decrease in constant values).
Employment remained practically constant between 1888 and 1987, showing a 9 % decrease in 1989. Investments in film extrusion dropped by 60% in current values - or 67% in constant values- in 1988, in comparison to 1987.
Exports increased by almost 17% in 1988, compared to 1987; but only by 3% in the next year. (22.7% between 1987-1989). In 1987, exports of film represented about 27% of extrusion products (11% of total plastics exports), while in 1989 films only represented about 23% of extruded products (10% of total plastics).

c.2 Sheet Extrusion

The sales from this activity accounts for over 20% of the total sales income from extrusion processes.
Sales income for sheets production increased by 16.3% in current values between 1987 and 1988; equivalent to about 3% decrease in common values. Employment increased by about 3% in 1988, but decreased by about 6 % the year after. Investments in Sheet fabrication processes decreased by 11% between 1988 and 1987 in current values, or about 25.6% in constant values, between 1988 and 1987.
Exports increased by 16% in 1988, and by about 19% in 1989, for a cumulative 32% for the two year period. 1989 sheets exports represent about 29% of total extruded products exports (~13% of total plastics exports).

c.3 Profile Extrusion

Sales from profiles corresponds to about 20 % of total extrusion sales income.
Profiles sales for 1988 increased by only 12.4 % in current values, over the previous year, representing an actual decrease of 6.5 % in constant values. Employment decreased by 19% between 1987 and 1988, and a further 10% during 1989. Investment decreased by 61% in current values between 1987 and 1988, corresponding to a decrease of 67.5% in constant figures.
Exports, on the other hand, increased by 36% in 1988, over the previous year, and almost another 20% between 1988 and 1989; for a cumulative 63% for the 1987-1989 period. Profiles export only represented 18% of extruded products in 1987 (7.5% of total plastics products), increasing to almost 21% of extrusion exports (9% of total plastic products) in 1989.

c.4 Pipe and Conduits Extrusion

This sub-sector also accounts for 20% of the total sales of extrusion processes. It constitutes the only extrusion sub-sector on the increase in constant values. Sales increased by 29 % in current values between 1987 and 1988, corresponding to an increase of over 7 % in constant values.
Employment decreased by 2 % during 1988 and 14% during 1989.
Investment increased by 23 % in current values over 1988, (in absolute figures the 1989 investment was 5.3 million NISh) equivalent to less than 3 % in constant values.
Exports of pipe and conduits show the highest growth during the 1987-1989 period;cumulative of ~81%; 57% in 1988 and 15% in 1989.
Exports of extruded pipes and conduits only represented 17.7% of extruded products exports (7.3% of plastics) in 1987, increasing to 22% of extruded products exports (9.7% of plastics) in 1989.

c.5 Fiber and Filament Extrusion

This sector represents only 4 % of the total extrusion sales . Sales increased by 9% in current values between 1988 and 1987; or a 9 % decrease in constant values. Employment decreased by 14 % during 1988, and a further 7% in 1989. Investment decreased in 1988 by 67% in current values.
Exports showed a cumulative increase of about 22% for the 1987-1989 period, (~12% in 1988, and ~10% in 1989). Fiber and Filament exports account for almost 5% of total extruded products (~2% of plastics) in 1989.

d. Other Processing Methods

After the Injection Molding and Extrusion processes, Coating and Lamination (accounting for some 7% of total plastics industry sales income) and Blow Molding (5.5 % of plastics industry sales income),are the only sub-sectors,above 5% of total plastic sales.

d.1 Blow molding convertors increased their current value sales by 18% between 1987 and 1988 (equivalent to a 2% decrease in constant values). Employment increased by 17% during 1988; exports - although on the increase- are not significant.

d.2 Coating and Lamination Processes increased in sales by only 10.6 % in current values between 1988 and 1987, which represented a decrease of 8% in constant values. Employment remained practically constant. There was a sizable drop in investment in this sub-sector during 1988. Exports increased by 20% in 1988 but decreased by 7.5% during 1989. This sub-sector accounted for 6.6-6.7% of plastics exports in 1987, 1988, dropping to 5.5% in 1989.

d.3 Of all the smaller volume convertors, only Die Casting (representing about 2% of the plastics industry income) and Vacuum Forming (representing less than 4%) convertors showed increases in constant values between 1987 and 1988. Die Casting increase was 41 % in current value - or 17.7% in constant values; Vacuum Forming sales income increased by 23.6% in current values between 1988 and 1987, corresponding to about 3% real increase over this period. Vacuum Forming convertors showed the highest increase in manpower for any conversion sector during the period, i.e.over 100 people -or 67 % increase between 1987 and 1988/1989.

3.2.6 Exports

Table # 3.2.6 presents the ratio between exports sales over total sales for each Processing Technology sub-sectors for the years 1987 and 1988. Since the exports shown represent 100% of the income of factories exporting plastics products, while the income from total sales is only for about 60%, the percentages shown in this table are not representative for the plastics industry as a whole, but only for the group of plastics industries actually exporting. Thus, special care has to be taken not to compare the percentages shown to similar export/total sales income from other industrial sectors, nor other countries.

Of the total group of Plastic factories exporting, about one third of the total in 1987 and 1988 were obtained from exports; the % exports on total sales for injection molding was ~45%, and for all the combined extrusion processes it amounted to about 37% of the total sales. The processes manufacturing large volume/weight plastics articles were obviously the ones with the lowest export/sales income ratio;i.e. blow molded articles :~6%, foamed and expanded articles:<1% and vacuum formed articles:1.4%.

TABLE # 3.2.6

ISRAEL PLASTICS INDUSTRY STATISTICS 1987-1988-1989

SUMMARY OF SALES and EXPORTS, SHOWING CORRESPONDING SHARE OF EACH CONVERSION SECTOR AND SHARE OF EXPORT ON TOTAL MARKET

PROCESSING METHODS	TOTAL INDUSTRY	DISTRIBUTION BY PROCESSING METHODS: INJECTION MOLDING	BLOW MOLDING	EXTRUS FILM	EXTRUS PIPE	EXTRUS SHEETS	EXTRUS PROFILE	EXTRUS FIBR/FIL.	EXTRUS SUB-TOTAL	DIE CASTING	FOAM & EXPANDABL	ROTATION MOLDING	COMPOUN-DING	COATING& LAMINAT.	VACUUM FORMING	CALEN-DERING	OTHER PROCESSES
1.SALES AND PERCENTAGE OF SPECIFIC CONVERSION PROCESSOR SECTOR ON TOTAL INDUSTRY																	
IN 1987 in M.NISh	936.1	278.2	51.1	127.5	67.7	73.4	74.2	15.2	358.0	16.7	31.2	13.3	35.0	68.1	32.2	21.0	30.5
equivalent in M$	585.1	173.9	31.9	79.7	42.3	45.9	46.4	9.5	223.8	10.4	19.5	8.3	21.9	42.6	20.1	13.1	19.1
Percent of Total(1987)		29.7%	5.5%	13.6%	7.2%	7.8%	7.9%	1.6%	38.2%	1.8%	3.3%	1.4%	3.7%	7.3%	3.4%	2.2%	3.3%
IN 1988 in M.NISh	1,088.2	325.4	60.3	144.7	87.3	85.4	83.4	16.6	417.4	23.6	32.7	11.6	38.7	75.3	39.8	22.7	38.8
equivalent in M$	680.1	203.4	37.7	90.4	54.6	53.4	52.1	10.4	260.9	14.8	20.4	7.3	24.2	47.1	24.9	14.2	24.2
Percent of Total (1988)		29.9%	5.5%	13.3%	8.0%	7.8%	7.7%	1.5%	38.4%	2.2%	3.0%	1.1%	3.6%	6.9%	3.7%	2.1%	3.6%
IN 1989 in M.NISh																	
equivalent in M$																	
Percent of Total (1989)																	
2.EXPORTS in MILLION DOLLARS																	
IN 1987	187.6	75.9	2.0	20.7	13.6	24.5	14.0	4.4	77.2	2.8	0.2	0.7	4.6	12.7	0.2	5.1	6.4
Percent of Total (1987)		40.5%	1.0%	11.0%	7.3%	13.0%	7.5%	2.4%	41.2%	1.5%	0.1%	0.4%	2.4%	6.7%	0.1%	2.7%	3.4%
%export/total sales	32.1%	43.6%	6.1%	26.0%	32.2%	53.3%	30.2%	46.5%	34.5%	26.8%	0.9%	8.3%	20.8%	29.7%	0.9%	38.9%	33.3%
IN 1988	230.3	92.0	2.3	24.2	21.4	27.1	19.1	4.9	96.7	3.5	0.2	0.5	4.1	15.2	0.3	5.2	10.2
Percent of Total (1988)		40.0%	1.0%	10.5%	9.3%	11.8%	8.3%	2.1%	42.0%	1.5%	0.1%	0.2%	1.8%	6.6%	0.1%	2.3%	4.4%
%export/total sales	33.9%	45.3%	6.2%	26.7%	39.2%	50.8%	36.6%	47.6%	37.1%	23.8%	0.9%	6.3%	16.9%	32.4%	1.4%	36.9%	41.9%
IN 1989	254.9	101.0	2.6	25.4	24.7	32.3	22.9	5.4	110.6	3.3	0.5	0.9	5.4	14.1	0.3	3.8	12.3
Percent of Total (1989)		39.6%	1.0%	10.0%	9.7%	12.7%	9.0%	2.1%	43.4%	1.3%	0.2%	0.4%	2.1%	5.5%	0.1%	1.5%	4.8%
%export/total sales																	

3.2.7 Factors of Gross Investment/Total Sales , and Total Sales /Employee.

An overview for the major processes, including comparisons to the overall plastics industry is presented hereinafter.

3.2.7.1 Gross Investment/Total Sales

Table # 3.2.7.1 presents a summary of the Gross Investment/ Total Sales for the major Processing Methods. It should be noted that the total investment of 138 million NISh in 1987 is split into ~36% each for injection molding, and total extrusion - processes, ~11% for Foam and Expanded processes. Around 4 % each for coating and lamination processes, blow molding and compounding. The total investment of 99 million NISh in 1988 is split 46 % for injection molding, 28% all extrusion processes, ~8% for Foam and Expandable processes,and ~ 5% for blow molding facilities.

TABLE # 3.2.7.1 INVESTMENT / SALES - BY PROCESSING METHODS

Investment/Sales Income		% in 1987		% in 1988	% in 1989
Rubber + Plastics			12.2	6.8	
Partial Plastic Industry			14.7	9.1	
1. Injection Molding			17.6	14.0	
2. Extrusion - Total			13.5	6.7	
2.1	Film	17.2		6.1	
2.2	Sheets	14.0		10.8	
2.3	Profiles	14.2		4.9	
2.4	Pipes + Conduits	6.4		6.1	
3. Blow Molding			9.4	8.1	
4. Foam + Expanded			47.8	24.2	
5. All other processes			9.4	5.0	

3.2.7.2 Total Sales /Employee

This is an important factor, usually compared between industrial sectors and countries, it is an indication of the change in efficiency from one year to another;it is also a good factor which permits evaluation comparisons as to labor intensiveness of the various Processing Technologies. Table # 3.2.7.2 presents an Overview for the major processes - showing sales /employee in current $, and in constant 1989 $ (translated from 1989 NISh- after Israeli inflationary adjustment).

TABLE # 3.2.7.2 INCOME / EMPLOYEE- BY PROCESSING METHODS

	K$/empl.1987		K$/empl.1988		K$/empl.1989	
Sales Income/Employee in	Curr.$	Con.$	Curr.$	Con.$	Curr.$	Con.$
Plastics Overall(T.#2.4)	89.0	104.9	99.3	97.4	98.8	98.8
Partial Plastic Industry	89.9	105.9	100.7	98.8		
1. Injection Molding	79.2	93.3	91.0	89.3		
2. Extrusion - Total	91.5	107.8	113.4	111.2		
2.1 Film	83.9	98.8	95.7	93.9		
2.2 Sheets	134.5	158.5	152.1	149.2		
2.3 Profiles	75.9	89.4	105.1	103.1		
2.4 Pipes + Conduits	120.9	142.4	159.5	156.4		
3. Blow Molding	92.3	108.7	93.1	91.3		
4. Foam + Expanded	216.7	255.3	107.0	104.9		
5. Coating+Laminating	120.2	141.6	136.2	133.6		
6. Vacuum Forming	125.0	147.3	92.5	90.7		
7. Compounding	180.8	213.0	195.1	191.4		
8. All other processes	88.5	125.0	105.0	103.0		

3.2.8 Research and Development.

Table # 2.8 on page 2.21 presents information on Research and Development (R & D) activities for the Plastics Industry, as reported in the Annual Statistical Abstracts of the Central Bureau of Statistics for the years 1985/86 and 1987. The statistical information indicates that there are only 18 Rubber and Plastics Industrial Sectors performing their own R & D activities. The Data Base, from the information presented by plastics exporters for 1988 shows that of the 184 enterprises over 140 perform R&D themselves, and another 5 have R & D work performed by research institutions, or others.
Table # 3.2.8 presents the Information of R & D Activities, split by Processing Methods.

TABLE # 3.2.8 RESEARCH AND DEVELOPMENT- BY PROCESSING METHODS

RESEARCH AND DEVELOPMENT	Total Fact. #	R&D done in-House		R&D done by Others		No R&D done	
		#	%	#	%	#	%
PLASTICS INDUSTRY-part.	188	142	75.5	5	2.7	45	21.8
1. Injection Molding	60	45	75.0	1	1.7	14	23.3
2. Extrusion - Total	64	52	81.3	1	1.6	11	17.2
2.1 Film	21	14	66.7			7	33.3
2.2 Sheets	11	10	90.9			1	9.1
2.3 Profiles	15	13	86.7	1	6.7	1	6.7
2.4 Pipes + Conduits	12	12	100.				
2.5 Fiber + Filament	5	3	60.0			2	40.0
3. Blow Molding	6	5	83.3			1	16.7
4. Die Casting	7	4	57.1	1	14.3	2	28.6
5. Coating+Laminating	6	5	83.3			1	16.7
6. Vacuum Forming	6	4	66.6			2	33.3
7. Compounding	5	5	100				
8. All other processes	34	22	64.7	2	5.9	10	29.4

3.2.9 The Industry:Breakdown by Ownership and By Factories Size

3.2.9.1 By Ownership

Table # 2.9 - on page 2.23 - presents the breakdown of the Rubber and Plastics Industrial Sector by ownership and by size of factories.
Table # 3.2.9.1 shows Plastics Factory Ownership, for the factories in the Data Base (Exporters) broken down -for 1988-by the major Processing Methods.

TABLE # 3.2.9.1 OWNERSHIP BREAKDOWN - BY PROCESSING METHODS

OWNERSHIP	Total Fact. #	PRIVATE		COOPERATIV KIBBUTZIM		PUBLIC/ STATE	
		#	%	#	%	#	%
PLASTICS INDUSTRY-part.	188	123	65.4	64	34.0	2	1.1
1. Injection Molding	60	41	68.3	18	30.0	1	1.7
2. Extrusion - Total	64	32	50.0	31	48.4	1	1.6
2.1 Film	21	14	66.7	7	33.3		
2.2 Sheets	11	5	45.5	6	54.5		
2.3 Profiles	15	8	53.3	7	46.7		
2.4 Pipes + Conduits	12	3	25.0	9	75.0		
2.5 Fiber + Filament	5	2	40.0	2	40.0	1	20.0
3. Blow Molding	6	6	100.0				
4. Die Casting	7	4	57.1	3	42.9		
5. Coating+Laminating	6	4	66.7	2	33.3		
6. Vacuum Forming	6	4	66.7	2	33.3		
7. Compounding	5	4	80.0	1	20.0		
8. All other processes	34	28	82.4	6	17.6		

3.2.9.2 By Size of Factory - Based on Number of Employees.

Table # 3.2.9.2 shows Plastics Factory broken down for the factories in the Data Base (Exporters) broken down -for 1988-by the major Processing Methods.

TABLE # 3.2.9.2 BREAKDOWN BY SIZE - BY PROCESSING METHODS

SIZE OF FACTORY BASIS:NUMBER EMPLOYEE	Total Fact. #	1-99 Employees		100-299 Employees		over 300 Employees	
		#	%	#	%	#	%
PLASTICS INDUSTRY-part.	184	162	88.0	18	9.8	4	2.2
1. Injection Molding	59	52	88.1	5	8.5	2	3.4
2. Extrusion - Total	61	55	90.2	6	9.8		
2.1 Film	20	17	85.0	3	15.0		
2.2 Sheets	11	11	100 .				
2.3 Profiles	14	13	86.7	1	6.7		
2.4 Pipes + Conduits	11	9	81.8	2	18.2		
2.5 Fiber + Filament	5	5	100.0				
3. Blow Molding	7	5	71.4			2	28.6
4. Die Casting	7	5	71.4	2	28.6		
5. Coating+Laminating	6	4	66.7	2	33.3		
6. Vacuum Forming	6	5	83.3	1	16.7		
7. Compounding	4	4	100.0				
8. All other processes	34	32	94.1	2	58.8		

3.3 Distribution By Products End Use Appliations

3.3.1 Sales

Table # 3.3.1 and Figure # 13 present Sales Income according to Product's End-Uses.

TABLE # 3.3.1 SALES DISTRIBUTION BY PRODUCTS END USES			
End Use	% in 1987	% in 1988	% in 1989
Sales - M$	585	680	
1. Packaging	32.8	32.4	
2. Consumers Goods	8.7	8.7	
3. Construction Uses	17.6	17.1	
4. Agricultural Uses	19.8	20.3	
5. Toys	0.7	0.6	
6. Furniture Components	6.2	6.3	
7. Industrial Appl.	6.3	7.0	
8. Medical Components	0.7	0.5	
9. Military Uses	3.3	3.3	
10. Compound Materials	3.8	3.7	
11. Other Uses	0.1	0.0	

3.3.2 Sales from Exports

Table # 3.3.2 and Figure # 14 present distribution of exports per Product's End-Uses. As stated, exports shown in this table is to be considered for 100% of the Plastics Industry.

TABLE # 3.3.2 EXPORT DISTRIBUTION BY PRODUCTS END USES			
End Use	% in 1987	% in 1988	% in 1989
Total Exports income M$	187.5	230.3	254.9
1. Packaging	20.6	21.0	21.2
2. Consumers Goods	11.2	11.0	10.9
3. Construction Uses	20.0	19.6	19.7
4. Agricultural Uses	27.4	27.4	27.8
5. Toys	1.2	1.2	1.3
6. Furniture Components	7.0	7.2	6.8
7. Industrial Appl.	6.3	7.4	7.6
8. Medical Components	0.7	0.7	0.6
9. Military Uses	3.3	3.1	2.2
10. Compound Materials	2.2	1.5	1.9

3.3.3 Employment Distribution

Table # 3.3.3 and Figure # 15 present employment distribution for about 60 % of the labor force in the plastics industries into the various product's end-uses.

TABLE # 3.3.3. EMPLOYMENT DISTRIBUTION BY PRODUCTS END USES			
End Uses	% in 1987	% in 1988	% in 1989
Total Employment #	6,509	6,757	6,488
1. Packaging	30.9	32.7	32.9
2. Consumers Goods	12.4	11.8	12.8
3. Construction Uses	16.2	15.4	14.5
4. Agricultural Uses	14.2	13.8	14.0
5. Toys	1.3	1.1	1.1
6. Furniture Components	9.9	9.9	10.0
7. Industrial Appl.	8.5	8.8	7.6
8. Medical Components	1.7	1.7	2.2
9. Military Uses	3.1	3.0	2.8
10. Compound Materials	1.8	1.8	2.0

3.3.4 Investments

Table # 3.3.4 presents distribution of investments by Product's End-Uses . The partial information accounts for over 70% in 1987 and over 80% in 1988 of the total investments in the combined Rubber and Plastics Products Industrial Sector.

TABLE # 3.3.4. INVESTMENT DISTRIBUTION BY PRODUCTS END USES			
End Use	% in 1987	% in 1988	% in 1989
Total Investments MNISh	138	99	
1. Packaging	34.6	27.8	
2. Consumers Goods	7.6	8.8	
3. Construction Uses	9.1	10.9	
4. Agricultural Uses	9.5	14.6	
5. Toys	0.2	0.1	
6. Furniture Components	9.8	8.7	
7. Industrial Appl.	22.7	20.5	
8. Medical Components	2.0	2.4	
9. Military Uses	1.2	1.6	
10. Compound Materials	3.8	4.4	

3.3.5 Rate of Growth by End Uses

Table # 3.3.5 presents the changes in Sales , Exports, Employment and Investment from year to year for the various Product's End-Uses.

TABLE # 3.3.5 RATE OF GROWTH DISTRIBUTION BY PRODUCTS END USES

End Use	%increase 1988/1987				%increase 1989/1988			
	Sale Inc* NISh	Xprt Inc. $	Empl * #	New* Invs NISh	Sale Inc* NISh	Xprt Inc. $	Empl * #	New* Invs NISh
Plastics Industry	16.2	22.8	3.8	-28		10.7	-4.0	
1. Packaging	15.2	24.6	9.9	-42		12.1	-3.3	
2. Consumers Goods	16.1	20.0	0.3	-16		9.8	6.5	
3. Construction Uses	12.0	20.9	-1.6	-14		11.1	-9.3	
4. Agricultural Uses	19.0	23.1	0.8	10.7		12.1	-3.0	
5. Toys	-1.5	15.4	-9.4	n.s.		25.9	-9.1	
6. Furniture Component	16.6	26.5	4.0	-36		3.6	-2.5	
7. Industrial Appl.	27.6	43.1	6.5	-35		13.9	-17	
8. Medical Components	-6.6	21.0	5.4	-14		-	23.9	
9. Military Uses	24.0	13.3	-0.5	0		-20	-9.4	
10. Compound materials	13.4	-17	5.1	-15		40.3	3.3	

Notes : * Plastics Industry refers to the compiled totals of the partial factory by factory data.Not total for the industry.

Analyses and Discussion:
Based on the above summary table the following analyses can be made for the plastics factories included in the data base obtained from the Plastics Department; it should be borne in mind that the analyses only applies to the exporting factories.

1. The end-uses showing the major sales increases between 1987 and 1988, were : products for industrial uses (+27.6%); military uses (+24 %); agricultural uses (+19 %); furniture components (+16.6%); consumer goods (+16.1%), packaging (+15.2%), and construction uses (+12%). Medical components showed a decrease of -6.6 % and toys -1.5%.

2. Largest increases in exports between 1987 and 1989 were for industrial uses (+28% average/year), furniture components (+26.5%); packaging components (+18% average/year); agricultural applications (+17.5 % per year); construction uses (+16 % average/year); consumers goods (+14% average/year).

3. Investments decreased for all end-use manufacture, excepting for agricultural applications - which showed an increase in investment of 10.7% between 1987 and 1988.

4. Plastics factories for the production of medical components and consumer goods were the only industries showing an increase in employment.

3.3.6 Exports as a Factor of Sales

Table # 3.3.6 presents the ratio between exports and total sales for each Product End-Use application for the years 1987 and 1988. Since the exports shown represent 100 % of the sales of the factories exporting plastics products, while the income from total sales is only 60 %, such ratios are not necessarily representative for the overall industry, but only for those exporting plastics products.

SUMMARY OF SALES and EXPORTS, SHOWING CORRESPONDING SHARE FOR EACH END USE AND SHARE OF EXPORT ON TOTAL MARKET

END USE	TOTAL INDUSTRY	PACKAGING	CONSUMER GOODS	CONSTRUC USES	AGRICULT USES	TOYS	FURNITURE COMPONENT	INDUSTRY USES	MEDICAL COMPONENT	MILITARY USES	COMPOUND MATERIALS
1.SALES AND PERCENTAGE FOR EACH END USE ON TOTAL INDUSTRY											
IN 1987 in M.NISh	936.1	306.6	81.4	161.7	185.6	6.8	58.5	55.5	6.1	37.5	35.8
equivalent in M$	585.1	191.6	50.9	101.1	116.0	4.3	36.6	34.7	3.8	23.4	22.4
Percent of Total(1987)		32.8%	8.7%	17.3%	19.8%	0.7%	6.2%	5.9%	0.7%	4.0%	3.8%
IN 1988 in M.NISh	1,088.2	353.1	94.5	181.1	220.8	6.7	68.2	70.8	5.7	46.5	40.6
equivalent in M$	680.1	220.7	59.1	113.2	138.0	4.2	42.6	44.2	3.6	29.1	25.4
Percent of Total (1988)		32.4%	8.7%	16.6%	20.3%	0.6%	6.3%	6.5%	0.5%	4.3%	3.7%
IN 1989 in M.NISh											
equivalent in M$											
Percent of Total (1989)											
2.EXPORTS in MILLION DOLLARS											
IN 1987	187.5	38.7	21.0	37.4	51.3	2.3	13.2	11.9	1.2	6.2	4.1
Percent of Total (1987)		20.6%	11.2%	19.9%	27.4%	1.2%	7.0%	6.3%	0.7%	3.3%	2.2%
%export/total sales	32.0%	20.2%	41.3%	37.0%	44.2%	55.1%	36.1%	34.3%	32.5%	26.6%	18.4%
IN 1988	230.3	48.3	25.2	45.2	63.2	2.7	16.7	10.0	1.5	7.1	3.4
Percent of Total (1988)		21.0%	11.0%	19.6%	27.4%	1.2%	7.3%	4.4%	0.7%	3.1%	1.5%
%export/total sales	33.9%	21.9%	42.7%	39.9%	45.8%	65.2%	39.2%	22.7%	42.4%	24.3%	13.4%
IN 1989	254.9	54.1	27.7	50.2	70.9	3.4	17.3	19.4	1.5	5.7	4.8
Percent of Total (1989)		21.2%	10.9%	19.7%	27.8%	1.3%	6.8%	7.6%	0.6%	2.2%	1.9%
%export/total sales											

The highest export/sales ratio is for toys (55% in 1987; 65% in 1988); Agricultural components follows (44 % in 1987 and 46 % in 1988); consumer goods (41% in 1987; and 43% in 1988), furniture and medical components are next in line.

3.3.7 Factors of Gross Investment/Total Sales , and Total Sales/Employee.

3.3.7.1 Gross Investment/Total Sales.

Table # 3.3.7.1 presents a summary of the Gross Investment/Total Sales for the major end-uses.
The highest ratio of investment/sales are shown for factories manufacturing Medical components and Industrial Applications; the lowest investment/sales ratio is for toys.

TABLE # 3.3.7.1 INVESTMENT / SALES BY PRODUCTS END USES

Investment/Sales Income	% in 1987	% in 1988	% in 1989
Rubber + Plastics	12.2	6.8	
Partial Plastic Industry	14.7	9.1	
1. Packaging	15.5	7.8	
2. Consumers Goods	12.8	9.3	
3. Construction Uses	7.7	5.9	
4. Agricultural Uses	7.1	6.6	
5. Toys	4.4	1.5	
6. Furniture Components	23.1	12.6	
7. Industrial Appl.	56.2	28.7	
8. Medical Components	45.9	42.1	
9. Military Uses	4.3	3.4	
10. Compound Materials	14.5	10.8	

3.3.7.2 Sales Per Employee

Table # 3.3.7.2 presents the labor intensiveness factor of sales per employee for the various end-use applications. The table shows the Sales/employee factor on a current and a constant (1989 basis) $ basis.

The production of compounding materials, military applications and agricultural components shows the highest sales income/ employee factors, while medical components, toys, consumer goods, and furniture components show the lowest income/employee factor.

TABLE # 3.3.7.2 INCOME/EMPLOYEE BY PRODUCTS END USES

	K$/empl.1987		K$/empl.1988		K$/empl.1989	
Sales Income/Employee in	Curr.$	Con.$	Curr.$	Con.$	Curr.$	Con.$
Plastics Overall(T.#2.4)	89.0	104.9	99.3	97.4	98.8	98.8
Partial Plastic Industry	89.9	105.9	100.7	98.8		
1. Packaging	95.3	112.2	99.9	98.1		
2. Consumers Goods	63.9	75.2	74.1	72.8		
3. Construction Uses	95.8	112.8	109.0	107.1		
4. Agricultural Uses	125.1	147.3	147.8	145.1		
5. Toys	50.6	59.6	54.5	53.5		
6. Furniture Components	57.0	67.1	63.8	62.6		
7. Industrial Appl.	62.5	73.6	74.8	73.5		
8. Medical Components	34.2	40.2	30.7	30.1		
9. Military Uses	115.3	135.7	144.1	141.5		
10. Compound Materials	191.5	225.4	206.5	202.8		

SECTION 4.

THE PLASTICS INDUSTRY IN ISRAEL - COMPARISON TO OTHER INDUSTRIAL SECTORS IN ISRAEL

4.0 General

This section presents analyses and comparisons between financial and economic data and various economic factors of the Plastics Industry in Israel - as presented in Section 2 of this Study - to other industrial sectors in Israel for the years 1986 to 1989. Growth variations from year to year are also presented.

Comparisons are made in Current Values (NISh or $ -as applicable) of the Plastic Industry for the following industrial and economic sectors:

1. Rubber Goods and Tires.

Since Rubber products, tires and plastic products all belong to the same overall Industrial Sector, the comparison is pertinent for the combined Sector and also specifically for the plastics products, tires and rubber goods sub-sectors.
Furthermore, since part of the information, data and analyses in Section 2 (Tables # 2.5 and onward) are presented for the overall combined Sector, it is pertinent to show the inter-relation of the plastics sub-sector to the combined overall Sector.

2. Chemicals and Oil.

Since Plastics stem from the chemicals and oil industry, it is certainly relevant to present financial, economic comparative data for this Sector.

3. Industrial Products Replaceable by Plastics.

Plastics replaces glass, paper and cardboard, wood and metal products. It is therefore of interest to compare the economic factors of these industrial sectors.

4.1 Comparison of Plastics Industry to Rubber Goods and Tires

Table # 4.1 presents comparisons of Total Sales, Exports, and Local Market; Employment and Investment for the Combined Rubber and Plastics Sector, compared to the same parameters for the separate sub-sectors, showing the % contribution of the plastics sub-sector.

Since the statistical export figures (and therefore local market figures) for the Plastics Industry were corrected based on actual export figures - and not on the export figures appearing in the Statistical Abstract of Israel (see Table # 2.2.1), the corrected figures are the ones used in Table # 4.1.

Table # 4.1.1 presents comparative economic factors;i.e. percentage of exports on total sales; total sales per person employed; percent of investment on total sales.

Growth variations between year and year for each factor are also shown in Table # 4.1.1.

TABLE # 4.1. RUBBER AND PLASTICS INDUSTRY SECTOR - ISRAEL
SALES COMPARISONS BETWEEN RUBBER AND PLASTICS SUB-SECTORS

YEAR	1986	1987	1988	1989
SALES IN MILLION CURRENT NISh				
Rubber+Plastics	1,417.8	1,851.5	1,976.8	2,360.7
Rubber Goods	100.2	117.9	108.7	113.8
Tires & Tubes	199.1	192.4	116.9	200.7
Rubber+ Tires	299.3	310.3	225.6	314.5
% of integrated	21.1%	16.8%	11.4%	13.3%
Plastics	1,118.5	1,541.1	1,751.2	2,046.2
% of integrated	78.9%	83.2%	88.6%	86.7
SALES FROM EXPORTS - IN MILLION CURRENT DOLLARS				
Rubber+Plastics	214.3	268.4	310.2	343.0
Rubber Goods	29.8	31.0	39.6	29.1
Tires & Tubes	45.7	49.8	40.3	59.0
Rubber+ Tires	75.5	80.8	79.9	88.1
% of integrated	35.2%	30.1%	25.8%	25.7%
Plastics *	138.8	187.6	230.3	254.9
% of integrated	64.8%	69.9%	74.2%	74.3%
LOCAL MARKET SALES IN MILLION CURRENT NISh				
Rubber+Plastics	1,098.4	1,422.0	1,480.5	1,702.1
Rubber Goods	55.8	68.3	45.3	57.9
Tires & Tubes	131.0	112.7	52.4	87.4
Rubber+ Tires	186.8	181.0	97.7	145.3
% of integrated	17.0%	12.7%	6.6%	8.5%
Plastics *	911.6	1,241.0	1,382.9	1,556.8
% of integrated	83.0%	87.3%	93.4%	91.5
NUMBER OF EMPLOYEES				
Rubber+Plastics	13,688	14,218	13,708	13,104
Rubber Goods	1,775	1,686	1,548	1,169
Tires & Tubes	1,772	1,712	1,132	1,150
Rubber+ Tires	3,547	3,398	2,680	2,319
% of integrated	25.9%	23.9%	19.6%	17.7%
Plastics	10,141	10,820	11,028	10,785
% of integrated	74.1%	76.1%	80.4%	82.3%
INVESTMENTS IN MILLION CURRENT NISh				
Rubber+Plastics	127.6	187.9	119.4	116.1
Rubber+ Tires		25.1	10.2	
% of integrated		13.4%	8.5%	
Plastics		162.8	109.2	
% of integrated		86.6%	91.5%	

Notes : K=Thousand . M = Million . (n) = Nominal

Sources:The Industry in Israel - Tables for 1987, 1988 1989.
* = Based on revised information -Plastics Department

TABLE # 4.1.1. RUBBER AND PLASTICS INDUSTRY SECTOR - ISRAEL
COMPARISONS BETWEEN RUBBER AND PLASTICS SUB-SECTORS
FACTORS AND VARIATIONS

YEAR	1986	1987	1988	1989
FACTOR : % EXPORT ON TOTAL SALES				
Rubber+Plastics	22.5%	23.3%	25.1%	27.9%
Rubber Goods	44.3%	42.1%	58.3%	49.1%
Tires & Tubes	34.2%	41.4%	55.2%	56.4%
Rubber+ Tires	37.5%	41.6%	56.7%	53.4%
Plastics	18.5%	19.5%	21.0%	23.9%
Fact.Plast/Rubb	0.49	0.47	0.37	0.45
FACTOR : SALES/EMPLOYEE -K$/employee				
Rubber+Plastics	69.5	81.4	90.1	93.8
Rubber Goods	37.9	43.7	44.9	50.7
Tires & Tubes	75.4	70.2	64.5	90.9
Rubber+ Tires	56.6	57.1	52.6	70.6
Plastics	74.1	89.0	99.3	98.8
Fact.Plast/Rubb	1.31	1.56	1.89	1.40
FACTOR : % INVESTMENT ON TOTAL SALES				
Rubber+Plastics	9.0%	10.2%	6.0%	4.9%
Rubber+ Tires		8.1%	4.5%	
Plastics		10.6%	6.2%	
Fact.Plast/Rubb		1.30	1.39	

VARIATIONS (n)%	1987/1986	1988/1987	1989/1988
IN TOTAL SALES (Current NISh Basis)			
Rubber+Plastics	+30.5%	+ 6.8%	+19.4%
Rubber Goods	+17.6%	- 7.8%	+ 4.7%
Tires & Tubes	- 3.4%	-39.2%	+71.7%
Rubber+ Tires	+ 3.7%	-27.3%	+39.4%
Plastics	+37.8%	+13.7%	+16.8%
IN EXPORTS SALES- (Current $ Basis)			
Rubber+Plastics	+25.2%	+15.5%	+10.6%
Rubber Goods	+ 4.0%	+27.7%	-16.5%
Tires & Tubes	+ 7.0%	-19.1%	+46.4%
Rubber+ Tires	+ 3.7%	- 1.1%	+10.3%
Plastics	+35.2%	+22.8%	+10.7%
IN NUMBER OF EMPLOYEES			
Rubber+Plastics	+ 3.8%	- 3.6%	- 4.4%
Rubber Goods	- 5.0%	- 8.2%	-24.5%
Tires & Tubes	- 3.4%	-33.9%	+ 1.6%
Rubber+ Tires	- 4.2%	-21.1%	-13.5%
Plastics	- 6.7%	+ 1.9%	- 2.2%
IN SALES/EMPLOYEE - ($ Basis)			
Rubber+Plastics	+17.1%	+10.7%	+ 4.1%
Rubber Goods	+15.3%	+ 2.7%	+12.9%
Tires & Tubes	- 6.9%	- 8.1%	+40.9%
Rubber+ Tires	+ 0.9%	- 7.9%	+34.2%
Plastics	+20.1%	+11.6%	- 0.5%

Analyses and Discussion:

The followings comments can be made from Tables # 4.1 and 4.1.1 :

1. Total sales of the Plastics sub-sector accounts for over 80 % of the total sales of the Rubber and plastics products sales. The weight of the plastics sub-sector on the total sector has increased in the last years (from ~79% in 1986 to ~87% in 1989). Such relative increase in sales of plastics on total sector sales is due to actual increase in plastics sales, (by about 83% in current NISh, cumulative between 1986-1989) at times when sales of tires and rubber products hardly changed between 1986 and 1989 (increase by only 5% in current NISh during the same period).

2. The export component for tires and rubber products is considerably higher than the export component for plastics products. Since 1988, the export component of the tires and rubber products increased from 37% to well over 50%; however,this is mainly due to drop in local market sales of such products (by over 22 % in current NISh between 1986-1989).
The export component of plastics products increased from 18.5% on total sales in 1986, to almost 24% in 1989.

3. The plastics industry employed almost 80% of the total 13,000+ employees in the Rubber and Plastics Industrial sector. The proportion increased from 74% in 1986 to 82% in 1989.
Due to the strong decrease of total sales in Tires and Rubber goods, the number of employees in these industries decreased from 3,547 in 1986 to 2,319 in 1989. During the same period there was a slight increase in manpower in the plastics industrial sector, from 10,141 employees in 1986 to 10,785 employees in 1989.

4. During 1987 and 1988 most of the investments made in the Rubber and Plastics Products sector were in plastics industry; i.e. 86.6% in 1987, 91.5% in 1988. (no split information is available for 1986 and 1989)

5. The sales /employee factor for the plastics industry is considerably higher than for the combined tires and the rubber goods industries. However, the difference decreased considerably during 1989, as the rubber goods industry increased their sales/employee. The following comparison is of interest :

Sales / employee - K$/employee			
	1986	1989	%increase(86-89)
Plastics	74	99	33.3
Tires	75	91	21.3
Rubber Goods	38	51	34.2
Tires+Rubber	57	71	24.6

6. Based on the statistical information presented in Tables # 4.1 and 4.1.1 it can be seen that the Plastics industry is a much more steady, active sector than the tire/rubber goods industries, showing continuous increase in exports, and a steady local market supply position; while the tires/rubber goods industries are more erratic, facing difficulties in local market sales, requiring acute manpower decreases over the last years.

4.2 Comparison of Plastics Industry to Basic Chemical Industry

Table # 4.2 presents comparisons of Sales , Export, Local Market, Number of Employees , Investments and Capital Stock between the Basic Chemical industrial sector and the Plastics industrial sector, for the years 1986, 1987, 1988 and 1989.

TABLE# 4.2.COMPARISONS BETWEEN THE PLASTICS INDUSTRY AND BASIC CHEMICALS INDUSTRIAL SECTOR

YEAR	1986	1987	1988	1989
SALES IN MILLION CURRENT NISh				
Basic Chemicals	968.8	1,335.2	1,731.0 *	2,170.6
Plastics	1,118.5	1,541.1	1,751.2	2,046.2
Fact.Plast/Chem	1.15	1.15	1.01	0.94
SALES FROM EXPORTS - IN MILLION CURRENT DOLLARS				
Basic Chemicals	429.4	552.8	806.8	857.1
Plastics *	138.8	187.6	230.3	254.9
Fact.Plast/Chem	0.32	0.34	0.29	0.30
LOCAL MARKET SALES IN MILLION CURRENT NISh				
Basic Chemicals	329.0	450.7	440.1	525.0
Plastics *	911.6	1,241.0	1,382.9	1,556.8
Fact.Plast/Chem	2.77	2.75	3.14	2.97
NUMBER OF EMPLOYEES				
Basic Chemicals	5,573	5,629	5,667	5,593
Plastics	10,141	10,820	11,028	10,785
Fact.Plast/Chem	1.82	1.92	1.95	1.93
INVESTMENTS IN MILLION CURRENT NISh				
Basic Chemicals	240.4^	332.0^	390.0^	500.0^
Plastics	127.6**	162.8	109.2	116.1**
Fact.Plast/Chem	0.58	0.49	0.28	0.23
CAPITAL STOCK IN MILLION CURRENT NISh				
Basic Chemicals	3,643.1^	4,465.5^	5,145.3^	6,235.7^
Plastics **	1,047.7	1,356.5	1,626.5	1,962.3
Fact.Plast/Chem	0.29	0.30	0.32	0.32

Notes : K=Thousand . M = Million . (n) = Nominal * = adjusted
^= Chemicals inc. pharmaceutical,insect.**=Rubber + Plastics.

Sources:The Industry in Israel - Tables for 1987, 1988 1989.
* = Based on revised information -Plastics Department

Analyses and Discussion:
Table # 4.2 shows that:

1.While the sales of the plastics industry was, during 1986 and 1987, somewhat higher (~15%) than the sales for the chemical industry, this is not the case anymore; in 1989 plastics sales were 6% lower than the sales from chemical products sales.

2.The chemical industry is much more export oriented than the plastics industry. Exports of chemicals have been 30% or more higher than exports of plastics.

3.Local market consumption of plastics products is considerably higher than consumption of chemicals (by value.)

4. There is about twice the number of employees in the plastics industry than in chemicals (10-11,000 against 5,500 people).

5.New investments in the plastics industry used to be about half of the investments for the chemical industry during 1986 and 1987 but have decreased to about one quarter in 1988, and even less in 1989.

6. Total capital stock in the plastics industry is about 30-32% the capital stock accumulated in the chemical industry. It is well known that while the chemical industry is highly capital intensive, the plastics industry is labor intensive.

4.3 Comparisons between Plastics Industry and other Industrial Sectors Manufacturing Goods Replaceable by Plastics.

Table # 4.3 presents various comparisons and analyses between the Plastics Industrial Sector and several other Sectors, whose products compete with the plastics industry. Such sectors are:

* Wood and wood products
* Paper and Cardboard
* Glass
* Metal products

Since the information shown for metal industries encompasses a wide number of industrial metal products, the total data was analyzed and only the combined data of selected branches of the light metal industry - those which can be replaced by plastic products - are included in the comparison.

Analyses and Discussion :
The following analyses can be made from Table # 4.3:

1. Except for metal products, sales of the plastics industry has and is considerably higher than the sales for the other industries used in the comparison (wood, paper and cardboard and glass). Sales of metal products is almost 17% higher than the sales from plastics.

2. Plastic products export is considerably higher than the export of the other industries. In 1986, sales from metal product export was only about 9% lower than the export of plastic products; however export increase of plastics has been considerably higher than for metal products, and in 1989 sales from metal products export was about 1/3 less than the sales from plastics exports.

3. The Metal and Wood products industries employ a larger number of employees than the plastics industry. Paper and cardboard industry employs about 63 % of the people engaged in the plastics industry. All the industries to which plastics was compared in this group showed considerable manpower decreases between 1986-1989. The plastics industry has been much steadier in it`s manpower variations from year to year, and there has even been a slight increase from 1986 to 1989 (by about 6 %).

4. Of the industries for which new investment information is available, (Wood and Paper and Cardboard), the plastics industry is the one showing the highest new investment in the years 1986 to 1989.

5. Capital Stock (accumulated non-depreciated capital) in the plastics industry is about 2.3 times the capital stock in the Paper and Cardboard industrial sector and well over 3 times the capital stock in the Wood and products industrial sector. .

TABLE# 4.3.COMPARISON BETWEEN THE PLASTICS INDUSTRY AND INDUSTRIAL SECTORS MANUFACTURING GOODS REPLACEABLE BY PLASTICS

YEAR	1986	1987	1988	1989
SALES IN MILLION CURRENT NISh				
Wood + Products	794.1	1,052.8	1,156.1	1,294.7
Paper+Cardboard	842.0	1,088.2	1,222.7	1,441.7
Glass	100.0	111.5	71.7	80.1
Metal Products<	1,270.0	1,692.7	1,959.8	2,392.7
Plastics	1,118.5	1,541.1	1,751.2	2,046.2
SALES FROM EXPORTS - IN MILLION CURRENT DOLLARS				
Wood + Products	36.5	47.1	45.3	47.0
Paper+Cardboard	13.4	19.4	26.2	26.1
Glass	4.8	5.1	6.6	5.6
Metal Products<	126.5	141.2	158.1	170.1
Plastics *	138.8	187.6	230.3	254.9
LOCAL MARKET SALES IN MILLION CURRENT NISh				
Wood + Products	739.7	977.4	1,083.6	1,204.5
Paper+Cardboard	822.0	1,057.2	1,180.8	1,391.6
Glass	92.9	103.3	61.1	69.3
Metal Products<	1,081.5	1,466.8	1,706.8	2,066.1
Plastics *	911.6	1,241.0	1,382.9	1,556.8
NUMBER OF EMPLOYEES				
Wood + Products	13,639	13,830	13,536	11,936
Paper+Cardboard	6,805	7,383	7,370	6,848
Glass	1,063	1,060	892	782
Metal Products<	18,445	18,860	17,020	15,375
Plastics	10,141	10,820	11,028	10,785
INVESTMENTS IN MILLION CURRENT NISh				
Wood + Products	34.5	49.7	30.3	33.2
Paper+Cardboard	35.3	54.6	49.8	40.5
Glass	n.a.	n.a.	n.a.	n.a.
Metal Products<	n.a.	n.a.	n.a.	n.a.
Plastics	127.6**	162.8	109.2	116.1**
CAPITAL STOCK IN MILLION CURRENT NISh				
Wood + Products	386.3	460.1	526.6	606.2
Paper+Cardboard	519.2	633.3	716.9	832.7
Glass	n.a.	n.a.	n.a.	n.a.
Metal Products<	n.a.	n.a.	n.a.	n.a.
Plastics **	1,047.7	1,356.5	1,626.5	1,962.3

Notes : K=Thousand . M = Million . (n) = Nominal * = adjusted
< = selected branches of metal industry. **=Rubber + Plastics.

Sources:The Industry in Israel - Tables for 1987, 1988 1989.
* = Based on revised information -Plastics Department

4.4 Comparisons between Major Economic Factors of the Plastics Industry and other Industrial Sectors.

The comparisons in the previous sections is in absolute values; not less important is to analyze the major economic factors; as well as the growth variations from year to year.

The following parameters are compared between the Plastics Industrial Sector and the various other industries :

* Table # 4.4.1 - Percent sales of Exports on Total Sales
* Table # 4.4.2 - Percent sales of Local Market on Total Sales
* Table # 4.4.3 - Sales per Employee
* Table # 4.4.4 - Percent Investment on Total Sales
* Table # 4.4.5 - Percent Investment on Capital Stock
* Table # 4.4.6 - Total Sales on Capital Stock

Most of these tables also present Comparison of Growth Variations from year to year between 1986 and 1989.

4.4.1 Comparisons of Exports and Sales

Table # 4.4.1 presents comparison as to percent exports on sales for the plastics industry, in comparison to the other industries analyzed, as well as the year to year variations in total sales and in export sales.

Table # 4.4.1 COMPARISONS BETWEEN THE PLASTICS INDUSTRY AND VARIOUS INDUSTRIAL SECTORS : PERCENT EXPORTS SALES ON TOTAL SALES

YEAR	1986	1987	1988	1989
Total Industry	37.9%%	37.7%	32.3 %	36.0%
Plastics	18.5%	19.5%	21.0%	23.9%
Rubber+Plastics	29.9%	29.8%	30.6%	34.9%
Rubber Goods	44.3%	42.1%	58.3%	49.1%
Tires & Tubes	34.2%	41.4%	55.2%	56.4%
Rubber+ Tires	37.5%	41.6%	56.7%	53.4%
Basic Chemicals	66.0%	66.2%	74.6%	75.8%
Wood + Products	6.8%	7.1%	6.3%	7.0%
Paper+Cardboard	2.4%	2.8%	3.4%	3.5%
Glass	7.1%	7.3%	14.7%	13.5%
Metal Products<	14.8%	13.3%	12.9%	13.7%

VARIATIONS (n)%	1987/1986	1988/1987	1989/1988
IN TOTAL SALES (Current NISh Basis)			
Basic Chemicals	+37.0%	- 2.3%	+19.3%
Wood + Products	+32.6%	+ 9.8%	+12.0%
Paper+Cardboard	+29.2%	+12.4%	+17.9%
Glass	+11.5%	-35.7%	+11.7%
Metal Products*	+33.3%	+15.8%	+22.1%
Plastics	+37.8%	+13.7%	+16.8%
IN EXPORTS SALES - (Current $ Basis)			
Basic Chemicals	+28.7%	+45.9%	+ 6.2%
Wood + Products	+29.0%	- 3.8%	+ 3.7%
Paper+Cardboard	+44.8%	+35.1%	- 0.4%
Glass	+ 6.3%	+29.4%	-15.2%
Metal Products	+11.6%	+11.9%	+ 7.6%
Plastics	+35.2%	+22.8%	+10.7%

Notes : K=Thousand . M = Million . (n) = Nominal * = adjusted
< = selected branches of metal industry. **=Rubber + Plastics.

Analyses and Discussion :

1. While the plastics industry shows a considerable higher percentage of export sales on total sales, than the metal,glass, wood and paper and cardboard industries, its export component is considerably lower than that for the chemical, rubber goods and tire industries.

2. The plastics industry shows a higher sales growth than all the other industries analyzed, except the chemical industry. The same conclusion is also true with regard to exports.

4.4.2 Comparisons of Local Market Sales

Table # 4.4.2 presents comparisons as to percent local market sales on total sales for the plastics as well as other industries used in the comparison.
The information of Local Market Sales is actually a result of the difference between Total Sales and Exports.

Table # 4.4.2 COMPARISON BETWEEN THE PLASTICS INDUSTRY AND VARIOUS INDUSTRIAL SECTORS : PERCENT LOCAL MARKET SALES ON TOTAL SALES

YEAR	1986	1987	1988	1989
Israeli Industry	61.3 %	62.3 %	67.8 %	64.0 %
Plastics	81.5%	80.5%	79.0%	76.1%
Rubber+Plastics	77.5%	76.8%	74.9%	72.1%
Rubber Goods	55.7%	57.9%	41.7%	50.9%
Tires & Tubes	65.8%	58.6%	41.7%	46.3%
Rubber+ Tires	63.7%	58.3%	43.3%	46.2%
Basic Chemicals	34.0%	33.8%	25.4%	24.2%
Wood + Products	93.2%	92.8%	93.7%	93.0%
Paper+Cardboard	97.6%	97.2%	96.6%	96.5%
Glass	92.9%	92.7%	85.2%	86.5%
Metal Products<	85.2%	86.7%	87.1%	86.3%

Notes : K=Thousand . M = Million . (n) = Nominal * = adjusted
< = selected branches of metal industry. **=Rubber + Plastics.

Analyses and Discussion:
1. Basic Chemicals is actually the only industry - from the ones entering the comparison - which caters primarily to export, rather tan the local market. Rubber goods industries have also been an industrial sub-sector showing a large export proportion. All the other industrial sectors are primarily local market oriented.

2. Among the group of such local market oriented industries, the plastics industrial sector is the one which shows the highest export trend over the last years.

4.4.3 - Comparisons of Sales per Employee.

Table # 4.4.3 presents comparisons as to the sales per employee, expressed in Thousand Dollars per Employee for the Plastics Industrial Sector, compared to other industries used in the comparison.

Table # 4.4.3 COMPARISON BETWEEN THE PLASTICS INDUSTRY AND VARIOUS INDUSTRIAL SECTORS : SALES/EMPLOYEE -K$/employee

YEAR	1986	1987	1988	1989
Ind.currK$/empl	* 60.7	69.5	85.3	89.7
Plastics	74.1	89.0	99.3	98.8
Rubber+Plastics	69.5	81.4	90.1	93.8
Rubber Goods	37.9	43.7	44.9	50.7
Tires & Tubes	75.4	70.2	64.5	90.9
Rubber+ Tires	56.6	57.1	52.6	70.6
Basic Chemicals	116.7	148.3	190.9	202.1
Wood + Products	39.1	47.6	53.4	56.5
Paper+Cardboard	83.0	89.5	103.7	109.7
Glass	63.1	65.7	50.2	53.3
Metal Products<	46.2	56.1	72.0	81.0

Notes : K=Thousand . M = Million . (n) = Nominal * = adjusted
< = selected branches of metal industry. **=Rubber + Plastics.

VARIATIONS (n)%	1987/1986	1988/1987	1989/1988
IN NUMBER OF EMPLOYEES			
Basic Chemicals	+ 1.0%	+ 0.7%	- 1.3%
Wood + Products	+ 1.4%	- 2.1%	-11.8%
Paper+Cardboard	+ 8.5%	- 0.2%	- 7.1%
Glass	- 0.3%	-15.8%	-12.3%
Metal Products<	+ 2.2%	- 9.7%	- 9.7%
Plastics	- 6.7%	+ 1.9%	- 2.2%
IN SALES/EMPLOYEE - ($ Basis)			
Basic Chemicals	+27.1%	+28.7%	+ 5.9%
Wood + Products	+21.7%	+12.2%	+ 5.8%
Paper+Cardboard	+ 7.8%	+15.9%	+ 5.8%
Glass	+ 4.1%	-23.6%	+ 6.2%
Metal Products<	+21.4%	+28.3%	+12.5%
Plastics	+20.1%	+11.6%	- 0.5%

Analyses and Discussion :

1. In 1989, the Chemical industrial sector is the one that shows the highest sales/employee factor -$202thousand dollars/employee- while the Plastics Industrial Sector has a factor of less that 100thousand dollars/employee. Of all the other industries only the Paper and Cardboard Industrial Sector has a higher factor than Plastics -~110thousand dollars/employee-. All the other industries analyzed have considerably lower sales/employee factors.

2. It is noteworthy that all industries analyzed had a ~6-12% increase in the sales/employee factor, between 1988 and 1989, except the Plastics industrial Sector, which showed a slight decrease. It should be emphasized that while the Metal Products and the Chemical industry experienced cumulative improvements in sales/employee factors of over 70% between 1986 and 1989, the Plastics Industrial Sector only showed a 33% cumulative improvement.

4.4.4 - Comparisons of Percent Investment on Total Sales

Table # 4.4.4 presents comparisons as to the percent investment on total sales for the Plastics Industrial Sector, compared to other industries included in the study.

Table # 4.4.4 COMPARISON BETWEEN THE PLASTICS INDUSTRY AND VARIOUS INDUSTRIAL SECTORS : PERCENT INVESTMENT ON TOTAL SALES

YEAR	1986	1987	1988	1989
Total Industry	5.4%%	6.5%	4.2 %	4.8%
Plastics		10.6%	6.2%	
Rubber+Plastics	9.0%	10.2%	6.0%	4.9%
Rubber+ Tires		8.1%	4.5%	
Basic Chemicals	24.8%	24.1%	22.5%	23.0%
Wood + Products	4.3%	4.7%	2.6%	2.6%
Paper+Cardboard	4.1%	5.0%	4.0%	2.8%

Analysis and Discussion:

Except for the chemical industry, investments in other industries have been below 10% on sales. There was a strong negative investment trend between 1987 and 1988.

4.4.5 - Comparisons of Percent Investment on Capital Stock And Comparisons to Percent Capital Stock Deterioration

Table # 4.4.5 presents comparisons as to the percent investment on capital stock for the Plastics Industrial Sector, compared to other industries used in the comparison. Percent of Capital Stock Deterioration are also shown.

Table # 4.4.5 COMPARISON BETWEEN THE PLASTICS INDUSTRY AND VARIOUS INDUSTRIAL SECTORS: PERCENT INVESTMENT ON CAPITAL STOCK

YEAR	1986	1987	1988	1989
Total Industry	8.3%	8.7%	7.0 %	6.6%
Plastics		11.9%	6.7%	
Basic Chemicals	6.6%	7.2%	7.6%	8.0%
Wood + Products	8.9%	10.6%	5.7%	5.5%
Paper+Cardboard	8.9%	7.8%	6.9%	4.9%
PERCENT CAPITAL STOCK DETERIORATION				
Total Industry	5.1%	4.2%	4.0 %	3.5%
Plastics	4.8%	3.8%	3.2%	2.6%
Basic Chemicals	3.9%	3.3%	3.5%	3.3%
Wood + Products	9.6%	7.1%	5.7%	4.5%
Paper+Cardboard	6.0%	5.2%	6.2%	4.9%

Analysis and Discussion:

For all the industries - including the chemical industry, investments have been below 10% on capital stocks. This factor is relatively low for industry in Israel.
The overall industrial capital stock deterioration is below 5 % per year.The plastics industry has shown the lowest capital stock deterioration factor and the highest investment-deterioration differences over the years, compared to the various industries analyzed.

4.4.6 -Comparisons of Total Sales on Capital Stock

Table # 4.4.6 presents comparisons as to total sales on capital stock ratios for the Plastics Industrial Sector, compared to other industries used in the comparison.

Table # 4.4.6 COMPARISON BETWEEN PLASTICS INDUSTRY AND VARIOUS INDUSTRIAL SECTORS : TOTAL SALES ON CAPITAL STOCK

YEAR	1986	1987	1988	1989
Total Industry	118.9%	120.2%	122.0 %	123.8%
Plastics	112.2%	116.4%	115.4%	120.6%
Basic Chemicals	26.6%	29.9%	33.6%	34.8%
Wood + Products	205.5%	224.9%	219.5%	213.6%
Paper+Cardboard	162.2%	171.8%	170.5%	173.1%

Analyses and Discussion :

The Total Sales/Capital Stock factor for the Plastics Industry is quite similar to Industry as a whole in Israel, and has been on the increase during the years 1986-1989.

4.5. Comparison of Other Economic Factors between the Plastics Industrial Sector and Other Industrial Sectors in Israel.

Table # 4.5.1 presents partial comparative information and data regarding Establishments and Personnel performing Research and Development activities in the various industries, in comparison to the Plastics and Rubber combined industries.

Table # 4.5.2 presents the comparison between Research and Development Expenses and Split of R&D expenses, between the Plastics and rubber and other industries.

Table # 4.5.3 presents a comparison of Ownership details -i.e. factories owned by Private, Labor Confederation and Public companies for the various industries in comparison to Plastics and Rubber Industries.

Table # 4.5.4 presents comparisons of factories size- based on number of employees between the Plastics and Rubber combined industries and the other industrial sectors analyzed.

TABLE #4.5.1. RUBBER AND PLASTICS INDUSTRY SECTOR - ISRAEL
COMPARISON BETWEEN PLASTIC+RUBBER SECTOR AND OTHER SECTORS
RESEARCH AND DEVELOPMENT

	1985/86	1987	% Change
ESTABLISHMENTS AND EMPLOYED PERSONS IN RESEARCH AND DEVELOPMENT			
Establishments engaged in R&D			
Basic Metal +Metal Products	37	37	-
Chemical+Oil Products	26	28	+ 7.7%
Plastics+Rubber	18	18	-
Persons employed in R&D			
Basic Metal +Metal Products	280	340	+21.4%
Chemical+Oil Products	644	690	+ 7.1%
Plastics+Rubber	97	108	+11.3%
Percent on Total Employees			
Basic Metal +Metal Products	0.5%	0.7%	+41.8%
Chemical+Oil Products	3.5%	3.6%	+ 2.9%
Plastics+Rubber	0.7%	0.8%	+14.2%
% on Total R&D in all Industries			
Basic Metal +Metal Products	4.4%	5.9%	+34.1%
Chemical+Oil Products	10.1%	11.9%	+17.8%
Plastics+Rubber	1.5%	1.9%	+26.7%
Graduates			
Basic Metal +Metal Products	144	172	+19.4%
Chemical+Oil Products	419	462	+10.3%
Plastics+Rubber	47	53	+12.8%
Percent of Graduates/R&D			
Basic Metal +Metal Products	51.4%	50.6%	- 1.5%
Chemical+Oil Products	65.1%	67.0%	+ 2.9%
Plastics+Rubber	58.9%	59.3%	< 1.0%
Practical Engineers& Technicians			
Basic Metal +Metal Products	136	168	+23.5%
Chemical+Oil Products	225	228	+ 1.3%
Plastics+Rubber	50	55	+10.0%

Analyses and Discussion :

1. From the above table it can be seen that only in the Chemical Industry there has been an increase in the establishments performing Research and Development, while the Metal and Plastics/Rubber Industrial establishments have remained the same.

2. This is more evident from the expenses in Research and Development activities (Table # 4.5.2), that while in the chemical industry R and D expenses have increased, the opposite is true in the Metal and Plastics/Rubber industries.

TABLE #4.5.2 RUBBER AND PLASTICS INDUSTRY SECTOR - ISRAEL
COMPARISON BETWEEN PLASTIC+RUBBER SECTOR AND OTHER SECTORS
RESEARCH AND DEVELOPMENT EXPENSES

R&D CURRENT EXPENSES	1985/86	1987	%var.
in current MNIS			
Basic Metal +Metal Products	15.08	17.53	+16.2%
Chemical+Oil Products	28.51	45.85	+60.8%
Plastics+Rubber	4.52	5.41	+19.7%
in current M$			
Basic Metal +Metal Products	10.12	10.96	+ 8.3%
Chemical+Oil Products	19.13	28.65	+49.8%
Plastics+Rubber	3.03	3.38	+11.6%
in constant MNIS (1989 equiv.)			
Basic Metal +Metal Products	25.40	24.94	- 1.8%
Chemical+Oil Products	48.01	65.23	+35.9%
Plastics+Rubber	7.83	7.64	- 2.4%
R&D CURRENT EXPENSES/SALES (**)			
Basic Metal +Metal Products	0.43%	0.42%	- 2.3%
Chemical+Oil Products	1.02%	1.32%	+29.4%
Plastics+Rubber	0.33%	0.29%	-12.1%

SPLIT OF R&D EXPENSES	1985/1986		1987		%
	KNISHn nominl	%@R&D CurEx	KNISHn nominl	%@R&D CurEx	Vari-ation
Wages and other Labor expenses					
Basic Metal +Metal Products	7,719	51.2%	9,033	51.5%	+17.0
Chemical+Oil Products	14,961	52.5%	27,880	60.8%	+86.4
Plastics+Rubber	2,080	46.0%	2,839	52.5%	+36.5
Materials and energy					
Basic Metal +Metal Products	5,328	35.3%	3,577	20.4%	-32.9
Chemical+Oil Products	5,114	17.9%	6,251	13.6%	+22.2
Plastics+Rubber	897	19.8%	785	14.5%	-12.5
Other expenses includ.Overhead					
Basic Metal +Metal Products	781	5.2%	2,243	12.8%	+187%
Chemical+Oil Products	3,515	12.3%	6,254	13.6%	+77.9
Plastics+Rubber	220	4.9%	678	12.6%	+209%
Contract and Commission Workes					
Basic Metal +Metal Products	1,256	8.3%	2,677	15.3%	+113%
Chemical+Oil Products	4,919	17.3%	5,467	11.9%	+11.1
Plastics+Rubber	1,322	29.2%	1,103	20.4%	-16.6
Investment Buildings/Equipment					
Basic Metal +Metal Products	2,441		276		-88.7
Chemical+Oil Products	4,111		8,336		+103%
Plastics+Rubber	676		318		-53.0
R&D Financed by Government					
Basic Metal +Metal Products	1,805		2,329		+46.6
Chemical+Oil Products	4,787		6,606		+38.0
Plastics+Rubber	506		1,195		+136%

Source: Statistical Abstract of Israel-1988, 1989 and 1990

TABLE # 4.5.3 RUBBER AND PLASTICS INDUSTRY SECTOR - ISRAEL
COMPARISON BETWEEN RUBBER AND PLASTICS AND OTHER SECTORS
SPLIT BY FACTORIES OWNERSHIP

YEAR	1987		1988		1989	
ESTABLISHMENTS		%indust		%indust		%indust
Wood+Products	1,443	13.4%	1,440	13.6%	1,368	13.3%
Paper	208	1.9%	214	2.0%	217	2.1%
Metal Materials	2,191	20.4%	2,097	19.9%	2,017	19.6%
Chemicals+Oil	239	2.2%	222	2.1%	216	2.1%
Plastics+Rubber	509	4.7%	494	4.7%	478	4.7%
OWNERSHIP	# estab	% in sector	# estab	% in sector	# estab	% in sector
PRIVATE						
Wood+Products	1,124	77.9%	1,130	78.5%	1,079	78.9%
Paper	171	82.2%	176	82.2%	179	82.5%
Metal Materials	1,207	55.1%	1,160	55.3%	1,128	55.9%
Chemicals+Oil	128	53.6%	123	55.4%	120	55.6%
Plastics+Rubber	288	56.6%	294	59.5%	282	59.0%
LABOR CONFEDERATION						
Wood+products	319	22.1%	310	21.5%	289	21.1%
Paper	37	17.8%	38	17.8%	38	17.5%
Metal materials	324	14.8%	283	13.5%	264	13.1%
Chemicals +oil	40	16.7%	34	15.3%	34	15.7%
Plastics+Rubber	221	43.4%	200	40.5%	196	41.0%
PUBLIC						
Wood+ Products	none	-	none	-	none	-
Paper	none	-	none	-	none	-
Metal Materials	660	30.1%	654	31.1%	625	31.0%
Chemicals+Oil	71	29.7%	65	29.3%	63	29.2%
Plastics+Rubber	none	-	none	-	none	-

Sources:The Industry in Israel - Tables for 1987, 1988 1989.

Analyses and Discussions :

It can be seen that while the Wood and Products, and Paper and Cardboard industries are primarily private industries in Israel, the Chemical and Oil, Metal and Plastics/Rubber Industrial Sectors are about 55-59% private owned industries only. About 30% of the Chemicals and Metal industries are of Public Ownership; the Plastics and rubber industrial sector is primarily owned by the Trade Confederation and Kibbutz Movement, in addition to the ~ 60% private ownership.

TABLE # 4.5.4 RUBBER AND PLASTICS INDUSTRY SECTOR - ISRAEL
COMPARISON BETWEEN RUBBER AND PLASTICS AND OTHER SECTORS
SPLIT BY FACTORIES SIZE

YEAR		1987		1988		1989	
FACTORIES SIZE # of Employees		# estab	% in sector	# estab	% in sector	# estab	% in sector
1-99 EMPLOYEES							
Wood+Products		1,029	71.3%	1,055	73.3%	1,031	75.4%
Paper		92	44.2%	101	47.2%	110	50.8%
Metal Materials		1,012	46.2%	1,006	49.9%	988	49.0%
Chemicals+Oil		55	23.0%	51	23.0%	54	25.0%
Plastics+Rubber		326	64.1%	325	65.8%	316	66.1%
100-299 EMPLOYEES							
Wood+Products		126	8.7%	71	4.9%	69	5.0%
Paper		45	21.6%	40	18.7%	37	16.9%
Metal Materials		259	11.8%	233	11.6%	206	10.2%
Chemicals+Oil		51	21.3%	48	21.6%	45	20.8%
Plastics+Rubber		90	17.7%	104	21.1%	108	22.6%
300-499 EMPLOYEES							
Wood+Products	(*)	288	20.0%	246	17.1%	211	15.4%
Paper	(*)	71	34.1%	14	6.5%	31	14.1%
Metal Materials		70	3.2%	40	2.0%	46	2.3%
Chemicals+Oil		18	7.5%	17	7.7%	28	13.0%
Plastics+Rubber	(*)	94	18.5%	41	8.3%	27	5.7%
500+ EMPLOYEES							
Wood+Products		---		68	4.7%	57	4.2%
Paper		---		59	27.5%	39	18.2%
Metal Materials		850	38.8%	818	40.5%	777	38.5%
Chemicals+Oil		115	48.1%	106	47.7%	89	41.2%
Plastics+Rubber		---		24	4.9%	27	5.7%

Notes : (*)-includes +500 size plants.

Sources:The Industry in Israel - Tables for 1987, 1988 1989.

Analyses and Discussion:

While the Chemicals and Oil Industry and to a lesser extent the Metals Industrial Sector are primarily made-up by large sized establishments of 500 employees and more, this is not the case for the plastics/rubber wood and products and paper and cardboard industries, which are primarily made-up by small shops of less than 100 employees. The metal industries are split, about 40% being large concerns, and 50% being small (less than 100 employees) shops.

SECTION 5.

COMPARISON OF ECONOMIC STATUS OF PLASTICS INDUSTRY IN ISRAEL TO PLASTICS INDUSTRIES IN OTHER COUNTRIES

5.0 General

This section presents comparisons between various financial and economic data and factors related to the Plastics Industrial Sector- as presented in Sections 2 and 3 and similar information on Plastics industries in other countries.
Two groups of comparative figures are presented in this Section.

GROUP I. THE LARGE DEVELOPED ECONOMIES

GROUP II. EUROPEAN COUNTRIES OF 4-10 MILLION POPULATION

Group I - The Large Developed Economies comprise The United States, West Germany, Japan, The United Kingdom, France and Italy. The comparison with these large developed economies is aimed at showing the potential of the Plastics Industrial Sector in the highly populated and developed countries.Such comparison is primarily pertinent in regards to future trends and directions.

Group II- European Countries of 4-10 Million Population;these are: Belgium, Austria, Switzerland, Denmark, Finland and Norway.
The comparison of the israeli plastics industry to the plastics industry in these countries is very interesting, as these countries fall into the same overall population group as Israel, and show a similar degree of economic development - with the exception of Belgium and Switzerland -which are more developed economies than Israel.

Table # 5.0 presents basic economic information for 1988 and 1989 for the countries shown in the two Groups.

Performance of the Economy and Plastics Industry in Group II Countries During 1989, and Forecast for 1990.

Belgium : There was an increase in labor costs and a shortage of qualified labor. GDP is forecast to grow by 3.4% in 1990 and 2.7 % in 1991. Inflation is forecast to be 3.2% in 1990 and 3% in 1991. There will be a further decrease in unemployment and deficit of the state budget.
Growth of the Plastics Processing Industry during 1989 was 7.8 % in real terms. Prospects for the 1990s were equally good, although there is some uncertainty about the acceptability of some plastics packaging applications in the future.

Austria : There was a good economic situation in 1989; high orders, flattening exports and increasing legislation in broad sectors of the environment. GDP is forecast to increase by 3.5% in 1990.

Suisse (Switzerland) : During 1989 the labor market was saturated, and there were problems with recruiting new labor force. The weakness of the Swiss Frank has been a problem. The economy was forecast to grow moderately in 1990.
No personnel were available for the Plastics Processing Industry; especially trained/professional people. Major problems were in :
a. Enforcing professional training in this field, due to costs.
b. Quality assurance against prompt competitive deliveries.
c. Safety of the environment in processing and sales.

Denmark : There was an increase in unemployment during 1989; a falling current account deficit; low private consumption and domestic growth. Conditions for competitiveness improved, due to low increase in wage rates,and falling exchange rates for the DKr. Forecasts for 1990, in real terms, were a 1.5% growth in private consumption; 1% growth in GNP; 5% growth in exports and 2% growth in private investment.
For the Danish plastics processing industry 1989 was a good year. Exports went up by 8%, and the investment in machinery valued by the imports in machinery increased by 14%. The national market, however is still suffering from falling private consumption. The Danish plastics processors have therefore rationalized with resulting falling employment and increased productivity. The competitiveness between companies is good, mainly due to low increases in wages.

Finland: There was a high demand for industrial products and difficulties keeping inflation down in 1989. Demands for industrial products is diminishing.The Finnish plastics converting industry has invested considerably in other countries.The industry owns almost the same production capacities abroad as in Finland.

TABLE # 5.0 ISRAEL PLASTICS INDUSTRY COMPARED TO OTHER COUNTRIES GENERAL ECONOMIC DATA AND INFORMATION 1988 AND 1989

	Population -Mill		Labor Force-Mil		Unemployment- %		Nom.GDP % Growth		Inflation %	
YEAR	1988	1989	1988	1989	1988	1989	87/8	88/9	87/8	88/9
GROUP I. THE LARGE DEVELOPED ECONOMIES										
United States	248	248	123	123	5.5	5.3	4.0	3.0	4.4	4.7
West Germany	61.3	61.8	26.2	27.7	8.7	7.9	5.1	4.1	1.0	2.8
Japan	123	123	62	63	2.3	2.1	6.1	6.5	0.7	2.3
United Kingdom	56.6	56.9	27.9	27.9	7.3	6.0	4.5	2.7	6.8	7.8
France	55.7	56.3	24.2	24.4	10.5	9.7	3.5	3.5	3.0	3.5
Italy	57.4	57	24.3	24.0	12.0	12.0	9.0	3.2	5.1	6.6
GROUP II. EUROPEAN COUNTRIES OF 4-10 MILLION POPULATION										
Belgium	9.9	9.9	4.2	4.3	10.4	9.7	3.7	4.4	1.2	3.1
Austria	7.6	7.6	2.8	2.9	4.7	6.2	4.0	6.4	2.0	2.5
Suisse	6.7	6.7	3.1	3.2	0.7	0.5	3.0	3.0	1.9	4.5
Denmark	5.1	5.1	2.8	2.8	8.6	9.4	0.5	5.0	5.0	5.2
Finland	5.0	5.0	2.5	2.6	4.5	2.0	11.3	4.9	5.1	7.1
Norway	4.2	4.2	2.0	2.0	5.5	8.0	-1.1	0.8	8.5	4.0
ISRAEL^	4.5	4.6	1.4	1.5	8.0	9.0	2.0	1.3	24.0	20.7

SOURCES OF INFORMATION: British Plastics Federation/IPAD Status Israel Statistics Abstracts

5.1 NUMBER OF ESTABLISHMENTS

Table # 5.1 presents a comparison of the number of plastic industry establishments between Israel and the other countries, and calculates a factor of Establishments in other countries to establishments in Israel.

TABLE # 5.1 ISRAEL PLASTICS INDUSTRY COMPARED TO OTHER COUNTRIES
NUMBER OF ESTABLISHMENTS

NUMBER OF ESTABLISHMENTS	1987		1988		%VAR 87to 88 *	1989		%VAR 88to 89 *
	Number	F**	Number	F**		Number	F**	
I. IN COMPARISON TO THE LARGE DEVELOPED ECONOMIES								
United States			12,800	25.9		12,800	26.8	-
West Germany			2,138	4.33		2,188	4.58	+2.3
Japan			18,861	38.2		19,553	40.9	+3.7
United Kingdom			4,000	8.10		4,000	8.37	-
France			3,836	7.77		3,836	8.03	-
Italy			5,000	10.1		5,000	10.5	-
II.IN COMPARISON TO EUROPEAN COUNTRIES OF 4-10MILLION POPULATION								
Belgium (9.9M)			141	0.29		137	0.29	-3.0
Austria (7.6M)			294	0.6		300	0.63	+2.0
Suisse (6.7M)			1,400	2.83		1,400	2.93	-
Denmark (5.1M)			419	0.85		338	0.71	-19
Finland (5.0M)			570	1.30		615	1.29	+7.9
Norway (4.2M)			320	0.65		300	0.63	-6.2
ISRAEL^ (4.6M)	509	1.00	494	1.00		478	1.00	-3.2

NOTES: * Variation; percent data for current year/previous year
** Factor : Data for other country/data for Israel; Israel = 1.

SOURCES OF INFORMATION: British Plastics Federation/IPAD Status Report for other countries; Section 2 of this Study for Israel.

DISCUSSION AND COMMENTS :

1. Japan is the country which has the largest number of plastics industry establishments -over 19,500 in 1989 - followed by the United States -12,800. Japan and Germany were the only countries showing an increase in establishments between 1988 and 1989.
2. Italy, United Kingdom and France have between ~4-5,000 plastic industry enterprises; Germany considerably less; i.e. <2,200.
3. Of the countries in Israel`s population group, Switzerland has the largest number of plastics shops (1,400), while Belgium has the lowest number (137); Finland has slightly more (615), while Denmark (338), Norway (300) and Austria (300) have less than

5.2 PRODUCTION OF PLASTICS RAW MATERIALS.

Table # 5.2 presents a comparison of production of Plastics Raw Materials between Israel and the other countries for 1987, 1988 and 1989. Factors of Production of other countries to Israel are included, as well as year to year percentage variations.

TABLE # 5.2 ISRAEL PLASTICS INDUSTRY COMPARED TO OTHER COUNTRIES
PRODUCTION OF PLASTICS RAW MATERIALS - IN K TONS

	1987		1988		%VAR 87to 88 *	1989		%VAR 88to 89 *
	K Tons	F**	K Tons	F**		K Tons	F**	
I. IN COMPARISON TO THE LARGE DEVELOPED ECONOMIES								
United States	25,313	124	27,115	135	7.1	26,556	120	-2.1
West Germany	8,441	41.4	9,160	45.6	8.6	9,065	40.9	-1.0
Japan	10,032	49.2	11,016	54.8	9.8	11,955	54.0	8.5
United Kingdom	1,872	9.18	1,911	9.5	2.1	2,032	9.18	6.3
France	3,865	18.9	4,070	20.2	5.3	4,259	19.2	4.6
Italy	2,820	13.8	2,950	14.7	4.6	3,010	13.6	2.0
II.IN COMPARISON TO EUROPEAN COUNTRIES OF 4-10MILLION POPULATION								
Belgium (9.9M)	2,517	12.3	2,679	13.3	6.4	2,808	12.7	4.8
Austria (7.6M)	743	3.64	861	4.28	15.9	919	4.15	6.7
Suisse (6.7M)	138	0.68	148	0.74	7.2	168	0.76	13.5
Denmark (5.1M)	n.a.		n.a.			n.a.		
Finland (5.0M)	290	1.42	330	1.64	13.8	400	1.81	21.2
Norway (4.2M)	377	1.96	420	2.09	11.4	445	2.00	5.9
ISRAEL (4.6M)	204	1.00	201	1.00	-1.5	221	1.00	10.0

NOTES: * Variation; percent data for current year/previous year
** Factor : Data for other country/data for Israel; Israel = 1.
All tonnage figures in Thousands Metric Tons.

SOURCES OF INFORMATION: British Plastics Federation/IPAD Status Report for other countries; Section 2 of this Study for Israel.

DISCUSSION AND COMMENTS :

1. The United States is the largest producer of plastics raw materials, followed by Japan and West Germany. The United States produced in 1989 over 26 million tons, while Japan produced almost 12 million tons, and Germany over 9 million tons. France (>4 MT),Italy (>3 MT),Belgium (2.8MT) and United Kingdom (>2.0 MT) follow.

2. Of the countries in the population group compared to Israel, Belgium, Austria (900KT), Denmark (445KT) and Finland (400KT) produce larger quantities than Israel, while Switzerland produces less (168 KT). Finland (21%), Switzerland (13%) and Israel (10%) showed the highest rate of production growth between 1988 and 1989.

5.3 CONSUMPTION OF PLASTICS MATERIALS.

Table # 5.3 presents a comparison of consumption of Plastics Materials between Israel and the other countries for 1987, 1988 and 1989. Factors of consumption of other countries to Israel are included, as well as year to year percentage variations.

TABLE # 5.3 ISRAEL PLASTICS INDUSTRY COMPARED TO OTHER COUNTRIES
CONSUMPTION OF PLASTICS MATERIALS - IN K TONS

	1987		1988		%VAR 87to 88 *	1989		%VAR 88to 89 *
	K Tons	F**	K Tons	F**		K Tons	F**	
I. IN COMPARISON TO THE LARGE DEVELOPED ECONOMIES								
United States	23,751	84.2	25,414	87.6	7.0	26,957	87.2	6.1
West Germany	7,437	26.4	7,828	27.0	5.3	8,088	26.2	3.3
Japan	8,845	31.4	9,969	34.4	12.7	10,987	35.6	10.2
United Kingdom	3,012	10.7	3,251	11.2	7.9	3,445	11.1	5.9
France	3,243	11.5	3,309	11.4	2.0	3,611	11.7	9.1
Italy	3,725	13.2	3,760	12.9	0.9	4,000	12.9	6.4
II.IN COMPARISON TO EUROPEAN COUNTRIES OF 4-10MILLION POPULATION								
Belgium (9.9M)	1,022	3.6	1,357	4.7	32.8	1,426	4.6	5.1
Austria (7.6M)	734	2.6	870	3.0	18.5	776	2.5	-11
Suisse (6.7M)	541	1.9	597	2.1	10.4	627	2.0	5.0
Denmark (5.1M)	435	1.5	471	1.6	8.3	470	1.5	-0.2
Finland (5.0M)	372	1.3	385	1.3	3.5	420	1.4	9.1
Norway (4.2M)	268	0.9	263	0.9	-1.8	310	1.0	17.9
ISRAEL (4.6M)	282	1.0	290	1.0	2.8	309	1.0	6.6

NOTES: * Variation; percent data for current year/previous year
** Factor : Data for other country/data for Israel; Israel = 1.
All tonnage figures in Thousands Metric Tons.

SOURCES OF INFORMATION: British Plastics Federation/IPAD Status Report for other countries; Section 2 of this Study for Israel.

DISCUSSION AND COMMENTS :

1. The United States is the largest consumer of plastics materials, followed by Japan and West Germany. The United States consumed in 1989 close to 27 million tons, while Japan almost 11 million tons,and Germany about 8 million tons.Italy (4 MT), France (3.6MT) and United Kingdom(>3.4 MT) are the next largest consumers
2. Of the countries in the population group compared to Israel, Belgium (>1.4MT), Austria (776KT), Switzerland (627KT), Denmark (470KT) and Finland (420KT) consume larger quantities than Israel, while Norway (310 KT) consumes the same as Israel. Norway (~18%), Japan (10%) and Finland (9%) had the highest rate of consumption

5.4 CONSUMPTION PER CAPITA.

Table # 5.4 and Figure # 16 present a comparison of consumption of Plastics Materials per capita, between Israel and the other countries for 1987, 1988 and 1989. Factors of consumption of other countries to Israel are included,as well as year to year percentage variations.

TABLE # 5.4 ISRAEL PLASTICS INDUSTRY COMPARED TO OTHER COUNTRIES CONSUMPTION PER CAPITA IN KG/PERSON/YEAR

PER CAPITA CONSUMPTION	1987		1988		%VAR 87to 88 *	1989		%VAR 88to 89 *
	Kg/p/y	F**	Kg/p/y	F**		Kg/p/y	F**	
I. IN COMPARISON TO THE LARGE DEVELOPED ECONOMIES								
United States	98.0	1.5	104.0	1.6	6.1	108.0	1.6	3.8
West Germany	120.8	1.9	127.7	1.9	5.7	130.9	1.9	2.5
Japan	72.3	1.1	81.2	1.3	12.3	89.1	1.3	9.7
United Kingdom	53.2	0.8	57.4	0.9	7.9	60.5	0.9	5.4
France	58.0	0.9	59.0	0.9	1.7	64.0	0.9	8.5
Italy	65.0	1.0	66.0	1.0	1.5	70.0	1.0	6.0
II.IN COMPARISON TO EUROPEAN COUNTRIES OF 4-10MILLION POPULATION								
Belgium (9.9M)	103.0	1.6	137.0	2.1	33.0	144.0	2.1	5.1
Austria (7.6M)	96.8	1.5	114.6	1.8	18.4	101.7	1.5	-11
Suisse (6.7M)	81.7	1.3	89.5	1.4	9.5	93.2	1.4	4.1
Denmark (5.1M)	84.8	1.3	92.0	1.4	8.5	91.0	1.3	-1.0
Finland (5.0M)	71.0	1.1	77.0	1.2	8.4	84.0	1.2	9.0
Norway (4.2M)	65.0	1.0	63.0	0.9	-3.1	73.0	1.1	15.9
ISRAEL (4.6M)	64.0	1.0	64.8	1.0	1.3	67.8	1.0	4.6

NOTES: * Variation; percent data for current year/previous year
** Factor : Data for other country/data for Israel; Israel = 1.

SOURCES OF INFORMATION: British Plastics Federation/IPAD Status Report for other countries; Section 2 of this Study for Israel.

DISCUSSION AND COMMENTS :

1. Belgium (144 Kg/person/year), Germany (131 Kg/p/y) and the United States (108 Kg/p/y) are the largest per capita consumers of plastics products. Israel per capita consumption (~68 Kg/p/y) is in the same order than Italy (70 Kg/p/y), and somewhat above the per capita consumption of France (64 Kg/p/y) and the United Kingdom (60.5 Kg/p/y).Austria (102 Kg/p/y),Switzerland(93 Kg/p/y), Denmark (91 Kg/p/y), Japan (89 Kg/p/y), Finland (84 Kg/p/y) and Norway (73 Kg/p/y) are all above Israel.
2. Norway (~ 16 %), Japan (~10%) and Finland (9%) experienced the largest growth in per capita consumption between 1988 and 1989. Austria evidenced the strongest decline(-11%) for the same period.

5.5 SALES FROM PLASTICS PRODUCTS

Table # 5.5 presents a comparison of the Sales Values of plastics manufactured products in current Dollars between Israel and the other countries for 1988 and 1989. Factors of Sales Values of other countries to Israel are included.

TABLE # 5.5 ISRAEL PLASTICS INDUSTRY COMPARED TO OTHER COUNTRIES
SALES VALUE OF PLASTICS PRODUCTS IN MILLION U.S.DOLLARS

SALES VALUE	1987		1988		%VAR 87to 88 *	1989		%VAR 88to 89 *
	M US $	F**	M US $	F**		M US $	F**	
I. IN COMPARISON TO THE LARGE DEVELOPED ECONOMIES								
United States			60,206	55.0		68,186	64.0	13.3
West Germany			24,541	22.4		25,745	24.2	4.9
Japan			69,325	63.3		68,643	64.4	-1.0
United Kingdom			14,476	13.2		15,314	14.4	5.8
France			11,074	10.1		11,608	10.9	4.8
Italy			11,678	10.7		12,088	11.3	3.5
II.IN COMPARISON TO EUROPEAN COUNTRIES OF 4-10MILLION POPULATION								
Belgium (9.9M)			2,570	2.3		2,730	2.6	6.2
Austria (7.6M)			1,264	1.2		1,356	1.3	7.3
Suisse (6.7M)			n.a.			2,445	2.3	n.a.
Denmark (5.1M)			1,899	1.7		1,749	1.6	-7.9
Finland (5.0M)			1,119	1.0		1,279	1.2	14.3
Norway (4.2M)			n.a.			n.a.		
ISRAEL (4.6M)	963		1,095	1.0		1,066	1.0	-2.6

NOTES: * Variation; percent data for current year/previous year
** Factor : Data for other country/data for Israel; Israel = 1.
All money values in Million Current Dollars.

SOURCES OF INFORMATION: British Plastics Federation/IPAD Status Report for other countries; Section 2 of this Study for Israel.

DISCUSSION AND COMMENTS :

1. Although sales income from plastic products was higher in Japan than in the United States for 1988; the income figures for 1989 are very similar for Japan and USA (>68 billion dollars). West Germany sales income was almost 26 billion dollars in 1989. United Kingdom, Italy and France sales income ranged between 11.6-15.3 billion dollars, each, in 1989. The largest increase in sales income between 1988 and 1989 was in the United States (13%). Europe`s increase was about 5%,while Japan decreased income by 1%.
2. Of the countries in Israel`s population group, Belgium and Switzerland show the highest sales income, (2.7 and 2.4 billion dollars respectively), followed by Denmark (1.7 billion dollars). Austria and Finland are slightly above Israel`s 1 billion sales

5.6 NUMBER OF EMPLOYEES IN PLASTICS INDUSTRY

Table # 5.6 shows comparisons as to the number of persons, working in the Plastics Industry in Israel,compared to the other countries within the groups established. For each country the corresponding percentage on the labor force has been calculated, and variations between 1988 and 1989 are also included in the table.

TABLE # 5.6 ISRAEL PLASTICS INDUSTRY COMPARED TO OTHER COUNTRIES
NUMBER OF EMPLOYEES - THOUSANDS EMPLOYEES

NUMBER OF PERSONS	1987		1988		%VAR 87to 88 *	1989		%VAR 88to 89 *
	Number	F**	Number	%**		Number	%**	
I. IN COMPARISON TO THE LARGE DEVELOPED ECONOMIES								
United States			605	0.5		605	0.5	0.0
West Germany			245	1.0		258.6	0.9	5.6
Japan			397.2	0.6		417.8	0.7	5.2
United Kingdom			180	0.6		180	0.6	0.0
France			122.1	0.5		127.6	0.5	4.5
Italy			104	0.4		115	0.5	10.6
II.IN COMPARISON TO EUROPEAN COUNTRIES OF 4-10MILLION POPULATION								
Belgium (9.9M)			14.7	0.4		15.2	0.4	3.4
Austria (7.6M)			13.6	0.5		14.2	0.5	4.4
Suisse (6.7M)			21.7	0.7		22.9	0.7	5.5
Denmark (5.1M)			16.7	0.6		15	0.5	-10
Finland (5.0M)			12	0.5		13.1	0.5	9.2
Norway (4.2M)			6.8	0.3		6.5	0.3	-4.4
ISRAEL (4.6M)	10.8	1.0	11.0	0.8	1.8	10.8	0.7	-1.8

NOTES: * Variation; percent data for current year/previous year
** Percent employees in plastics industry on total labor force

SOURCES OF INFORMATION: British Plastics Federation/IPAD Status Report for other countries; Section 2 of this Study for Israel.

DISCUSSION AND COMMENTS :

1. The United States is the country with the largest number of persons engaged in the Plastics Industry (over 600 thousand), followed by Japan (over 400 thousand) and Germany (>250 thousand).
2. In Group II, Switzerland - with it`s many small plastics processing shops, employs the largest number of people; i.e almost 23 thousand. Belgium, Austria, Finland and Denmark employ a lower number of people (11-15 thousand people), notwithstanding that Belgium`s sales income from plastics is about twice the income of the other countries.
3. In all countries analyzed, employees in the plastics industry represent less than 1% of the total labor force. In the analysis, Israel shows the highest percentage of workers in plastics (0.8%).

5.7 SALES PER EMPLOYEE.

Table # 5.7 and Figure #17 show comparisons as to the yearly sales income per employee in the Plastics Industry in Israel, compared to the other countries. Factors between Israel and other countries are presented, as well as variations between 1988 and 1989.

TABLE # 5.7 ISRAEL PLASTICS INDUSTRY COMPARED TO OTHER COUNTRIES
SALES INCOME PER EMPLOYEE IN THOUSAND U.S.DOLLARS

SALES PER EMPLOYEE	1987		1988		%VAR 87to 88 *	1989		%VAR 88to 89 *
	K$/emp	F**	K$/emp	F**		K$/emp	F**	
I. IN COMPARISON TO THE LARGE DEVELOPED ECONOMIES								
United States			99.5	1.0		112.7	1.14	+13
West Germany			100	1.01		99.5	1.01	-0.5
Japan			174.5	1.76		164.3	1.66	-5.9
United Kingdom			80.4	0.81		85.0	0.86	+5.7
France			90.6	0.91		89.4	0.91	-1.3
Italy			112.3	1.13		104.8	1.06	-6.7
II.IN COMPARISON TO EUROPEAN COUNTRIES OF 4-10MILLION POPULATION								
Belgium (9.9M)			173.9	1.75		180.0	1.82	+3.5
Austria (7.6M)			93.1	0.94		95.8	0.97	+2.9
Suisse (6.7M)			n.a.			106.8	1.08	n.a.
Denmark (5.1M)			113.4	1.14		118.2	1.20	+4.2
Finland (5.0M)			93.0	0.94		97.7	0.99	+5.1
Norway (4.2M)			n.a.			n.a.		n.a.
ISRAEL (4.6M)			99.3			98.8		-0.5

NOTES: * Variation; percent data for current year/previous year
** Factor : Data for other country/data for Israel; Israel = 1.

SOURCES OF INFORMATION: British Plastics Federation/IPAD Status Report for other countries; Section 2 of this Study for Israel.

DISCUSSION AND COMMENTS :

1. Belgium (180 K$/employee) and Japan (164 K$/employee) show the highest sales income per employee,although their plastics industry set-up are diametrically opposite. In Japan there are many small sized labor-intensive plastics processors, while in Belgium there are primarily modern highly automated plastics factories.
2. The rest of the countries analyzed show approximately the same range of income per employee-between $80,000-118,000 $/employee; with Denmark (118 K$) being on the top of the scale, and the United Kingdom (85K$) and France (89 K$) being at the lower end of the range. Israel is in the middle (close to 100 K$), jointly with Finland, Austria and Germany.
3. Israel -like Germany, Japan, France and Italy showed a decrease in sales income/employee,while the U.S.showed a sizable increase.

5.8 SIZE OF PLANTS (BY EMPLOYEES)

Table # 5.8 and Figure # 18 show comparisons as to the distribution of plants by size, based on the number of employees working in a plant, between the Plastics Industry in Israel, compared to the other countries within the groups established.

TABLE # 5.8 ISRAEL PLASTICS INDUSTRY COMPARED TO OTHER COUNTRIES
DISTRIBUTION OF PLANTS BY SIZE - IN PERCENTAGES

NUMBER OF ESTABLISHMENTS	1988				1989			
	1-99	100-*299	300-*499	>500	1-99	100-*299	300-*499	>500
I. IN COMPARISON TO THE LARGE DEVELOPED ECONOMIES								
United States	75.0	5.0	5.0	15.0	75.0	5.0	5.0	15.0
West Germany	71.0	13.0	13.0	3.0	26.3	20.3	20.3	33.1
Japan	96.9	1.5	1.5	0.1	96.6	1.6	1.6	0.2
United Kingdom	81.8	8.6	8.6	1.1	79.8	9.5	9.5	1.4
France	95.0	2.0	2.0	1.0	95.0	2.3	2.3	0.5
Italy	98.5	0.7	0.7	0.2	85.0	2.5	2.5	10.0
II.IN COMPARISON TO EUROPEAN COUNTRIES OF 4-10MILLION POPULATION								
Belgium (9.9M)	67.0	15.0	15.0	3.0	67.0	15.0	15.0	3.0
Austria (7.6M)	87.0	6.0	6.0	1.0	88.0	5.5	5.5	1.0
Suisse (6.7M)	n.a.	n.a	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Denmark (5.1M)	87.0	2.2	2.2	8.6	89.0	5.0	5.0	1.0
Finland (5.0M)	n.a	n.a.	n.a.	n.a.	96.0	2.0	2.0	0.0
Norway (4.2M)	88.0	6.0	6.0	0.0	90.0	5.0	5.0	0.0
ISRAEL (4.6M)	65.8	21.1	8.3	4.8	66.1	22.6	5.6	5.6

SOURCES OF INFORMATION: British Plastics Federation/IPAD Status Report for other countries; Section 2 of this Study for Israel.

*as the data of plant size in the world is divided differently; for 100-299 and 300-499 it was taken as 50%-50% of the given data.

DISCUSSION AND COMMENTS :

1. Japan, France and Italy have the largest amount of small plants -even to the extent of having a large proportion of plants of 10 employees and less. Germany appears to have undertaken a drastic change for size increase and rationalization. Israel appears to have a relatively large group in the 100-300 employee cluster, while Belgium appears to have several 300-500 employee sized plants. West Germany and the United States appear as the leaders in the larger 500 + employee group.
2. It is believed that the information presented in the reports of IPAD is not consistent between 1988 and 1989.

5.9 COMPARISON AS TO SALES DISTRIBUTION BY END USES

Table # 5.9 shows comparisons as to sales distributions by end uses - for the year 1989 - expressed in percentage of the total sales, in Israel compared to the other countries in the two groups analyzed. Since several countries (France, Belgium) do not show the end-use split in a detailed form, but rather in combined groups, the comparison is not always valid

TABLE # 5.9 ISRAEL PLASTICS INDUSTRY COMPARED TO OTHER COUNTRIES
SALES DISTRIBUTION BY END USES - IN PERCENTAGE OF TOTAL CONSUMPTION

END - USE	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
I. IN COMPARISON TO THE LARGE DEVELOPED ECONOMIES - % -											
United States	31	10	22	0	4	4	**	6	0	0	23
West Germany	21	7	19	5	13	9	3	7	10	1	5
Japan	27.6	8.4	10.6	2.3	9	1	1.5	13.1	4.2	0.1	22.2
United Kingdom	35	4	24	2	6	5	4	10	2	1.6	6.4
France	30.5	n.a.	16.6	5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	42.4
Italy	41	4	13	6	7	5	n.a.	n.a.	n.a.	n.a.	24
II.IN COMPARISON TO EUROPEAN COUNTRIES OF 4-10 MILLION POPULATION -%-											
Belgium (9.9M)	33	7	24	n.a.	n.a.	5	n.a.	n.a.	n.a.	n.a.	31
Austria (7.6M)	32	3	20	5	6	7	2	12	6	1	6
Suisse (6.7M)	23	5	24	6	4	5	0	13	8	0	12
Denmark (5.1M)	21	5	27	2	5	3	17	7	2	7	4
Finland (5.0M)	47	1	31	1	3	2	1	7	1	-	6
Norway (4.2M)	27	2	26	11	0	3	2	16	5	-	8
ISRAEL (4.6M)	32	8.7	17	20	3 *	6	0.7	***	7	0.7	4.9

NUMBER CODE FOR END - USES

1. = PACKAGING
2. = HOUSEWARES
3. = BUILDING
4. = AGRICULTURAL
5. = AUTOMOTIVE + OTHER TRANSPORT
6. = FURNITURE
7. = TOYS
8. = ELECTRIC/ELECTRONIC
9. = ENGINEERING/INDUSTRIAL
10. = MEDICAL COMPONENTS
11. = OTHERS

NOTES: *Use for Military Industries;considered primarily as transport
** Included in Housewares. *** Included in Industrial/engineering

SOURCES OF INFORMATION: British Plastics Federation/IPAD Status Report for other countries; Section 3 of this Study for Israel.

Discussion and Comments

1. Packaging (Group 1) appears to be the major end use application in all the countries analyzed. In Finland (47%) and Italy (41%) this application corresponds to a higher percentage than the 30-35% characteristic in the most other countries. In Germany and Denmark the percentage of application in packaging is lower; i.e. 21%.

2. The next largest use of plastics products in most countries is in Building applications (Group 3). This application accounts for over 20 % of plastics consumption in the United States, United Kingdom, Belgium, Switzerland, Austria, Denmark, Norway and Finland (Where it constitutes 31%). In West Germany (19%), Israel (17%) and France (16.6%) it is reaching close to 20%, and on the increase. Only in Italy (13%) and Japan (10.6%) this application is relatively low.

3. Israel is the leader in plastics applications for agricultural uses, (Group 4) with 20% of the total plastics sales being consumed in this application.Norway is the only other country - of the two groups analyzed- to show any sizable consumption (11% of total) in this application.

4. Norway (16%), Japan and Switzerland (13% each), Austria (12%) and the United Kingdom (10%) show are relatively high consumption of plastics materials for electric and electronic applications (Group 8).

5. Germany (13%), followed by Japan (9%), Italy (7%) , United Kingdom and Austria (6% each) are the leaders of plastics consumption in Automotive and other transport applications (Group 5).

6. United States (10%), Japan (8.4%), Israel (8.7%), Germany and Belgium (7% each) show the largest proportion in plastics consumption for housewares (Group 2). However, since the "houseware" classification, is not necessarily consistent in the various countries, the comparison may be misleading.

7. West Germany (10%), Switzerland (8%) and Israel (7%) show the highest relative consumption of plastics materials in engineering and industrial applications;while consumption for furniture appears to be highest in West Germany (9%), Austria (7%) and Israel (6%). Denmark is the outstanding consumer of plastics materials for toys manufacture.

5.10 COMPARISON AS TO SALES VALUE OF PLASTICS PROCESSING MACHINERY.

Table # 5.10 shows comparisons as to sales value of Plastics processing machinery for the year 1987, 1988 and 1989 - in Israel compared to the other countries in the two groups analyzed.
Factors of comparison between the various countries to Israel are also shown, as well as variations from year to year.

TABLE #5.10 ISRAEL PLASTICS INDUSTRY COMPARED TO OTHER COUNTRIES
SALES OF PLASTICS PROCESSING MACHINERY - M$

	1987		1988		%VAR 87to 88 *	1989		%VAR 88to 89 *
	M $	F**	M $	F**		M $	F**	
I. IN COMPARISON TO THE LARGE DEVELOPED ECONOMIES								
United States@	338.8		397.3	13.6	17.3	436.6	23.1	9.9
West Germany ~	3288.4		3538.3	121	7.6	3487.2	185	-1.4
Japan	1438.2		1767.6	60.5	22.9	1889.9	99.9	6.9
United Kingdom	86.9		98.9	3.4	13.7	114.7	6.1	16.0
France	2703.7		949.0	32.5	-65	1010.2	53.4	6.4
Italy	1676.8		1904.8	65.2	13.6	2190.5	116	15.0
II.IN COMPARISON TO EUROPEAN COUNTRIES OF 4-10MILLION POPULATION								
Belgium (9.9M)	n.a.		n.a.	--	--	n.a.	--	--
Austria (7.6M)	299.3		315.0	10.8	5.2	338.6	17.9	7.5
Suisse (6.7M)	n.a.		517.0	17.7	--	609.0	32.2	17.8
Denmark (5.1M)	n.a.		49.6	1.7	--	57.7	3.1	16.4
Finland (5.0M)	n.a.		n.a.	--	--	n.a.	--	--
Norway# (4.2M)	20.2		21.5	0.7	6.5	24.3	1.3	13.0
ISRAEL# (4.6M)			29.2	1.0		18.9	1.0	-35

NOTES: * Variation; percent data for current year/previous year
** Factor : Data for other country/data for Israel; Israel = 1.
All money values in Million Current Dollars.

@ - injection molding & extrusion machinery only.
~ - production value only.
# - plastics processing machinery IMPORT only.

SOURCES OF INFORMATION: British Plastics Federation/IPAD Status Report for other countries; Section 2 of this Study for Israel.

DISCUSSION AND COMMENTS :

1. Germany, followed by Italy, and Japan were the largest sellers of Plastics Processing Machinery in 1989. The United States shows a relatively low sales figure; even considering that the figures are for injection molding and extrusion machinery only.
2. Of the 4-10 Million Group II countries Switzerland is by far the largest seller of Plastics Machinery with over 600 million dollars. However it is expected that most of this amount is exported.
3. The figures appearing for Norway and Israel are imports, and not sales figures; thus they can not be properly compared with the sales figures of the other countries.

SECTION 6

FORECASTS FOR THE YEAR 2000
THE PLASTICS INDUSTRY WORLD WIDE

6.0 General Discussion

Since plastic products are so diversified and include practically every aspect of daily life - packaging, building, industry, consumers goods, automotive and other transportation industries, agriculture, military applications, electric and electronic components,toys, medical parts, furniture, cloth, and many others- their demand is highly influenced by a large number of socio-economic factors.

Plastics consumption has always been influenced by the prevailing -from time to time- economic environment, growth, construction and reconstruction, degree of industrialization, population acquisition power, competitive power in replacing paper, metal, glass, cardboard, etc., diversification, innovation and new application development- all of these factors have been influenced by the availability and price of energy -mainly fossil fuels- and by the effects (pre - or after effects) of wars.

Since many of the plastic products are not in absolute necessary applications, recessions have affected plastics consumption negatively, while prosperity tends to improve plastics markets. It can also be stated, without hesitancy, that high oil prices affect plastics consumption adversely and dampen replacement and new application potentials.

This section discusses major factors influencing global trends in plastics consumption and development of new applications; analyses are made regarding specific directions and trends regarding plastics end-use applications and the possible effect of such global forecasts on the Israeli Plastics Industry.

A number of recent studies, reports and current trade information are used in these discussions, forecasts and analyses. Every attempt is being made, to adjust pre-Gulf War information to an expected post war economic environment.

Studies and reports prepared by The World Bank, SRI and Chem - Systems, over 1987-1989 are used for basic information and overall trend patterns. More current information -as appearing in European Chemical News (ECN) and Modern Plastics over 1990 and in January/February 1991 are also used.

A recent study by H.D.Frenkel, "The Polymer Industry in Israel and the World" ; The Samuel Neaman Institute -November 1990, is freely quoted, updated and a number of concepts and analyses, presented therein, are summarized and complemented in this Section.

6.1 MACRO-ECONOMIC PROJECTIONS FOR THE 1990s.

So as to prepare worldwide forecasts for the Plastics Industry by the year 2000,a base-line macro-economic scenario has to be set-up. In setting up such a scenario projections are calibrated to reflect the main features of the global economy in the 1990s, as perceived after the Persian Gulf War.

The key assumptions about the macro-economic policies of the industrial countries center primarily on the fiscal and monetary policies of the United States, Germany and Japan; with the United States fiscal policy playing the key role.

It is assumed that :

6.1.1 World-wide Scenario:

* As an aftermath of the Persian Gulf War, there will be a period of prosperity, reconstruction and new construction and development speared by the United States; such activities will be felt in the industrialized countries, as well as in certain development areas -mainly in Asia, East Europe and certain Latin American countries. Such a prosperous period is expected to last until the mid 1990s; by 1996 or 1997, the world economy will probably face a certain curtailment and enter into a slow-down period leading to Recession, unless a large scale war will change such a descending downward path.

* As a direct consequence of the fast pace of oil exploration over the last fifteen years, reserves of crude oil and even more so of gas have increased significantly; it is therefore forecast that there will be ample availability of both of these fossil petrochemical raw materials.
  It is expected that the price of crude oil will remain as at present ($ 20 or less per barrel), adjusted for the inflation of the U.S.$. Over-availability, strong intra Opec competition and the competitive effect of low cost natural gas will tend to force oil prices downward.
  Tremendous availability of large quantities of very low priced gas in Asia, Africa and Latin America will permit competitive inroads of these areas in the petrochemical markets, causing change-overs from naphtha to gas basis in the industry.

6.1.2 Industrial Countries GDP Growth

Pre-Gulf forecasts indicate that the industrial countries were expected to maintain an average real GDP per capita growth of about 3 percent per year in the 1990s, which is somewhat higher than in the 1980s.

The writers believe that the effects of the Persian Gulf War, the unification of Germany and Project 1992 will most likely increase such average real GDP growth by at least 1 percentage point higher for the United States and West Europe, in the next years - to 1996, and somewhat lower thereafter.

Japan`s rate of per capita growth is projected to be above 5 %, in view of continuous domestic market demand.

A review of the expected scenarios for the industrialized regions; i.e. United States, West Europe and Japan follows.

6.1.2.1. United States Scenario:

* The United States will only be able to reduce its fiscal deficit slightly in the next few years, as increased spending -military as well as civil, will only be partly compensated by modest tax increase which may be enacted during such a period of prosperity.

* Long range financial and economic assistance arrangements between the United States and it`s Persian Gulf oil rich allies - mainly Saudi Arabia and Kuwait- are bound to increase american exports to these countries, yielding considerably cash influx to the U.S. economy.

* The U.S. budget deficit will not meet the targets set by the Gramm-Rudman-Hollings Budget Act -a balanced budget by 1992-1993 However, it is expected that -after the spending euphoria of the next years- there will be a period of curtailment permitting balancing of the budget by the end of the century.

6.1.2.2 West European Scenario

* The unification of Germany will lead to considerable development and growth in East Germany, and probably adjacent countries such Switzerland, Austria in the West, and Czechoslovakia and Hungary in the West.

* Project 1992 aims to dismantle national barriers to the free movement of labor, capital goods and services across the national boundaries within the European Community. This will create the largest single market in the world -320 million consumers- by the end of 1992. This project will significantly increase the level of competition in the European market, particularly for non-European exporters and in markets outside Europe. Expectations have already increased investment in Europe by both European and non-European trans-national companies. Initially there is expected to be some economic disruption as national and trans-national companies rationalize their Europe based operations.

  The impact of Project 1992 on Western Europe will be positive and significant, but its effect on the rest of the world will be less certain. It will depend partly on the macro-economic policies followed in Europe, particularly to deal with inflationary consequences of more rapid growth. On the whole, monetary and fiscal policies in Europe will permit a relatively high rate of growth because of the process of unification.

6.1.2.3 Japan Scenario

* Japan`s macro-economic policy will be accommodating, allowing for very strong growth in domestic demand.

* Gross domestic savings will continue to exceed by far gross domestic investment. This will result in Japan to continue investing in the United States and in other countries, and at the same time encouraging domestic consumption.

* The rapid pace of technology change and diverse innovations will be a determinant factor of domestic economic growth in Japan, more so than in any other country.

6.1.3 Developing Countries Scenario

For the developing countries, the prospects for the 1990s are still unclear because of uncertainty about the level and cost of the financial loans that they will require for further development and increased domestic consumption. Average per capita real income in the development countries is expected to rise over 3 percent a year in the 1990s, with substantial diversity between countries. Income is expected to grow more than 6 percent per year (5 % on a per capita basis) in the Asian New Industrialized Economies (NIEs) -including Korea, Malaysia, Thailand, Taiwan, Singapore and Hong Kong-; compared to only 4 percent (less than 1 percent per capita) in Africa. The disparity in expected growth performance between these two groups is intimately related to different levels of investment, spending on human resources and education, outward orientation, macro-economic stability, industrialization and external debt, as well as different population growth rates and income distribution.

* The per capita income of the NIEs is expected to continue growing at rates significantly above average for the development countries., although somewhat more slowly than in the 1980s. The process of "graduation" will continue and by the year 2000, most of the current NIEs will become part of the industrialized countries.

* Large countries - such as China and India should also grow faster than average for the developing countries, and faster than their average growth in the 1980s.

* The economic situation in many poor African countries is expected to remain precarious. The average per capita income in Africa is expected to grow less than 1 percent a year in the first half of the 1990s, then somewhat faster later in the 1990s. Even by the year 2000, the average per capita income in Africa will be less than in the mid-1960s.

* Development countries that were low performers in the 1980s but are expected to implement needed policy reforms - reducing budget deficits, improving incentives for private investment and industrialization, building up confidence, and reforming and restructuring their trade and financial sectors- are now expected to increase their per capita income growth significantly by the mid 1990s.

* Financing requirements for reconstruction of the damages of the war in Kuwait, Saudi Arabia, Iraq and Israel and increased domestic spending will significantly decrease the AID and Loan possibilities of the development countries in Africa and Latin America from United States financial resources.

Table # 6.1.3 presents past and expected future GDP growth rates. Comparisons are made between
a). high, medium and low income countries,
b). geographical regions.

Forecasts are presented, as made by the World Bank in 1990, and as predicted by the writers, adjusted by the effects of the Persian Gulf War.

TABLE # 6.1.3 PAST AND EXPECTED FUTURE REAL GDP GROWTH RATES						
Countries	Populat million	GDP Bill.$	GDP $/ Capita	During 1980s	Forecast 1990s Prewar	Postwar
Classification by Income				% average growth/year		
High Income OECD	747	12,348	16,530	2.8	3.0	4.0
Low+middle income	3,874	2,825	729	4.3	5.1	>5
Low Income	2,828	819	290	6.5	5.8	6.2
Middle income	1,046	2,006	1,917	2.9	4.5	5.0
Classification of Low and Middle Income by Geographical Regions						
Africa	450	150	333	0.9	3.7	3.0
Asia	2,598	1,064	410	7.5	6.2	6.5
*New Industr.Econ	140	376	2,686	7.8	6.4	6.5
Europe+MiddleEast + North Africa	388	796	2,052	2.8	3.5	4.0
Latin American + Caribbean	405	739	1,824	1.6	4.2	4.2
Low+Middle income excpt China+India	2,008	2,296	1,143	2.8	4.5	4.7
Severely indebted middle-income	486	822	1,691	1.7	3.9	3.2
Source : World Bank Data, adjusted for the Gulf War effects.						

6.1.4 Relation between GDP Growth and Plastics Industry Growth.

Based on past history - especially since 1965 to 1989 - growth of plastics consumption in most countries is usually 1 to 2 % higher than the growth in GDP. It is believed that the major reason for such augmented growth - over and above the GDP- and the normal growth of other goods- is related to the continuous replacement of plastics instead of traditional metal, paper and glass in packaging, engineering, electric and building applications.

For the forecast purposes of this study, plastics growth is assumed to be - in most geographic regions - only slightly higher than the expected growth of the GDP (adjusted for the post-war effects), although such replacement trend favoring plastics is expected to continue, and even increase due to new innovations, inventions and widened applications.

It is therefore believed that the forecasts presented in this Section are on the conservative side.

6.2 WORLD WIDE PLASTICS INDUSTRY BY THE YEAR 2000.

6.2.1 Factors Influencing Global Trends of Plastics Consumption.

The following have been identified in previous studies as major factors influencing global trends in polymer manufacturing :

1). Feedstock Availability
2). Market Growth, Penetration and Saturation
3). Vertical Integration
4). Changes in International Trade Patterns

6.2.1.1 Feedstock Availability and Continuation of Low Prices Will Tend to Increase Plastics Consumption.

Feedstock availability is the major factor influencing polymer production. This factor has a direct effect on polymer prices and therefore plastics consumption.
The major feedstocks for petrochemicals/polymer production are and will continue to be:

* naphtha - which is a crude oil component, and therefore, primarily influenced by the latter`s prices

and

* natural gas condensates

The prices of both of these raw materials- naphtha and natural gas- are expected to remain low, which will tend to encourage plastics consumption.

Naphtha, although still the main feedstock should continue a long term declining trend in favor of new ethane based ethylene capacity in gas rich areas, and to a lesser degree to unbalanced refinery streams, ranging from refinery gases to heating oils.
Naphtha prices are critical to the continuation of this trend. In the short term, the shift in feedstocks has been slowed- down by the drop in naphtha prices from around US$ 300 per ton in 1983 to the prices of US$ 150 in 1990. A temporary increase was experienced at the beginning of Gulf crisis, but the price is decreasing as the Gulf crisis is in its final phases. Softening of crude oil prices has taken away some of the incentives from natural gas as a low cost alternative feedstock.

While crude oil and therefore naphtha prices remain low, the polymer industry profits and the industry is capable of delivering raw materials at prices that encourage plastics consumption.

Although analysts have projected crude-oil prices to increase to the extent that naphtha should come back to the US$ 250-300/ton price range by 1995, the writers are in disagreement with such increasing naphtha price projections; believing that crude-oil prices will decrease, or at the very best increase in US$ by not more than the inflation of this currency, and naphtha prices will be strongly influenced by it`s supply and demand as petrochemical feedstock. World-wide over-availability of natural gas should have a direct effect on reduced naphtha prices. The writers consider US$ 200 (in constant 1990 $) as the top level price for naphtha during the 1990s, reaching $ 220 (in constant 1990 $) by the turn of the Century. Naphtha prices in the range of $ 150-180 (in constant 1990 $) should not be unlikely to be realized in the 1990s.
(Note: At the time of final editing of this study the price of naphtha is quoted at $ 187-189/ton CIF West Europe (June 1991)

Natural gas prices will be tied to its opportunity cost and will vary considerably from region to region, expected to range from very low in the Middle East, Latin America and the Pacific Basin, to very high in Western Europe, where it is scarce and premiums are granted for cleanliness, easiness of utilization and high opportunity values.

Table # 6.2.1 presents a summary of the writers' expected naphtha and natural gas prices for the years 1995 and 2000, in comparison to average 1990 prices.

Table # 6.2.1.1 FEEDSTOCK AVAILABILITY

CONTINUATION OF LOW NAPHTHA AND NATURAL GAS PRICES WILL TEND TO ENCOURAGE GLOBAL PLASTICS CONSUMPTION -IN 1990 CONSTANT $

YEAR FEEDSTOCK BASIS/AREA/COUNTRY		1990	1995	2000
NAPHTHA-Major Polymer Feedstock		165	190	220
NATURAL GAS US$/MMBtu Prices for Feedstocks	Wellhead USA-GulfCoast	1.85	2.00	2.20
	FOB Factory-WestEurope	2.80	3.20	3.70
	Middle East	0.50	0.50	0.50
	OtherEnergyRich Areas	0.40-1.25	0.50-1.00	0.50-1.00

6.2.1.2 Expected Worldwide Business Environment Should Enhance Plastics Market Growth and Penetration into New Applications in Spite of Saturation and Environmental Regulations.

* The cost of plastics and its competitive edge against other materials is, most likely, the most important factor encouraging consumption growth. With low polymer prices -as discussed above- such competitive position for plastics ought to prevail and shall influence positively other market factors:

** The aftermath of the Gulf War will have to lead to overall improvement of the world economy, which will spear-head re-construction, renewed transportation and military requirements, and increased domestic consumption.

** Plastics are expected to continue making significant inroads in non-durable goods, particularly packaging, at the expense of glass, paper and metal.

** Increased development and emphasis on new materials and blends will further stimulate the replacement of traditional materials Research and development on alloys and blends, additives, polymer modification in the reactor and composites will enable producers to specifically design and "tailor-make" polymer for new applications. Such innovations and the consequential increased application of plastics in engineering application should enhance consumption in markets hardly tapped at present.

** Increased knowledge and higher "comfort level" that design engineers and product developers now have with plastics, will lead toward initial designs in and for plastics materials; instead of the traditional concept of first using metal, glass, or paper and then replacing it with plastics.

** The plastics fabrication machinery business is projected to be particularly dynamic. New machinery, with enhanced control systems, automation,design improvements and improved auxiliary equipment will both support and promote plastics consumption, increasing the income per employee factor, profitability and overall industry improvement. The longer range effect shall probably lead to lower plastic prices and further increased consumption. The development of the plastics industry in Belgium over the last years- highly automated, sophisticated, and with considerable decreased manpower requirement is a good example of this point.

** Surging economies of large population countries in the Far East still have a relative low base per capita consumption. The share of such surging economies- especially Korea, Taiwan, Singapore, Indonesia, Thailand and Hong Kong - has been relatively low and therefore, their high growth impact has not yet been strongly felt on the overall global growth. Hence, while conventional plastics applications have generally reached maturity in traditional uses in the industrialized countries (see below), market development is very promising - indeed-even in conventional applications in the developing countries. This change in regional marketing arena ought to have a marked influential effect in polymer market penetration in the 1990s. The effect of industrialization and increased import trends of China should also have a marked positive influence on global plastics growth.

** The per capita consumption of plastics in many largely populated poor population areas -in the Middle East, East Europe, Latin America and Africa- is very low. While it may take many years for the people of such low-plastic consumption countries to have the means to increase significantly their consumption power, the trend of growth of plastics consumption should be faster than that of other materials, due to the former`s low priced competitive edge. The demographic effect of population growth in these low consumption areas - leading to additional households and consumer goods requirements should have a further positive effect on plastics consumption. This can be seen in Table # 6.2.1.2.

** Plastics will continue to replace traditional materials in consumer durable goods and will begin to make inroads in structural and semi-structural applications at the expense of various metals. These applications include automotive exterior body panels and exterior components.

* Against such an optimistic trend resulting from diverse positive growth factors, there are also several negative factors which can not be ignored and which will certainly dampen the very positive growth environment. The key negative factors are:

** High degree of maturity and saturation, especially in the large consuming Western Economies. The United States, Japan, West Germany - which account for over 430 million people - and have a very high acquisition power - have already a very high per capita plastics consumption, as can be seen in Table # 6.2.1.2. The increase of plastic products in these areas in their traditional high volume uses -packaging, appliances, clothing, consumers goods and construction- will certainly not be at the same growth factors as in the past.

** The impact on the global plastics industry of any potential economic recession or economic downturn in either the United States, Western Europe and/or Japan. The world market for traditional plastic applications had been strongly influenced in the past by the market size and growth in the developed western economies - United States,Western Europe and Japan-. These traditional marketing regions accounted -in 1987- for over 83% of global consumption. Although at present their market share has decreased to less than 75%, the impact of the economic environment in these developed Western Economies will be stronger felt as their financial power and sphere of political and economic influence throughout the world is much wider, and any sharp economic downturn and recessionary trends in any or all of these super-powers is bound to cause severe consumption and growth curtailments on a global basis.

** Public Issues, Legislation and Regulations may adversely affect plastics growth. The growth and success of the plastics industry, combined with rising public expectations over environmental, work-place and products safety, have created a climate in which plastics are increasingly targets of legislative and regulatory initiatives that seek restrictions upon their manufacture and use.
Areas of particular environmental concern are solid waste disposal and smoke generation -due to the liberation of potentially toxic combustion products of plastics.

Table # 6.2.1.2 PER CAPITA CONSUMPTION OF POLYMERS -Kg./person

Area	INDUSTRIALIZED REGIONS						REGIONS IN DEVELOPMENT					
	US+CANADA		JAPAN		WEST.EURO		LAT.AMER.		ASIA		AFRICA	
Popul	275 M		123 M		350 M		380 M		>2,500 M		> 600 M	
Year	1987	1990	1987	1990	1987	1990	1987	1989	1987	1989	1987	1989
Kg/yr	96	109	72	102	68	78	9.2	11.3	2.6	4.0	2.5	3.7
+%/YR	4.3%		12.5%		4.7%		10%		24%		22%	

6.2.1.3 Vertical Integration of Polymer Manufacturers Should Affect New Plastics Diversification and Application Development.
Vertical integration has and will primarily affect competitive polymer trade patterns, as such integration - motivated by large producers of basic raw materials in their desire to gain in economy of scale - will in the long run have a downward effect on polymer prices, which will benefit the industry and enhance plastics consumption.

One of the directions that polymer manufacturers are taking more and more - as part of their vertical integration - is to provide a more active and dynamic approach to the converters,in understanding the converters problems. Through vertical integration the polymer producing companies will also be better placed to provide compounding services, engineering and many times even financial assistance in new product development. The trend will be stronger in these directions, as more "in-reactor" compounding will prevail and more sophisticated relationships will be required between polymer producers, converters and the final end-use markets.

6.2.1.4 International Trade Should Improve Competitive Polymer Supplies, and Enhance Products Import toward New Plastics Markets.
World trade of polymers has grown considerably in the last decade. International trade in polymers continues to be dominated by the industrialized nations, although new producers have started to become a significant factor in the trading markets.
Increased international polymer supply potentials shall increase competition to the benefit of the plastic industry, with consequential drop in prices to the end-user which will lead to spurring plastic growth.

6.2.1.5 Innovations, new applications and improved plastics will advantageously replace traditional materials and be a major factor in plastics growth.
The gradual maturity of a number of polymers, especially in conventional uses has sparked a new generation of products and has created diversified new applications. New plastics have appeared in the world markets with substantial advantages in production costs, improved performance and technical characteristics.
The new products reaching the market in industrialized countries have the potential to become substitutes of long standing traditional materials - steel, glass, paper, -in many sectors of economic activity.
A major innovation - with potential large volume increase - stems from the increased development of engineering plastics (EP).
As commodity plastics face maturity in many applications, the next phase of the world`s polymer industry, especially in the industrialized countries, is the accelerated commercialization of the high technology, high performance engineering plastics.
Most of such engineering plastics demand will increase, as a result of their potential as metal replacements. The combination of structural engineering properties with the economics of thermoplastic processing makes these plastics excellent substitutes for metals and other materials in a wide range of markets.

Improvements and innovations are also progressing in the processes of commodity polymer manufacturing, for quality improvements and cost decreases; this direction should likewise increase growth as prices will be lowered, and improved quality will permit wider applications.

6.2.1.6 Summary of Global Trends.
Table # 6.2.1.6 presents an indicative Overview Summary of the influence of the various factors on trends of plastic consumption.

Table # 6.2.1.6 FACTORS IN GLOBAL TRENDS OF PLASTICS CONSUMPTION

STRONGLY POSITIVE	POSITIVE	NEGATIVE
*Low oil + gas prices *After-war prosperity * " " reconstruction *Low cost replacement penetration. *EP & new materials. *Wider Applications. *High growth:Far East *Steady growth Japan, Europe,USA in new & traditional uses.	*Growth in highly populated areas of low base consumption. *Improvement:machines &conversion processes *Lower cost polymers from improved process *› Competitive trade *Improved polymer producers`services. Better product design	*Maturity &Saturation in many common uses. *Environmental factor Solid Waste Combustibility *Recession in major Western Economy causes global impact

6.2.2 Growth Trends of Plastics per Major Applications

This Section presents forecasts of growth trends - over the 1990s of plastics consumption per major end-use applications.

6.2.2.1 Packaging

Packaging is the major end use application for plastics in almost all countries throughout the world, with India, certain African and the less developed Latin American countries as exceptions.
Over 30% of total plastics consumption in most of the industrialized countries (in Switzerland, Germany, and Japan the percentage is lower) is presently directed to this end-use.
Consumption of plastics for packaging applications increased in the United States by 6.3 % in 1990 over 1989. Such an increase follows a decrease by 2.3% consumption in this application for the previous year, considered due to saturation in this application.

The key for the plastics growth in this market throughout the 1990s will most likely come from the replacement of traditional materials and the creation of new packages.

By the year 2000, it is expected that in the United States, plastics will account for over 40% of food packaging materials, on a dollar value basis. The percentage will be lower in other parts of the world, but will tend to increase considerably.

Recent innovations, such as microwaveable prepared entree trays, will cause strong growth in consuming plastics products even at higher costs, as they are throw-aways, instead of glass, due to their convenience to consumers.

The increase in the number of meals eaten away from home, also leads to plastic consumption growth in this application. Fast food outlets - already so popular in the United States and Japan - are expected to expand considerable to Europe, South East Asia and other areas; such fast food establishments will continue to convert paper wraps and cardboard boxes to plastic containers, while the conversion of cups based on lower costs and process flexibility is also expected to continue growing.

Considering the slow growth of packaged products in the United States, plastics growth -in this application - will mainly occur as a result of the replacement of traditional materials -paper and wood products, metals and glass. In the flexible packaging area plastic shopping bags replacing paper bags, will grow considerably and is expected to be over 75 % by the year 2000.
As the consumption power and the degree of sophistication in packaging will increase such replacement tendencies will even be stronger in other parts of the world,

Plastic merchandise bags, industrial bags, and heavy duty shipping sacks are expected to show an annual growth of 8% through the mid 1990s in the United States, and probably well over 10% in the areas in development stages.

In the rigid packaging market, metal cans, glass jars, bottles, and other rigid containers are expected to be replaced by plastics, due to cost, flexibility and easier disposal considerations.
The advent of high barrier polymers and technology to combine dissimilar polymers - for example, a moisture barrier polymer such as a polyolefin with a barrier polymer such EVOH or PVdC through the use of adhesive resins and especially co-extrusion - will allow plastics to penetrate applications requiring oxygen, carbon dioxide, flavors, odor and solvent permeation protection.

By the year 2000, plastic barrier applications that require high temperature processing, such as retorting or pasteurization, will be common and may include baby foods, seafoods and beer. In addition to the high barrier properties offered by multilayer constructions, plastics will succeed in these applications due to their light weight, breakage resistance and design flexibility. However, plastic high barrier products do not offer the same level of spoilage protection as metal or glass. Therefore,the current shelf life requirements of food and beverage producers are likely to have to be reduced.

In the United States, at present, plastics only accounts for some 20% , with metal being 60% and glass 20% of the total rigid packaging requirements. Metal cans and glass jars and bottles are major targets for replacement by plastics.
In West Europe, plastics are only about 15 % of the total packaging market; potential of replacement of glass, corrugated, paper and metal packaging materials is therefore very promising, as can be seen from Table # 6.2.2.1A, which presents the per capita consumption of packaging materials in Western Europe, for 1987.

Table# 6.2.2.1A Consumption of Packaging Materials in West Europe

Kg/head-1987	TOTAL	TIN	ALUMN	GLASS	PAPER	CORRG	CARDB	PLASTICS	
									%
West Germany	131	10	<2	47	10	34	8	20	15
France	124	11	1	50	10	30	7	15	12
United Kingdom	108	14	<1	36	8	26	9	14	13
Italy	87	9	>1	32	5	23	7	10	12
Holland	140	23	<1	46	15	27	12	16	11
Sweden	100	12	<1	12	15	24	12	24	24
Denmark	105	20	2	24	25	-	16	18	17
Spain	83	8	<1	27	5	27	6	9	11
Portugal	54	-	-	26	-	15	6	7	13
Greece	40	-	-	7	5	16	6	6	15

Major adverse factors in plastics consumption growth in packaging applications, were due to environmental issues; however studies have been issued by the plastics packaging industry in West Europe, showing that the volume of rubbish would increase by 150%, packaging would weigh some 300% more and energy consumed by the packaging industry would increase by 100% with a corresponding increase in costs to manufacturers, distributors and consumers.

Growth Forecast of Plastics in Packaging:
Table # 6.2.2.1 presents the forecast of global annual volume growth to the year 2000, and the expected share of the major polymer resins in this application for the year 2000.

TABLE # 6.2.2.1 GLOBAL CONSUMPTION FORECAST FOR THE 1990s.								
APPLICATION : PACKAGING Approximate Share of Global Plastic Consumption : ~ 30 %								
GROWTH FORECAST PERIOD: Average % per annum	1990 - 1995 4%				1996 - 2000 3 %			
RAW MATERIALS SHARE -YEAR 2000	LDPE 35%	HDPE 30%	PP 11%	PS 10%	PET 9%	PVC 3%	ThSet 1%	Other 1%

6.2.2.2. Building and Construction

The building and construction industry is the second largest consumer of plastics. About 20% of world-wide plastics consumption is directed for building and construction applications.
In some countries -Finland, Canada, Denmark, Netherlands - the market share of this application is closer to 30%.

Plastics are now accepted by construction companies as viable alternatives to traditional materials due to their corrosion resistance and high strength to weight ratios.
The main plastics applications in the building and construction field are in pipes, fittings and conduits; panel and sidings; window frames, insulation and thermosetting resin-bonded woods.
PVC and the thermosetting resins are by far the main raw materials utilized for these end-uses.

Due to their wide application in the building and construction field, plastics in general and PVC specifically are highly influenced by the trends of the construction industry.

Considering the necessity of reconstruction activities in various countries in the Persian Gulf, in the Mid-East, the strive for improved housing in East European, Latin America, Far East and other poorer areas and the continuous increase in home remodeling in the more affluent Western Economies and Japan, the growth trend in the building industry is very bright for the 1990s.

During 1990, the rate of growth of plastics for building and construction -in the United States -was about 7%. However, the rate of home remodeling in the United States was projected -prior to the war -to increase at over 10% per year through the year 2000. This rate of growth is expected to be higher as returning U.S. military forces, will tend to improve their dwellings, as they did after the second world war, the Korean and Viet Nam wars. Piping replacements, advanced wiring systems, expanded attics and finished basements will become most important to plastics consumption.

As home sizes decrease and multi-dwelling construction increases over the next decade,the need for down-sized molded plumbing and electrical fixtures is expected to increase. The use of polymers in plumbing applications will continue to grow in building and construction applications. There will be a continuous growth in the use of plastics in prefabricated bathroom fixtures, decorative moldings and other sanitary-ware fixtures.

One of the greater growth potentials for plastics in the building and construction market lie in windows and glazing applications.
The demand for plastics will increase as the desire for sky-lights and solar panels will grow not only for energy utilization but also for the extra light it provides.
The choice of plastic glazing materials is directly related to the clarity and impact strength, scratch resistance and resistance to long-term yellowing under UV radiation of the polymer.

The widespread use of plastics in structural elements -insulation, decorative moldings, wall coverings, roofing and flooring material, window frames etc.-will be a function of their cost, performance and aesthetics by comparison to wood and metal elements.
Much of the future growth for plastics in building will also lie with the development of composite materials - for example, the use of composite bars to reinforce concrete as an alternative to steel -especially in infrastructure applications- reinforced plastics cladding panels and composite piping and road repairs.

Growth Forecast of Plastics in Building and Construction

In summary the use of polymers in building and construction can look forward to healthy growth into the 1990s.

Table # 6.2.2.2. presents the forecast of the global annual volume growth to the year 2000, and the expected share of the major polymer resins in this application for the year 2000.

TABLE # 6.2.2.2. GLOBAL CONSUMPTION FORECAST FOR THE 1990s.								
APPLICATION : BUILDING AND CONSTRUCTION Approximate Share of Global Plastic Consumption : ~ 20 %								
GROWTH FORECAST PERIOD: Average % per annum		1990 - 1995 7.5%			1996 - 2000 4.5%			
RAW MATERIALS SHARE -YEAR 2000	PVC 47%	PHNOL 18%	UR/ME 9%	PE 8%	PS 5%	PET* 4%	PUR 4%	Other 5%

* Unsaturated PET.

6.2.2.3 Consumer and Institutional Products

Consumer products encompass a wide variety of applications such as housewares, sporting goods, medical appliances and health care devices, toys and luggage. About 11% of global plastics consumption is for this application. 1990 growth in these fields in the United States was about 4.2 %.

In the houseware sector, replacement of traditional materials by plastics is expected to continue in both consumer and institutional markets; new fields are related to cooking in microwaves, through the availability of more plastic dishes and containers suitable " from the freezer to the micro". As the number of households with microwaves is expected to continue to increase, there will be a growth in the housewares plastic market. Some of the growth in plastics consumption for cookware will come at the expense of ceramics and glass. Plastics growth for the houseware sector is expected to grow at the rate of 3-4% per annum in the next years.

Of this whole group, plastics consumption for medical uses shows the brightest growth potential.
In the medical market high growth in plastics is expected due to replacement of glass and metal. For instrumentation and surgical products, trends to reduce cost may favor multiple use products, requiring plastic products to withstand radiation and autoclave sterilization for five or more cycles.

There is likely to be increased spending on the elderly, and on people hurt in the latest war; such items as artificial limbs, hips, wheelchairs and hearing aids. One area being rapidly driven by advances in medical practices is artificial bones and implants (orthopedics and prosthetics). This is due mainly to developments in new materials, often using advanced composites. It is estimated that in terms of value, over a quarter of the amounts spent on medical devices involves plastics.

Demand for plastics in medical and medical electronics applications is rising at a rate of 10% per annum and this is expected to increase even to 15 % in the later 1990s.

Practically all polymers are used in one or more medical market segments. Engineering plastics are used predominantly for intracorporeal applications, including heart and heart components, gastro-intestinal uses, eye and ear parts. Commodity plastics are used for a more diverse range of applications, including one-time use appliances.

In the toy market, plastics consumption will increase only slightly with particularly popular action figures and accessories, games and electronic devices. Polyethylene and Polystyrene are the main polymers used in this market. Rate of increase is expected to be 3 - 3.5 % per year.

Office supplies -such as tape dispensers, stapler bodies, desk organizers, trays etc.- represent one of the fields for good growth opportunity for plastics in replacing metal.

Another emerging consumer goods applications include the use of polypropylene for apparel and footwear -replacing canvas on sneakers and other leisure and work shoes.

Growth Forecast of Plastics in Consumers and Institutional Products.
Average growth rates of plastics in consumers and institutional products, will grow in the second part of the 1990s, mainly due to increased medical applications, as discussed above.

Table # 6.2.2.3. presents the forecast of the global annual volume growth to the year 2000, and the expected share of the major polymer resins in this application for the year 2000.

TABLE # 6.2.2.3. GLOBAL CONSUMPTION FORECAST FOR THE 1990s.								
APPLICATION : CONSUMER AND INSTITUTIONAL PRODUCTS Approximate Share of Global Plastic Consumption : ~ 11 %								
GROWTH FORECAST PERIOD: Average % per annum		1990 - 1995 4.5%			1996 - 2000 5.5 %			
RAW MATERIALS SHARE -YEAR 2000	PS 30%	PP 19%	HDPE 12%	LDPE* 11%	PET 8%	EP 7%	PVC 6%	ThSet 6%

* Includes LLDPE.

6.2.2.4 Electrical/Electronics Market
This market consumes at present an average of less than 10 % of total plastics on a global basis, (over 10% in Japan, Switzerland, Rumania, Norway and Austria).
1990 growth of this market was only 2.2 % in the United States, and 2.8 % in West Europe; however, it is expected that this application -excepting cables and wires -will prove to be one of the most dynamic markets for plastic usage through the year 2000.

The electrical/electronics market includes :

1. Wire, cable and conduits.
2. Major appliances -refrigerators,freezers,microwaves, dishwashers
3, Small appliances - kettles, coffemakers, hairdryers, irons, etc.
4. Brown goods - TV's, video and stereo equipment, etc.
5. Computers and Business Machines - faxes, photocopiers
6. Teletronics- telephones, satelite dishes, etc.

In West Europe, wire and cable application is currently the largest plastics consuming segment of this overall sector, representing some 53% of the total ; plastics materials for appliances constitutes some 27 %; refrigerators and other major appliances consume some 8% and all other electronic components - Segments 4,5 and 6- consume the remaining 12 %.
The distribution is quite different in Japan and the Far East where Brown Goods , Computers and Business Machines constitute the higher percentage.

Throughout the 1990s, the electrical/electronics will see a great change in the direction of applications. While cables, will face a drastic decrease due to replacements, the other application segments will constitute an area of rapid growth, due mainly to innovation and invention. Technology advances will maintain growth in sales, competitive prices and continuing development of new products.

Since all the wires and cables but power cables are to be replaced by fiber optics through the year 2000, the wire and cable market segment will be declining in its demand growth for plastics. It is expected that only about 35% of the conventional market of this segment will be retained.

It is foreseen that the major appliance industry will use increasing quantities of plastics for housings, due to the efficiencies gained by automating production and by incorporating the flexibility in design achievable with plastics systems. Molding parts, such as an entire refrigerator door, will create opportunities to develop plastics products and cause growth in the share of plastics in this market.
Consumption for appliances - large and small - is expected to grow at a rate of 6-8 % per annum, through the 1990s.

The communication equipment market will be very stable through the year 2000 in the United States, as compared to Western Europe, where tele-communications systems are being completely revamped. Due to increased competition among the suppliers to this industry, there will be increasing inter-material competition for current business. On a global basis there is expected to be a yearly growth of about 5 % per year.

The electronic component market will most likely show a net decrease in the use of plastics through the year 2000, due to the miniaturization of electronic equipment in general.

In the computer and peripheral market it is expected that by the year 2000, electronics will play a much larger role in the residential market. As a result ,there is the potential for a large increase in the use of plastics in this market segment. Plastics consumption growth in this segment is expected to be 12-15 % per annum.

The battery market, exclusive of conventional automotive batteries, is another area of potential high growth for plastics use through the year 2000.

There is no doubt that the trend toward greater consumer and industrial consumption of electronic devices will continue. However, this market will become even more competitive,as a greater number of countries begin to participate in the production of these devices.

Growth Forecast of Plastics in Electrical and Electronic Markets
Taking into account the decreases in plastics consumption in cable & wire and in the small electronic components applications on the one hand, and the increases in appliances, communication equipment and especially computers and business machines - on the other hand, the overall expected average annual growth for this overall group is forecast as 2.5 % per year in the early 1990s, increasing to 5% per annum in the later 1990s. The increasing growth is due to additional electronic devices, compact disks applications and other innovations and inventions.

Table # 6.2.2.4. presents the forecast of the global annual volume growth to the year 2000, and the expected share of the major polymer resins in this application for the year 2000.

TABLE # 6.2.2.4. GLOBAL CONSUMPTION FORECAST FOR THE 1990s.								
APPLICATION : ELECTRIC AND ELECTRONIC MARKETS Approximate Share of Global Plastic Consumption : ~ 10 %								
GROWTH FORECAST PERIOD: Average % per annum		1990 - 1995 2.5 %			1996 - 2000 5 %			
RAW MATERIALS SHARE -YEAR 2000	EP 21%	PP 16%	PS 15%	PVC 15%	PE 13%	ThSet 11%	ABS* 5%	Other 4%

* Includes SAN.

6.2.2.5 Furniture/Furnishings

This market consists of residential, office, commercial and institutional furniture as well as carpets, wall coverings, bedding, curtains and blinds. This sector constitutes about 6 % of the total global market consumption. It is highly developed in Germany, Spain and Australia. 1990 rate of growth in the United States was less than 2 %.

It is expected that there will be consistent growth in the application of injection molding products for commercial and institutional furniture and carpets.
An increasing demand of plastics for lighting fixtures and lamps,particularly of modern design patterns can also be expected.

Office furniture will become an increasingly important component of plastics consumption in this market segment with plastics demand growth coming at the expense of metal.

Ease of installation, decorating and color options and ease of care will dictate greater use of plastics.

Forecast of Growth of Plastics in Furniture and Furnishings

Table # 6.2.2.5. presents the forecast of the global annual volume growth to the year 2000, and the expected share of the major polymer resins in this application for the year 2000.

TABLE # 6.2.2.5. GLOBAL CONSUMPTION FORECAST FOR THE 1990s.								
APPLICATION : FURNITURE AND FURNISHINGS Approximate Share of Global Plastic Consumption : ~ 6 %								
GROWTH FORECAST PERIOD: Average % per annum		1990 - 1995 3 %			1996 - 2000 3 %			
RAW MATERIALS SHARE -YEAR 2000	PP 51%	PUR 22%	PVC 12%	PS * 6%	ThSet 4%	Other 5%		

* Includes other Styrenics

6.2.2.6 Transportation

Plastics consumption for transportation applications constitutes also some 6 % of total global plastics consumption. Out of the total consumption in this sector over 88% is for various automotive uses.
In 1990 there was a decrease in this sector in the United States due to decline of the automotive market. In West Europe there was a growth of over 6 % in this application.
Currently, Polyurethane is the main material catering to the automotive industry, followed by unsaturated PET, Polycarbonates and other engineering plastics.
Raw materials requirements will certainly change, as engineering plastics will become the major contributor for this wide growing application.
In this market, the automotive sector offers the greatest potential for growth. Automotive opportunities for plastics will come at the expense of metal, glass and rubber.

Automobile demand in the United States is projected to increase at only 1-1.5% per year, but new applications and growth in non-USA car markets should give a considerable boost to plastics consumption in this application.

There has been intense innovation by the automotive and polymer industry in recent years, as well as a growing intensity and interest of penetration into new applications in the automotive industry.

There are three areas of major volume growth for plastics which are expected to be developed into high growth consumption items in the future :

* exterior body panels
* bumper systems
* glazing -including lighting-

As plastics products -primarily engineering plastics - will become more cost competitive compared to traditional materials, such as steel and glass, there will be widened applications potentials. Many polymers have applications where they are a choice substitute for metals (bumper/fascia/trimmings); steel is still, in many instances, the optimum choice in body panels. Plastics penetration into this area is not so much hindered by their viability, but by the painting and paint line temperatures that are required. The trend is to set-up paint shops which are specifically designed for plastics materials.

In general, usage of polymers in the automotive industry is by no means a mature market, and continuous innovations are expected, as consumers -particularly in West Europe- demand cars which are more fuel efficient.

The current weight of plastics per car is estimated at 10%, and this is expected to raise to 13 % by 1995 and to 20 % by the year 2000.

Table # 6.2.2.6A presents some interesting information on the estimated average weight of plastics in automotive cars.

Table # 6.2.6A INFORMATION ON THE WEIGHT OF PLASTICS IN CARS

1. The Use of Plastics in Certain European Cars- kg/car

Peugeot 205	72
Citroen BX	102
Ford Sierra	120
Mercedes W 124 V20	99
BMW 3 Series	99
VW Golf	59

2. Estimated Average Weight of Plastics Per Car -kg/car

1980	55
1985	74
1990	104
1995	142
2000	213

Growth Forecast of Plastics in Transportation

Table # 6.2.2.6. presents the forecast of the global annual volume growth to the year 2000, and the expected share of the major polymer resins in this application for the year 2000.

TABLE # 6.2.2.6. GLOBAL CONSUMPTION FORECAST FOR THE 1990s.

APPLICATION : TRANSPORTATION
Approximate Share of Global Plastic Consumption : ~ 6 %

GROWTH FORECAST PERIOD: Average % per annum	1990 - 1995 6.5 %	1996 - 2000 8.5 %

RAW MATERIALS SHARE -YEAR 2000	EP 22%	PET* 18%	PUR 17%	PP 16%	ABS** 9%	PE 7%	PVC 4%	Other 7%

* Unsaturated PET. ** Includes SAN.

6.2.2.7 Industrial/Machinery Markets

This market segment encompasses all types of construction, farm and industrial machinery, engines, machine tools, ordnance and chemical process equipment.
This market constitutes at present some 4% of total global consumption; in Germany this market consumes 10% of the total

However in highly industrialized countries such as the United States, the United Kingdom and France it is very low. In Japan it represents 4.2 % of total plastic consumption.

The market will continue to be dominated by metal but plastics will continue to be used as protective guards, housings and mechanical components, miscellaneous components and trim and pump components.

The growth in this area will occur primarily as a replacement for metal in hostile environments,and in bearing and wear applications. Opportunities for plastics replacement of metals include parts consolidation in complex assemblies such as meters and pumps.

Growth should also come from increased demand for plastics in corrosive resistant environments, to include piping, waste treatment facilities and pollution control.

With the increasing development and commercialization of advanced composites, growth should be eminent in many industrial areas, and especially in the Aerospace and Military industries.

Composites represent an undoubted area of potential high growth for the plastics industry. The success of polymer composites is largely due to the fact that, compared to some metals, the advanced materials offer equivalent strength, lower weight and faster recycling per part, combined with high operating temperatures and chemical resistance.

Growth Forecast of Plastics in Industrial/Machinery Markets

Growth in this market is considered to be high, as it has barely been tapped in many of the major industrialized countries. Growth is assumed to increase considerably after 1995.

Table # 6.2.2.7. presents the forecast of the global annual volume growth to the year 2000, and the expected share of the major polymer resins in this application for the year 2000.

TABLE # 6.2.2.7. GLOBAL CONSUMPTION FORECAST FOR THE 1990s.

APPLICATION : INDUSTRIAL/MACHINERY MARKET
Approximate Share of Global Plastic Consumption : ~ 4 %

GROWTH FORECAST PERIOD: Average % per annum		**1990 - 1995 6.5 %**				**1996 - 2000 10 %**		
RAW MATERIALS SHARE -YEAR 2000	**EP 23%**	**HDPE 19%**	**CCR 14%**	**PUR 8%**	**ABS** 8%**	**PP 7%**	**PET* 6%**	**Other 15%**

* Unsaturated PET. ** Includes SAN.

6.2.2.8 Agricultural Applications

Agricultural/horticultural applications represent a widely diversified area of the plastics industry, but very few world-wide statistics are available. Worldwide, it represents about 3% of the market share, in India 30% of plastics consumption is for this market, in Israel 20%, in Rumania about 15%, New Zealand 14% and Norway 11%.
However in the United States this market represents less than 1%,in the United Kingdom 2%,in Germany 3% and in Japan 1.5%.

The major applications of plastics in agriculture/horticulture are:

* Domestic Greenhouses
* Hoses
* Plasticized PVC sheet
* Piping
* Tanks
* Feeding Troughs
* Drainage Pipes
* Large Greenhouses
* Irrigation Pipes
* Sprinklers
* Drip Systems
* Crop Covers
* Flower Pots
* Irrigation Nozzles

Growth in these applications are expected to be be mainly in the countries in development including East Europe and the Far East.

Growth Forecast of Plastics in Agricultural Applications

Table # 6.2.2.8. presents the forecast of the global annual volume growth to the year 2000, and the expected share of the major polymer resins in this application for the year 2000.

TABLE # 6.2.2.8. GLOBAL CONSUMPTION FORECAST FOR THE 1990s.								
APPLICATION : AGRICULTURE Approximate Share of Global Plastic Consumption : ~ 3 %								
GROWTH FORECAST PERIOD: Average % per annum		1990 - 1995 6.5 %			1996 - 2000 10 %			
RAW MATERIALS SHARE -YEAR 2000	LDPE 30%	PP 22%	HDPE 17%	PVC 16%	PS 9%			Other 6%

6.2.2.9 Other Markets

The other or miscellaneous category consists primarily markets for adhesives, inks, coatings, compounders, and several other un-classified categories.

6.2.3 GLOBAL FORECASTS TOWARD THE YEAR 2000.

Present global plastics consumption is estimated at 90 million tons, this is considerably higher than the estimates made by the various institutions and companies that prepared studies in 1987/88

The latest forecast, made by the writers in early 1990 estimated a global total of 86 million tons. The latest information, primarily from Modern Plastics shows that 1990 consumption in the United States and Japan was considerably higher than anticipated, and the estimated total world consumption -for 1990 - is thus assumed to be 90 million tons.

Table # 6.2.3.1 and Figures 19,20 and 21 present the Forecast of Growth of Plastic Consumption distributed by major regions between 1990 and the year 2000. The forecast is based on the 1990 consumption figures, as computed from the latest literature information and growth factors for polymers in the various regions as presented in a previous study by the writer.

Table # 6.2.3.2 and Figure # 19, 20 and 21 present the Forecast of Growth of Plastics consumption by Applications between 1990 and the year 2000. The forecast is based on the discussions in Sub-section 6.2.2 of this study.

TABLE # 6.2.3.1 GROWTH FORECAST OF PLASTIC CONSUMPTION BY MAJOR REGIONS - 1990 TO 2000

APPLICATION: PLASTICS IN:	1990 REGIONAL CONSUMPTION PERCENTAGE	MILL.TONS	1991-1995 AVG.GROWTH/YR	1995/1990 % INCREASE	1995 REGIONAL CONSUMPTION PERCENTAGE	MILLION TONS	1996-2000 AVG.GROWTH/YR	2000/1990 % INCREASE	2000 REGIONAL CONSUMPTION PERCENTAGE	MILLION TON
UNITED STATES*	31.1%	28	4.3%	23.4%	30%	34.6	3.7%	48.0%	29%	41.4
WEST EUROPE*	24.4%	22	4.0%	21.7%	23%	26.8	3.7%	45.9%	22%	32.1
				0.0%	0%	0.0		0.0%		0.0
JAPAN*	12.2%	11	6.0%	33.8%	13%	14.7	5.4%	74.1%	13%	19.1
				0.0%	0%	0.0		0.0%		0.0
OTHER EAST ASIA**	11.1%	10	6.5%	37.0%	12%	13.7	5.9%	82.5%	13%	18.2
				0.0%	0%	0.0		0.0%		0.0
REST OF WORLD**	21.1%	19	5.5%	30.7%	22%	24.8	5.3%	68.8%	22%	32.1
TOTAL	100.0%	90.0	4.9%	27.0%	100%	114.6	4.5%	58.3%	100%	143.0

* From Modern Plastics 1991; ** estimate, based on 1989 information

TABLE # 6.2.3.2 GROWTH FORECAST OF PLASTIC CONSUMPTION BY APPLICATIONS 1990 TO 2000

APPLICATION: PLASTICS IN:	1990 GLOBAL CONSUMPTION PERCENTAGE	MILL..TONS	1991-1995 AVG.GROWTH/YR	1995/1990 % INCREASE	1995 GLOBAL CONSUMPTION PERCENTAGE	MILLION TONS	1996-2000 AVG.GROWTH/YR	2000/1990 % INCREASE	2000 GLOBAL CONSUMPTION PERCENTAGE	MILLION TON
PACKAGING	30.0%	27.0	4.0%	21.7%	29%	32.8	3.0%	41.0%	27%	38.1
				0.0%						
BUILDING+CONSTRUCTION	20.0%	18.0	7.5%	43.6%	23%	25.8	4.5%	78.9%	23%	32.2
		0.0		0.0%	0%	0.0		0.0%		0.0
CONSUMER PRODUCTS	11.0%	9.9	4.5%	24.6%	11%	12.3	5.5%	62.9%	11%	16.1
		0.0		0.0%	0%	0.0		0.0%		0.0
ELECTRICAL/ELECTRONICS	10.0%	9.0	2.5%	13.1%	9%	10.2	5.0%	44.4%	9%	13.0
		0.0		0.0%	0%	0.0		0.0%		0.0
FURNITURE+FURNISHINGS	6.0%	5.4	3.0%	15.9%	5%	6.3	3.0%	34.4%	5%	7.3
		0.0		0.0%	0%	0.0		0.0%		0.0
TRANSPORTATION	6.0%	5.4	6.5%	37.0%	6%	7.4	8.5%	106.0%	8%	11.1
		0.0		0.0%	0%	0.0		0.0%		0.0
INDUSTRIAL APPLICATIONS	4.0%	3.6	6.5%	37.0%	4%	4.9	10.0%	120.7%	6%	7.9
		0.0		0.0%	0%	0.0		0.0%		0.0
AGRICULTURE	3.0%	2.7	4.0%	21.7%	3%	3.3	4.0%	48.0%	3%	4.0
		0.0		0.0%	0%	0.0		0.0%		0.0
OTHER USES	10.0%	9.0	5.0%	27.6%	10%	11.5	3.0%	48.0%	9%	13.3
TOTAL PLASTICS	100.0%	90.0	4.9%***	27.0%	100%***	114.6	4.5%***	58.0%***	100%	143.0

SECTION 7
ISRAEL PLASTICS INDUSTRY BY THE YEAR 2000.

7.1. Factors which will affect Plastics Market Growth in Israel

The Israeli plastics industry and it`s growth over the next decade will be influenced by five overall major factors :

* Domestic Economic Environment and Natural Market Growth of Present Existing Population.

* International Market Growth Factors, including New and Wider Application of Plastics.

* Direct and Indirect Effect of Increasing Immigration.

* Ability of Israeli Processors to Export Plastic Products.

* Effect of Local Production of Polymers.

7.1.1 Domestic Economic Environment and Natural Market Growth.

The international macro-economic global environment expected for the 1990s has been discussed in Sub-section 6.1 of this study.

Israel is certainly not an economically isolated island, but is very much influenced by the international economic environment. Since Israel - now more than ever - is very dependent economically on the economic environment in the United States, an immediate era of prosperity should definitely have very beneficial direct effects on Israel`s economy.

Direct positive effects will lead to increased economic aid and loan programs, which booster our economy, increased direct export potential as part of the increased consumption and acquisition power of the United States population and Israel's advantageous position in exporting to the United States under the Free Trade Agreement.

Indirect positive effects will be plastic components required for military, electronics, communications and other such high technology sub-contracts for the United States domestic market and probably for the Persian Gulf countries, which will be granted by U.S. contractors to Israeli and/or Israeli/American companies.

On the other hand, Israel has a mature plastics industry, and some of the applications are reaching saturation.

Israel`s per capita total polymer consumption is very high -even above the average West European consumption.

This is especially true for LDPE, HDPE ,PP and PET; less so for PVC and PS. Basically, it would appear that consumption of the polyolefins in conventional applications is nearly reaching saturation.

Packaging is the major consumer of plastics products in Israel. Packaging applications are not expected to grow significantly, the sole exception being the new developments of multilayers in packaging applications.

The second major consumer of plastics in Israel is in agricultural uses; especially the use of LDPE in agricultural film applications; such applications are practically saturated.

7.1.2 New and Wider Applications.

It is expected that newer and wider applications of polymers in Israel will contribute to growth over and above the expected marginal growth of the presently prevailing uses.

New and wider applications, ought to compensate - in part - the near-saturation in packaging and agricultural applications.

New industrial and agricultural applications, increased possibilities of plastics in electric and electronic end-uses and increased penetration in building and construction -replacing wood and metal in certain weight supporting structural uses - should cause increases in plastics consumption.

Polypropylene application in the furniture market has already made an inroad in Israel; this end-use application is certainly expected to increase further, especially with the commencement of local Polypropylene production.

Plastics consumption in the Medical application end-uses is another eventual interesting new consumer, so far hardly tapped in Israel.

7.1.3 Effect of Increasing Immigration.

During 1990 almost 200,000 immigrants arrived in Israel, representing over a 4 % population increase; such a large increase shall certainly have a very positive direct and indirect effect on plastics consumption.

Present forecasts regarding immigration are lower than the 1990 predictions. Continued immigration is bound to have increasing growth effects in use of plastics. However, in view of the present uncertainties, it is rather difficult to make worthwhile forecast evaluations.

However, so as to show the potential growth, forecast projections are made for two scenarios : One scenario considers MODERATE IMMIGRATION, of about 60,000 immigrants per year between 1991 and 1995, and decreasing gradually from 1995 onward. The other scenario -consistent with 1990 estimates - assumes A HIGH RATE OF IMMIGRATION -at the rate of 100,000 immigrants per year - until 1995- dropping gradually thereafter - to the same projected figures as the ones used in the MODERATE IMMIGRATION Scenario.

For any of the two scenarios- such new immigrants will increase the consumption of plastics in a direct and indirect manner; they will consume more packaging materials, more plastics components in household goods, more plastic toys, certainly much more plastic components in furniture and many more direct plastic uses can be expected. New immigrants shall increase considerably construction requirements with associated plastic utilization in this sector.

Using as a basis the 1990 per-capita plastic consumption figures in Israel, forecasts of consumption of plastics by new immigrants are calculated using a "Staged Increased Consumption Formula".

Such a formula assumes gradual integration of immigrants into the economy. Due to their initial lower consumption power possibilities, step by step increase in utilization of plastic products is assumed.

It is assumed that in the first year -of their immigration-such new immigrants would consume only 25% of the present per-capita consumption of the Israeli population, increasing step-wise :to 40% in the second year, 50% in the third year and so on until they achieve the full per capita consumption after 10 years of their immigration.

7.1.4 Ability of Israeli Processing Industry to Export Plastic Products. Changes in Pattern of Exports of Plastic Products

Exports of plastics products (excluding exports of polymers per se) during 1988 amounted to 230 million dollars, out of a total plastics products manufacture amounting to 1.1 billion dollars; thus export represented over 20% by value of total production. Exports of plastics products were continuously on the increase from 1982 until 1989, and are expected to continue increasing at about the same rate as for the last years.
Exports of polymers in 1988 were 79 thousand tons, at a value of 81 million dollars. Total exports of polymers in previous years were somewhat higher than in 1988, ranging between 80-84 thousand tons per year.
There should be an increased trend in polymers from Israel, as new polymer industries will come on-stream. The first one of these will be the polypropylene plant - expected on-stream by late 1992, and which is expected to export 20-30,000 tons/year.

Unless the changes in Europe after 1992 will have a dramatically negative effect on Israeli exports to Europe, there is no identifiable reason for a significant downward trend in plastics and polymer exports from Israel.

On the whole, the forecasts in this study for the next decade contemplate that export of plastic products from Israel will range between 20-25% of the plastics industry output, and that about 40-45 % of polymer output will continue to be exported.

7.1.5 Effect of Local Production

Local production of any specific polymer enhances local consumption This can best be seen by the continuous growth of LDPE in Israel. It is a fact that -on the whole- all polymers can be imported at competitive world-wide prices; however, when there is a shortage in supplies - as there was in 1988 - it is an evident that the existence of a local manufacturer assures continuity of supplies.

Local manufacturing provides closer technical-customer service, and in general prices are somewhat lower than imported polymers.

Unless special interest-free terms are obtained for imported polymers, which is only the case whenever there are large world-wide surpluses, there is a certain working capital advantage to local supplies, as stocks can be reduced.
While local production has had a definite positive effect on local consumption - especially on the growth of LDPE- the influence could be much stronger if:

* there would be greater inter-action between polymer manufacturers and processors.
* there would be a more aggressive technical service assistance/development policy on the part of polymer manufacturers.

The above would encourage existing and new processors to enter new applications, with the technical and development assistance of the polymer manufacturers.

7.2 FORECASTS OF ISRAEL`S PLASTICS CONSUMPTION OVER THE NEXT DECADE.

7.2.1. PROJECTIONS ALTERNATIVES

Considering all the factors discussed in Section 7.1, forecasts have been prepared as to expected plastics consumption over the next decade. Various forecasts have been evaluated, based on three growth scenarios, coupled with two immigration alternatives.

The following Growth Scenarios have been set-up for forecasting purposes :

GROWTH SCENARIOS

Growth scenarios are applied to the natural consumption path of the existing population; the effect of immigration is calculated separately.
Natural Growth of Plastics Consumption - without the effect of immigration-is to be evaluated for three varying growth scenarios:

REALISTIC GROWTH :
This scenario assumes an average annual growth in GNP in Israel of 2.7 % between 1991 and 1995; and dampened growth -after 1995 - to about 2.3 % per annum. Plastics growth is assumed to average 1% above the GNP growth; i.e. 3.7% average annual growth between 1991 and 1995; and 3.3% average annual growth after 1995.

OPTIMISTIC GROWTH :
This scenario assumes a very optimistic approach. It assumes that the National Economy will show an optimistic 3.3-3.6% average annual growth in GNP between 1991 and the year 2000. Plastics growth is assumed to be spear-headed by such an increased overall growth, and would be 1.5-2% average above the GNP growth; i.e. over 5 % average annual growth throughout the period of the evaluation (1991-2000).

PESSIMISTIC GROWTH :
This pessimistic scenario assumes that plastic products consumption would average a modest increase, equivalent to 2.6% per annum during the 1991-1995 period, decreasing to only a 2.2% average per annum growth thereafter.
Such low consumption growth may be resulting from an overall recession in the National Economy, or alternatively from a slump-down in the plastics industry; or a combination of the two.

IMMIGRATION ALTERNATIVES

As already discussed previously, in view of the uncertain immigration forecasts at present, two immigration alternatives are evaluated :

HIGH RATE OF IMMIGRATION :
This alternative, based on the 1990 optimistic forecasts, considers immigration to come to Israel at the rate of 100,000 immigrants per year between 1991 and 1995, decreasing to 40,000 in 1996; 30,000 per year in 1997 and 1998 and to 20,000 per year in 1999 and the year 2000.

MODERATE RATE OF IMMIGRATION
This alternative, has been adjusted downward, based on the 1991 decreased immigration. It assumes 60,000 immigrants per year from 1991 to 1995; and from 1996 onward, it assumes the same yearly immigration as in the previous alternative.

7.2.2 ALTERNATIVES AND METHODOLOGY IN CALCULATING FORECAST CONSUMPTION

Five alternate projection cases were set-up based on various combinations of the above discussed alternatives.
The following cases were set-up and evaluated and are are shown in detail in the set of Tables 7.2:

TABLE	GROWTH SCENARIO	IMMIGRATION ALTERNATIVE
7.2.RMI	Realistic	Moderate
7.2.RHI	Realistic	High Rate
7.2.OMI	Optimistic	Moderate
7.2.OHI	Optimistic	High Rate
7.2.PMI	Pessimistic	Moderate

The following methodology is used for forecasting each combined Growth/Immigration Alternative:

1. Expected consumption by new immigrants on a year to year basis, for each major end-use group is calculated. The calculations for each Alternative -of such additional consumption- are shown in the Tables 7.2, indicated with the suffix IMM-.

2. Expected natural increase in consumption for the years 1995 and 2000 are calculated for each case, based on the respective average annual natural growth figures for each specific alternative.
The additional consumption figures -due to immigration- as discussed above - are then added to the natural growth figures, to obtain the total expected consumption.

TABLE 7.2-OHI-IMM - DIRECT AND INDIRECT EFFECT OF INCREASING IMMIGRATION ON POLYMER CONSUMPTION

Description of Alternative: Overall Economy Increased Growth; Plastics @ 1.5-2% above GNP

Immigration expected to be at a high rate : 100,000 immigrants per year to 1995, decreasing thereafter

OPTIMISTIC/HIGH IMMIGRATION RATE

TONS PER YEAR

YEAR				1990	1991	1992	1993	1994	1995	Expct.TOTAL ISRAEL Consumption in 1995	% increase Due to NEW IMMIGRANTS	1996	1997	1998	1999	2000	Expct.TOTAL ISRAEL Consumption YEAR:2000	% increa due to NEW IMMIGRAN
New Immigration expected to arrive during year -				200,000	100,000	100,000	100,000	100,000	100,000			40,000	30,000	30,000	20,000	20,000		
APPLICATION : PLASTICS IN:	% OF TOTAL Plastics Consumption	Present Est.Total Consumption Tons/year	Present Percapita Consumption Kg/per/yr	ADDITIONAL CONSUMPTION OVER AND ABOVE NATURAL INCREASE FROM PRESENT POPULATION IN TONS/ YEAR														
PACKAGING	32.0%	104,416	22.0		1,099	2,308	3,627	5,166	6,924	138,804	5.0%	8,683	10,222	11,618	12,959	13,673	178,169	7.
AGRICULTURAL APPLICATIONS	20.0%	65,260	13.7		206	433	680	969	1,298	84,128	1.5%	1,628	1,917	2,178	2,430	8,875	106,859	8.
BUILDING/CONSTRUCTION USE	17.6%	57,429	12.1		846	1,777	2,793	3,978	5,332	87,988	6.1%	6,686	7,871	8,946	9,978	10,934	119,735	9.
CONSUMERS PRODUCTS *	9.8%	31,977	6.7		448	940	1,477	2,104	2,820	43,769	6.4%	3,537	4,163	4,732	5,278	5,784	57,132	10.
INDUSTRIAL APPLICATIONS**	10.3%	33,609	7.1		354	743	1,167	1,663	2,229	47,771	4.7%	2,795	3,290	3,739	4,171	4,571	69,140	6.
FURNITURE COMPONENTS	6.3%	20,557	4.3		216	454	714	1,017	1,363	28,197	4.8%	1,709	2,012	2,287	2,551	2,796	36,601	7.
OTHER USES	4.0%	13,052	2.7		137	289	453	646	866	16,965	5.1%	1,085	1,278	1,452	1,620	1,775	22,042	8.
TOTAL	100.0%	326,300	68.7		3,307	6,944	10,912	15,542	20,833	447,623	4.7%	26,123	30,753	34,952	38,987	48,408	589,679	8.
Population -million people		4.75		4.75	4.91	5.08	5.24	5.41	5.58			5.69	5.80	5.90	6.00	6.10		

* includes clothing, household articles, toys, sport and recreation articles, etc.

** includes electrical, electronics, automotive and military applications

TABLE 7.2-OHI - EXPECTED TOTAL CONSUMPTION OF PLASTICS IN YEARS 1995 AND 2000 INCLUDING EFFECT OF INCREASING IMMIGRATION

Description of Alternative : Overall Economy Increased Growth; Plastics @ 1.5-2% above GNP

Immigration expected to be at a high rate : 100,000 immigrants per year to 1995, decreasing thereafter

TONS PER YEAR

TIMISTIC/HIGH IMMIGRATION RATE

APPLICATION : PLASTICS IN:	PRESENT-1990-CONSUMPTION- % OF TOTAL Plastics Consumption	Present Est.Total Consumption Tons/year	Present Percapita Consumption Kg/per/yr	EXPECTED ALTERNATIVE FOR PLASTICS CONSUMPTION FOR THE YEAR 1995 Added Consumption due to Immigration Tons/year	Estimated Total Consumption YEAR: 1995 Tons/year	Revised for 1995 Per-Capita Consumption Kg/pers/yr	Revised for 1995 % of Total Plastics Consumption	Average Annual Rate of Growth on Present * Population excl.effect*	Average Annual Rate of Growth on Total Population including of Immigration Average.% per annum between 1990 to 1995	EXPECTED ALTERNATIVE FOR PLASTICS CONSUMPTION FOR THE YEAR 2000 Added Consumption due to Immigration Tons/year	Estimated Total Consumption YEAR : 2000 Tons/year	Revised for 2000 Per-Capita Consumption 2,000	Revised for 2000 % of Total Plastics	Average Annual Rate of Growth Population excl.effect	Average Annual Rate of Growth Population *including of Immigration Average.% per annum between 1996-2000
CKAGING	32.0%	104,416	22.0	6,924	138,804	24.9	31.0%	4.5%	5.9%	13,673	178,169	29.2	30.2%	4.8%	5.1%
RICULTURAL APPLICATIONS	20.0%	65,260	13.7	1,298	84,128	15.1	18.8%	4.8%	5.3%	8,875	106,859	17.5	18.1%	3.5%	4.8%
ILDING/CONSTRUCTION USES	17.6%	57,429	12.1	5,332	87,988	15.8	19.7%	7.2%	8.8%	10,934	119,735	19.6	20.3%	6.0%	6.4%
NSUMERS PRODUCTS *	9.8%	31,977	6.7	2,820	43,769	7.8	9.8%	4.7%	6.5%	5,784	57,132	9.4	9.7%	5.0%	5.5%
DUSTRIAL APPLICATIONS**	10.3%	33,609	7.1	2,229	47,771	8.6	10.7%	6.0%	7.3%	4,571	69,140	11.3	11.7%	7.5%	7.7%
RNITURE COMPONENTS	6.3%	20,557	4.3	1,363	28,197	5.1	6.3%	5.2%	6.5%	2,796	36,601	6.0	6.2%	5.0%	5.4%
HER USES	4.0%	13,052	2.7	866	16,965	3.0	3.8%	4.0%	5.4%	1,775	22,042	3.6	3.7%	5.0%	5.4%
TAL	100.0%	326,300	68.7	20,833	447,623	80.2	100.0%	5.3%	6.5%	48,408	589,679	96.7	100.0%	5.2%	5.7%
pulation -million people		4.75			5.58						6.10				

includes clothing, household articles, toys, sport and recreation articles, etc.
includes electrical, electronics, automotive and military applications.

TABLE 7.2-OMI-IMM - DIRECT AND INDIRECT EFFECT OF INCREASING IMMIGRATION ON POLYMER CONSUMPTION

Description of Alternative : Overall Economy Increased Growth; Plastics @ 1.5-2% above GNP.

Immigration expected to be moderate : 60,000 immigrants per year to 1995, decreasing thereafter

OPTIMISTIC/MODERATE IMMIGRATION

TONS PER YEAR

YEAR				1990	1991	1992	1993	1994	1995	Expct.TOTAL ISRAEL Consumption	% increase Due to NEW	1996	1997	1998	1999	2000	Expct.TOTAL ISRAEL Consumption	% increase due to NEW
New Immigration expected to arrive during year -				200,000	60,000	60,000	60,000	60,000	60,000	in 1995	IMMIGRANTS	40,000	30,000	30,000	20,000	20,000	YEAR:2000	IMMIGRANTS
APPLICATION : PLASTICS IN:	% OF TOTAL Plastics Consumption	Present Est.Total Consumption Tons/year	Present Percapita Consumption Kg/per/yr	ADDITIONAL CONSUMPTION OVER AND ABOVE NATURAL INCREASE FROM PRESENT POPULATION IN TONS/ YEAR														
PACKAGING	32.0%	104,416	22.0		1,099	2,088	3,056	4,155	5,386	136,650	3.9%	6,529	7,628	8,672	9,705	10,156	174,652	5.8%
AGRICULTURAL APPLICATIONS	20.0%	65,260	13.7		206	392	573	779	1,010	83,724	1.2%	1,224	1,430	1,626	1,820	6,677	104,661	6.4%
BUILDING/CONSTRUCTION USE	17.6%	57,429	12.1		846	1,608	2,353	3,199	4,147	86,330	4.8%	5,027	5,873	6,677	7,473	8,226	117,027	7.0%
CONSUMERS PRODUCTS *	9.8%	31,977	6.7		448	851	1,245	1,692	2,194	42,892	5.1%	2,659	3,107	3,532	3,953	4,351	55,699	7.8%
INDUSTRIAL APPLICATIONS**	10.3%	33,609	7.1		354	672	984	1,337	1,734	47,078	3.7%	2,101	2,455	2,791	3,124	3,439	68,008	5.1%
FURNITURE COMPONENTS	6.3%	20,557	4.3		216	411	602	818	1,060	27,773	3.8%	1,285	1,502	1,707	1,911	2,103	35,908	5.9%
OTHER USES	4.0%	13,052	2.7		137	261	382	519	673	16,696	4.0%	816	953	1,084	1,213	1,335	21,602	6.2%
TOTAL	100.0%	326,300	68.7		3,307	6,283	9,193	12,500	16,203	441,142	3.7%	19,642	22,949	26,090	29,199	36,288	577,558	6.3%
Population -million people		4.75		4.75	4.87	5.00	5.12	5.25	5.37			5.48	5.59	5.69	5.78	5.88		

* includes clothing, household articles, toys, sport and recreation articles, etc.
** includes electrical, electronics, automotive and military applications

TABLE 7.2-OMI - EXPECTED TOTAL CONSUMPTION OF PLASTICS IN YEARS 1995 AND 2000 INCLUDING EFFECT OF INCREASING IMMIGRATION

Description of Alternative : Overall Economy Increased Growth; Plastics @ 1.5-2% above GNP.

Immigration expected to be moderate : 60,000 immigrants per year to 1995, decreasing thereafter

MISTIC/MODERATE IMMIGRATION

TONS PER YEAR

PPLICATION : ASTICS IN:	PRESENT - 1990 - CONSUMPTION			EXPECTED ALTERNATIVE FOR PLASTICS CONSUMPTION FOR THE YEAR 1995						EXPECTED ALTERNATIVE FOR PLASTICS CONSUMPTION FOR THE YEAR 2000					
	% OF TOTAL Plastics Consumption	Present Est.Total Consumption Tons/year	Present Percapita Consumption Kg/per/yr	Added Consumption due to Immigration Tons/year	Estimated Total Consumption YEAR: 1995 Tons/year	Revised for 1995 Per-Capita Consumption Kg/pers/yr	Revised for 1995 % of Total Plastics Consumption	Average Annual Rate of Growth on Present * Population excl.effect of Immigration Average.% per annum between 1990 to 1995	Average Annual Rate of Growth on Total Population including effect of Immigration Average.% per annum between 1990 to 1995	Added Consumption due to Immigration Tons/year	Estimated Total Consumption YEAR : 2000 Tons/year	Revised for 2000 Per-Capita Consumption 2,000	Revised for 2000 % of Total Plastics	Average Annual Rate of Growth Population excl.effect of Immigration Average.% per annum between 1996-2000	Average Annual Rate of Growth Population including effect of Immigration Average.% per annum between 1996-2000
AGING	32.0%	104,416	22.0	5,386	136,650	25.4	31.0%	4.5%	5.5%	10,156	174,652	29.7	30.2%	4.8%	5.1
CULTURAL APPLICATIONS	20.0%	65,260	13.7	1,010	83,724	15.6	19.0%	4.8%	5.1%	6,677	104,661	17.8	18.1%	3.5%	4.5
DING/CONSTRUCTION USES	17.6%	57,429	12.1	4,147	86,330	16.1	19.6%	7.2%	8.5%	8,226	117,027	19.9	20.3%	6.0%	6.3
UMERS PRODUCTS *	9.8%	31,977	6.7	2,194	42,892	8.0	9.7%	4.7%	5.7%	4,351	55,699	9.5	9.6%	5.0%	5.3
STRIAL APPLICATIONS**	10.3%	33,609	7.1	1,734	47,078	8.8	10.7%	6.0%	7.0%	3,439	68,008	11.6	11.8%	7.5%	7.6
ITURE COMPONENTS	6.3%	20,557	4.3	1,060	27,773	5.2	6.3%	5.2%	5.9%	2,103	35,908	6.1	6.2%	5.0%	5.3
R USES	4.0%	13,052	2.7	673	16,696	3.1	3.8%	4.0%	5.0%	1,335	21,602	3.7	3.7%	5.0%	5.3
L	100.0%	326,300	68.7	16,203	441,142	82.1	100.0%	5.3%	6.2%	36,288	577,558	98.2	100.0%	5.2%	5.5
lation -million people		4.75			5.37						5.88				

cludes clothing, household articles, toys, sport and recreation articles, etc.
ncludes electrical, electronics, automotive and military applications.

TABLE 7.2-RHI-IMM - DIRECT AND INDIRECT EFFECT OF INCREASING IMMIGRATION ON POLYMER CONSUMPTION

Description of Alternative : Consumption Growth of plastics assumed to average about 1% above the GNP, as in developed countries

Immigration expected to be at a high rate : 100,000 immigrants per year to 1995, decreasing thereafter

REALISTIC/HIGH IMMIGRATION RATE

TONS PER YEAR

YEAR				1990	1991	1992	1993	1994	1995	Expct.TOTAL ISRAEL Consumption in 1995	% increase Due to NEW IMMIGRANTS	1996	1997	1998	1999	2000	Expct.TOTAL ISRAEL Consumption YEAR:2000	% increase due to NEW IMMIGRANTS
New Immigration expected to arrive during year -				200,000	100,000	100,000	100,000	100,000	100,000			40,000	30,000	30,000	20,000	20,000		
APPLICATION : PLASTICS IN:	% OF TOTAL Plastics Consumption	Present Est.Total Consumption Tons/year	Present Percapita Consumption Kg/per/yr	ADDITIONAL CONSUMPTION OVER AND ABOVE NATURAL INCREASE FROM PRESENT POPULATION IN TONS/ YEAR														
PACKAGING	32.0%	104,416	22.0		1,099	2,308	3,627	5,166	6,924	126,820	5.5%	8,683	10,222	11,618	12,959	13,673	150,626	9.1%
AGRICULTURAL APPLICATIONS	20.0%	65,260	13.7		206	433	680	969	1,298	73,680	1.8%	1,628	1,917	2,178	2,430	8,875	84,603	10.5%
BUILDING/CONSTRUCTION USE	17.6%	57,429	12.1		846	1,777	2,793	3,978	5,332	85,368	6.2%	6,686	7,871	8,946	9,978	10,934	106,664	10.3%
CONSUMERS PRODUCTS *	9.8%	31,977	6.7		448	940	1,477	2,104	2,820	40,969	6.9%	3,537	4,163	4,732	5,278	5,784	50,241	11.5%
INDUSTRIAL APPLICATIONS**	10.3%	33,609	7.1		354	743	1,167	1,663	2,229	45,689	4.9%	2,795	3,290	3,739	4,171	4,571	61,973	7.4%
FURNITURE COMPONENTS	6.3%	20,557	4.3		216	454	714	1,017	1,363	26,720	5.1%	1,709	2,012	2,287	2,551	2,796	32,500	8.6%
OTHER USES	4.0%	13,052	2.7		137	289	453	646	866	15,853	5.5%	1,085	1,278	1,452	1,620	1,775	18,079	9.8%
TOTAL	100.0%	326,300	68.7		3,307	6,944	10,912	15,542	20,833	415,099	5.0%	26,123	30,753	34,952	38,987	48,408	504,687	9.6%
Population -million people		4.75		4.75	4.91	5.08	5.24	5.41	5.58			5.69	5.80	5.90	6.00	6.10		

* includes clothing, household articles, toys, sport and recreation articles, etc.

** includes electrical, electronics, automotive and military applications

TABLE 7.2-RHI - EXPECTED TOTAL CONSUMPTION OF PLASTICS IN YEARS 1995 AND 2000 INCLUDING EFFECT OF INCREASING IMMIGRATION

Description of Alternative : Consumption Growth of plastics assumed to average about 1% above the GNP, as in developed countries

Immigration expected to be at a high rate: 100,000 immigrants per year to 1995, decreasing thereafter

ISTIC/HIGH IMMIGRATION RATE

TONS PER YEAR

PLICATION : STICS IN:	PRESENT - 1990 - CONSUMPTION			EXPECTED ALTERNATIVE FOR PLASTICS CONSUMPTION FOR THE YEAR 1995						EXPECTED ALTERNATIVE FOR PLASTICS CONSUMPTION FOR THE YEAR 2000					
	% OF TOTAL Plastics Consumption	Present Est.Total Consumption Tons/year	Present Percapita Consumption Kg/per/yr	Added Consumption due to Immigration Tons/year	Estimated Total Consumption YEAR: 1995 Tons/year	Revised for 1995 Per-Capita Consumption Kg/pers/yr	Revised for 1995 % of Total Plastics Consumption	Average Annual Rate of Growth on Present * Population excl.effect of Immigration Average.% per annum between 1990 to 1995	Average Annual Rate of Growth on Total Population including Immigration Average.% per annum between 1990 to 1995	Added Consumption due to Immigration Tons/year	Estimated Total Consumption YEAR : 2000 Tons/year	Revised for 2000 Per-Capita Consumption 2,000	Revised for 2000 % of Total Plastics	Average Annual Rate of Growth Population excl.effect of Immigration Average.% per annum between 1996-2000	Average Annual Rate of Growth Population including Immigration Average.% per annum between 1996-2000
GING	32.0%	104,416	22.0	6,924	126,820	22.7	30.6%	2.5%	4.0%	13,673	150,626	24.7	29.8%	3.0%	3.5%
ULTURAL APPLICATIONS	20.0%	65,260	13.7	1,298	73,680	13.2	17.8%	2.0%	2.5%	8,875	84,603	13.9	16.8%	1.0%	2.8%
DING/CONSTRUCTION USES	17.6%	57,429	12.1	5,332	85,368	15.3	20.6%	6.5%	8.2%	10,934	106,664	17.5	21.1%	4.0%	4.6%
MERS PRODUCTS *	9.8%	31,977	6.7	2,820	40,969	7.3	9.9%	3.2%	5.1%	5,784	50,241	8.2	10.0%	3.5%	4.2%
TRIAL APPLICATIONS**	10.3%	33,609	7.1	2,229	45,689	8.2	11.0%	5.0%	6.3%	4,571	61,973	10.2	12.3%	6.0%	6.3%
TURE COMPONENTS	6.3%	20,557	4.3	1,363	26,720	4.8	6.4%	4.0%	5.4%	2,796	32,500	5.3	6.4%	3.5%	3.9%
USES	4.0%	13,052	2.7	866	15,853	2.8	3.8%	2.5%	3.9%	1,775	18,079	3.0	3.6%	2.0%	2.6%
	100.0%	326,300	68.7	20,833	415,099	74.4	100.0%	3.7%	4.9%	48,408	504,687	82.7	100.0%	3.3%	3.9%
ation -million people		4.75			5.58						6.10				

ludes clothing, household articles, toys, sport and recreation articles, etc.
cludes electrical, electronics, automotive and military applications.

TABLE 7.2-RMI-IMM - DIRECT AND INDIRECT EFFECT OF INCREASING IMMIGRATION ON POLYMER CONSUMPTION

Description of Alternative : Consumption Growth of plastics assumed to average about 1% above the GNP, as in developed countries

Immigration expected to be moderate : 60,000 immigrants per year to 1995, decreasing thereafter

REALISTIC/MODERATE IMMIGRATION

TONS PER YEAR

YEAR				1990	1991	1992	1993	1994	1995	Expct.TOTAL ISRAEL Consumption in 1995	% increase Due to NEW IMMIGRANTS	1996	1997	1998	1999	2000	Expct.TOTAL ISRAEL Consumption YEAR:2000	% increase due to NEW IMMIGRANTS
New Immigration expected to arrive during year -				200,000	60,000	60,000	60,000	60,000	60,000			40,000	30,000	30,000	20,000	20,000		
APPLICATION : PLASTICS IN:	% OF TOTAL Plastics Consumption	Present Est.Total Consumption Tons/year	Present Percapita Consumption Kg/per/yr	ADDITIONAL CONSUMPTION OVER AND ABOVE NATURAL INCREASE FROM PRESENT POPULATION IN TONS/ YEAR														
PACKAGING	32.0%	104,416	22.0		1,099	2,088	3,056	4,155	5,386	124,666	4.3%	6,529	7,628	8,672	9,705	10,156	147,109	6.9%
AGRICULTURAL APPLICATIONS	20.0%	65,260	13.7		206	392	573	779	1,010	73,276	1.4%	1,224	1,430	1,626	1,820	6,677	82,405	8.1%
BUILDING/CONSTRUCTION USE	17.6%	57,429	12.1		846	1,608	2,353	3,199	4,147	83,710	5.0%	5,027	5,873	6,677	7,473	8,226	103,955	7.9%
CONSUMERS PRODUCTS *	9.8%	31,977	6.7		448	851	1,245	1,692	2,194	40,091	5.5%	2,659	3,107	3,532	3,953	4,351	48,809	8.9%
INDUSTRIAL APPLICATIONS**	10.3%	33,609	7.1		354	672	984	1,337	1,734	44,996	3.9%	2,101	2,455	2,791	3,124	3,439	60,841	5.7%
FURNITURE COMPONENTS	6.3%	20,557	4.3		216	411	602	818	1,060	26,296	4.0%	1,285	1,502	1,707	1,911	2,103	31,808	6.6%
OTHER USES	4.0%	13,052	2.7		137	261	382	519	673	15,583	4.3%	816	953	1,084	1,213	1,335	17,640	7.6%
TOTAL	100.0%	326,300	68.7		3,307	6,283	9,193	12,500	16,203	408,618	4.0%	19,642	22,949	26,090	29,199	36,288	492,567	7.4%
Population -million people		4.75		4.75	4.87	5.00	5.12	5.25	5.37			5.48	5.59	5.69	5.78	5.88		

* includes clothing, household articles, toys, sport and recreation articles, etc.
** includes electrical, electronics, automotive and military applications

TABLE 7.2-RMI - EXPECTED TOTAL CONSUMPTION OF PLASTICS IN YEARS 1995 AND 2000 INCLUDING EFFECT OF INCREASING IMMIGRATION

Description of Alternative : Consumption Growth of plastics assumed to average about 1% above the GNP, as in developed countries

Immigration expected to be moderate : 60,000 immigrants per year to 1995, decreasing thereafter

LISTIC/MODERATE IMMIGRATION

TONS PER YEAR

PLICATION : ASTICS IN:	PRESENT - 1990 - CONSUMPTION			EXPECTED ALTERNATIVE FOR PLASTICS CONSUMPTION FOR THE YEAR 1995						EXPECTED ALTERNATIVE FOR PLASTICS CONSUMPTION FOR THE YEAR 2000					
	% OF TOTAL Plastics Consumption	Present Est.Total Consumption Tons/year	Present Percapita Consumption Kg/per/yr	Added Consumption due to Immigration Tons/year	Estimated Total Consumption YEAR: 1995 Tons/year	Revised for 1995 Per-Capita Consumption Kg/pers/yr	Revised for 1995 % of Total Plastics Consumption	Average Annual Rate of Growth on Present * Population excl.effect of Immigration Average.% per annum between 1990 to 1995	Average Annual Rate of Growth on Total Population including effect of Immigration Average.% per annum between 1990 to 1995	Added Consumption due to Immigration Tons/year	Estimated Total Consumption YEAR : 2000 Tons/year	Revised for 2000 Per-Capita Consumption 2,000	Revised for 2000 % of Total Plastics	Average Annual Rate of Growth Population excl.effect of Immigration Average.% per annum between 1996-2000	Average Annual Rate of Growth Population including effect of Immigration Average.% per annum between 1996-2000
AGING	32.0%	104,416	22.0	5,386	124,666	23.2	30.5%	2.5%	3.6%	10,156	147,109	25.0	29.9%	3.0%	3.4%
CULTURAL APPLICATIONS	20.0%	65,260	13.7	1,010	73,276	13.6	18.0%	2.0%	2.3%	6,677	82,405	14.0	16.8%	1.0%	2.4%
DING/CONSTRUCTION USES	17.6%	57,429	12.1	4,147	83,710	15.6	20.5%	6.5%	7.8%	8,226	103,955	17.7	21.1%	4.0%	4.4%
UMERS PRODUCTS *	9.8%	31,977	6.7	2,194	40,091	7.5	9.8%	3.2%	4.6%	4,351	48,809	8.3	9.9%	3.5%	4.0%
STRIAL APPLICATIONS**	10.3%	33,609	7.1	1,734	44,996	8.4	11.0%	5.0%	6.0%	3,439	60,841	10.3	12.4%	6.0%	6.2%
ITURE COMPONENTS	6.3%	20,557	4.3	1,060	26,296	4.9	6.4%	4.0%	5.0%	2,103	31,808	5.4	6.5%	3.5%	3.9%
R USES	4.0%	13,052	2.7	673	15,583	2.9	3.8%	2.5%	3.6%	1,335	17,640	3.0	3.6%	2.0%	2.5%
L	100.0%	326,300	68.7	16,203	408,618	76.0	100.1%	3.7%	4.6%	36,288	492,567	83.8	100.1%	3.3%	3.8%
lation -million people		4.75			5.37						5.88				

cludes clothing, household articles, toys, sport and recreation articles, etc.
ncludes electrical, electronics, automotive and military applications.

TABLE 7.2-PMI-IMM - DIRECT AND INDIRECT EFFECT OF INCREASING IMMIGRATION ON POLYMER CONSUMPTION

Description of Alternative : Consumption Growth of plastics assumed to average 2.6% per annum, until 1995; decreasing 2.2% thereafter.

Immigration expected to be moderate : 60,000 immigrants per year to 1995, decreasing thereafter

PESSIMISTIC/MODERATE IMMIGRATION

TONS PER YEAR

YEAR				1990	1991	1992	1993	1994	1995	Expct.TOTAL ISRAEL Consumption in 1995	% increase Due to NEW IMMIGRANTS	1996	1997	1998	1999	2000	Expct.TOTAL ISRAEL Consumption YEAR:2000	% increase due to NEW IMMIGRANTS
New Immigration expected to arrive during year -				200,000	60,000	60,000	60,000	60,000	60,000			40,000	30,000	30,000	20,000	20,000		
APPLICATION : PLASTICS IN:	% OF TOTAL Plastics Consumption	Present Est.Total Consumption Tons/year	Present Percapita Consumption Kg/per/yr	ADDITIONAL CONSUMPTION OVER AND ABOVE NATURAL INCREASE FROM PRESENT POPULATION IN TONS/ YEAR														
PACKAGING	32.0%	104,416	22.0		1,099	2,088	3,056	4,155	5,386	119,014	4.5%	6,529	7,628	8,672	9,705	10,156	131,335	7.7%
AGRICULTURAL APPLICATIONS	20.0%	65,260	13.7		206	392	573	779	1,010	73,276	1.4%	1,224	1,430	1,626	1,820	6,677	82,405	8.1%
BUILDING/CONSTRUCTION USE	17.6%	57,429	12.1		846	1,608	2,353	3,199	4,147	74,898	5.5%	5,027	5,873	6,677	7,473	8,226	89,226	9.2%
CONSUMERS PRODUCTS *	9.8%	31,977	6.7		448	851	1,245	1,692	2,194	38,839	5.6%	2,659	3,107	3,532	3,953	4,351	45,285	9.6%
INDUSTRIAL APPLICATIONS**	10.3%	33,609	7.1		354	672	984	1,337	1,734	42,992	4.0%	2,101	2,455	2,791	3,124	3,439	53,188	6.5%
FURNITURE COMPONENTS	6.3%	20,557	4.3		216	411	602	818	1,060	25,116	4.2%	1,285	1,502	1,707	1,911	2,103	29,066	7.2%
OTHER USES	4.0%	13,052	2.7		137	261	382	519	673	15,583	4.3%	816	953	1,084	1,213	1,335	17,640	7.6%
TOTAL	100.0%	326,300	68.7		3,307	6,283	9,193	12,500	16,203	389,719	4.2%	19,642	22,949	26,090	29,199	36,288	448,144	8.1%
Population -million people		4.75		4.75	4.87	5.00	5.12	5.25	5.37			5.48	5.59	5.69	5.78	5.88		

* includes clothing, household articles, toys, sport and recreation articles, etc.

** includes electrical, electronics, automotive and military applications

TABLE 7.2-PMI - EXPECTED TOTAL CONSUMPTION OF PLASTICS IN YEARS 1995 AND 2000 INCLUDING EFFECT OF INCREASING IMMIGRATION

Description of Alternative : Consumption Growth of plastics assumed to average about 2.6% per annum, until 1995; decreasing to 2.2% thereafter.

Immigration expected to be moderate : 60,000 immigrants per year to 1995, decreasing thereafter

TONS PER YEAR

SSIMISTIC/MODERATE IMMIGRATION

APPLICATION : PLASTICS IN:	% OF TOTAL Plastics Consumption	Present Est.Total Consumption Tons/year	Present Percapita Consumption Kg/per/yr	EXPECTED ALTERNATIVE FOR PLASTICS CONSUMPTION FOR THE YEAR 1995						EXPECTED ALTERNATIVE FOR PLASTICS CONSUMPTION FOR THE YEAR 2000					
				Added Consumption due to Immigration Tons/year	Estimated Total Consumption YEAR: 1995 Tons/year	Revised for 1995 Per-Capita Consumption Kg/pers/yr	Revised for 1995 % of Total Plastics Consumption	Average Annual Rate of Growth on Present * Population excl.effect of Immigration Average.% per annum between 1990 to 1995	Average Annual Rate of Growth on Total Population including of Immigration Average.% per annum between 1990 to 1995	Added Consumption due to Immigration Tons/year	Estimated Total Consumption YEAR : 2000 Tons/year	Revised for 2000 Per-Capita Consumption 2,000	Revised for 2000 % of Total Plastics	Average Annual Rate of Growth Population excl.effect of Immigration Average.% per annum between 1996-2000	Average Annual Rate of Growth *including of Immigration Average.% per annum between 1996-2000
CKAGING	32.0%	104,416	22.0	5,386	119,014	22.1	30.5%	1.5%	2.7%	10,156	131,335	22.3	29.3%	1.5%	2.0%
RICULTURAL APPLICATIONS	20.0%	65,260	13.7	1,010	73,276	13.6	18.8%	2.0%	2.3%	6,677	82,405	14.0	18.4%	1.0%	2.3%
LDING/CONSTRUCTION USES	17.6%	57,429	12.1	4,147	74,898	13.9	19.2%	4.0%	5.5%	8,226	89,226	15.2	19.9%	3.0%	3.6%
SUMERS PRODUCTS *	9.8%	31,977	6.7	2,194	38,839	7.2	10.0%	2.5%	3.9%	4,351	45,285	7.7	10.1%	2.5%	3.1%
USTRIAL APPLICATIONS**	10.3%	33,609	7.1	1,734	42,992	8.0	11.0%	4.0%	5.0%	3,439	53,188	9.0	11.9%	4.0%	4.6%
NITURE COMPONENTS	6.3%	20,557	4.3	1,060	25,116	4.7	6.4%	3.0%	4.1%	2,103	29,066	4.9	6.5%	2.5%	3.0%
ER USES	4.0%	13,052	2.7	673	15,583	2.9	4.0%	2.5%	3.5%	1,335	17,640	3.0	3.9%	2.0%	2.6%
AL	100.0%	326,300	68.7	16,203	389,719	72.5	100.0%	2.6%	3.5%	36,288	448,144	76.2	100.0%	2.2%	2.9%
ulation -million people		4.75			5.37						5.88				

ncludes clothing, household articles, toys, sport and recreation articles, etc.
includes electrical, electronics, automotive and military applications.

7.2.3 PROJECTIONS FOR PLASTICS CONSUMPTION FOR VARIOUS ALTERNATIVES 1995 AND 2000.

Tables 7.2S and Figures # 22 and 23 summarize the major results for the various cases analyzed.

7.2.3.1 EXPECTED RATE OF GROWTH BY END-USES

Table 7.2.3.1 shows expected Rate of Growth of Plastics in Israel, for the various major end-uses between 1990-1995, and 1996-2000.

TABLE 7.2.3.1 EXPECTED RATE OF AVERAGE ANNUAL GROWTH : 1990-2000

SCENARIO	OPTIMISTIC GROWTH				REALISTIC GROWTH				PESSIMIST	
Immigrat. Rate	High		Moderate		High		Moderate		Moderate	
CASE-Tables7.2	OHI		OMI		RHI		RMI		PMI	
Avg.% Growth total%/^ex-imm	1990-95	96-2000	1990-95	96-2000	1990-95	96-2000	1990-95	96-2000	1990-95	96-2000
END-USES:	^=%natural growth only;exclude immigration effect									
PACKAGING	5.9%	5.1%	5.5%	5.1%	4.0%	3.5%	3.6%	3.4%	2.7%	2.0%
^-exc.immigrat	4.5^	4.8^	4.5^	4.8^	2.5^	3.0^	2.5^	3.0^	1.5^	1.5^
AGRICULTURAL APPLICATIONS	5.3%	4.8%	5.1%	4.5%	2.5%	2.8%	2.3%	2.4%	2.3%	2.3%
^-exc.immigrat	4.8^	3.5^	4.8^	3.5^	2.0^	1.0^	2.0^	1.0^	2.0^	1.0^
BUILDING & CONSTRUCTION	8.8%	6.4%	8.5%	6.3%	8.2%	4.6%	7.8%	4.4%	5.5%	3.6%
^-exc.immigrat	7.2^	6.0^	7.2^	6.0^	6.5^	4.0^	6.5^	4.0^	4.0^	3.0^
CONSUMERS PRODUCTS*	6.5%	5.5%	5.7%	5.3%	5.1%	4.2%	4.6%	4.0%	3.9%	3.1%
^-exc.immigrat	4.7^	5.0^	4.7^	5.0^	3.2^	3.5^	3.2^	3.5^	2.5^	2.5^
INDUSTRIAL APPLICATIONS**	7.3%	7.7%	7.0%	7.6%	6.3%	6.3%	6.0%	6.2%	5.0%	4.6%
^-exc.immigrat	6.0^	7.5^	6.0^	7.5^	5.0^	6.0^	5.0^	6.0^	4.0^	4.0^
FURNITURE COMPONENTS	6.5%	5.4%	5.9%	5.3%	5.4%	3.9%	5.0%	3.9%	4.1%	3.0%
^-exc.immigrat	5.2^	5.0^	5.2^	5.0^	4.0%	3.5^	4.0^	3.5^	3.0^	2.5^
OTHER USES	5.4%	5.4%	5.0%	5.3%	3.9%	2.6%	3.6%	2.5%	3.5%	2.6%
^-exc.immigrat	4.0^	5.0^	4.0^	5.0^	2.5^	2.0^	2.5%	2.0%	2.5^	2.0^
TOTAL PLASTICS	6.5%	5.7%	6.2%	5.5%	4.9%	3.9%	4.6%	3.8%	3.5%	2.9%
^-exc.immigrat	5.3^	5.2^	5.3^	5.2^	3.7^	3.3^	3.7^	3.3^	2.6^	2.5^

* includes clothing,household,toys,sport and recreation articles.
**includes electrical,electronics,automotive,military applications

COMMENTS AND DISCUSSION:

From the above table it can be seen that :

1. The effect of the new immigration will increase total Plastics consumption growth by about 1.2 % -over and above natural growth-in the early years (1990 to 1995) and by 0.5-0.6% in the latter years (1996 to 2000), for the High Rate of Immigration case. For the Moderate Immigration case the increase due to immigration is calculated to be 0.9% per year in the earlier years, and less than 0.5% in the latter years.
2. Immigration`s strongest effect is on construction and consumer`s products and packaging applications.

3. The overall plastic`s natural growth rate for Israel -excluding the effect of immigration- for the period 1990-1995- has been calculated at 5.3% per annum for the Optimistic Scenario, 3.7% per annum for the Realistic Scenario, and 2.6% per annum for the Pessimistic Scenario. After 1995, the rates of growth decrease somewhat.
Including the effect of immigration, the average annual rate of growth -for the 1991-1995 period- increases to 6.2-6.5% (the range stemming from the rate of immigration) for the Optimistic Scenario, 4.6-4.9% for the Realistic Scenario and 3.5% for the Pessimistic Scenario.
All the above rates of average yearly increases should be compared to the average 4.9% expected global increase (Table # 6.1.3.1) during the 1991-1995 period.- Further detailed comparisons between Israel's and the World`s Growth factors appear in Section 7.4.

7.2.3.2 EXPECTED CONSUMPTION BY END-USES

Table 7.2.3.2 shows expected Plastics Consumption in Israel, for the various major end-uses for 1995 and for the year 2000,compared to 1990 as well as the cumulative growth in percentages, based on 1990.

TABLE 7.2.3.2 EXPECTED PLASTICS CONSUMPTION (KTONS): FOR 1995 & 2000

SCENARIO		OPTIMISTIC GROWTH				REALISTIC GROWTH				PESSIMIST	
Immigrat. Rate		High		Moderate		High		Moderate		Moderate	
CASE-Table7.2	Base year	OHI		OMI		RHI		RMI		PMI	
KTons in Year	1990	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000
END-USE:											
PACKAGING	104	138	178	137	175	127	151	125	147	119	131
%cum.increase		33 %	71%	31%	67%	21%	44%	19%	41%	14%	26%
AGRICULTURAL APPLICATIONS	65	84	107	84	105	74	85	73	82	73	82
%cum.increase		29%	64%	28%	60%	13%	30%	12%	26%	12%	26%
BUILDING & CONSTRUCTION	57	88	120	86	117	85	107	84	104	75	89
%cum.increase		53%	108%	50%	104%	49%	86%	46%	81%	30%	55%
CONSUMERS PRODUCTS*	32	44	57	43	56	41	50	40	49	39	45
%cum.increase		37%	79%	34%	74%	28%	57%	25%	53%	22%	42%
INDUSTRIAL APPLICATIONS*	34	48	69	47	68	46	62	45	61	43	53
%cum.increase		42%	106%	40%	102%	36%	84%	34%	81%	28%	58%
FURNITURE COMPONENTS	21	28	37	28	36	27	33	26	32	25	29
%cum.increase		35%	78%	35%	75%	30%	58%	28%	55%	22%	41%
OTHER USES	13	17	22	17	22	16	18	16	18	16	18
%cum.increase		30%	69%	28%	66%	21%	39%	19%	35%	19%	35%
TOT. PLASTICS	326	448	590	441	578	415	505	409	493	390	448
%cum.increase		37%	81%	35%	77%	27%	55%	25%	51%	19%	37%

* includes clothing,household,toys,sport and recreation articles.
**includes electrical,electronics,automotive,military applications

COMMENTS AND DISCUSSION:

From the above table it can be seen that :

1. Based on the forecasts for the various scenarios analyzed, Israel`s consumption of plastics is expected to range between 390 and 480 thousand tons by 1995. At the present sales value of about $ 3,200 Plastics Industrial Sector Turnover would range between 1.25 to 1.5 billion dollars per year for 1995, depending on the Scenario. (compared to 1.07 billion dollars in 1989).

For the year 2000, the forecast ranges between 448 and 590 thousand tons -depending on the Scenario and rate of immigration. At the most optimistic scenario, this means a yearly turnover of about 1.9 billion dollars.

2. With the amount of building expected to surge in the coming years, consumption of plastics for construction and building uses is expected to be the fastest growing application in the next five years, for any of the scenarios contemplated ; ranging from 30% for the worst scenario to 53% cumulative growth over the next five years period. Obviously, the rate of immigration has a strong effect on application in this field.

Industrial oriented applications, including electrical appliances, electronics, "brown-boxed" articles, medical appliances, and the military establishment, are expected to be the next largest growth consumer group- especially so in the second half of the decade. The cumulative growth -over the 1990s- of these combined end-users is expected to range between 58% for the worst scenario to 106% for the best scenario. (Compared to 55-108% for Building and Construction applications- over the decade).

3. Packaging applications, will remain to be by far the largest plastics end-user, (over 50% higher than for any other application). This is true for any of the scenarios evaluated.
While the conventional packaging applications are not expected to increase over and above the population growth, new applications - already being fully commercialized in the United States, such as frozen food packages for microwave uses- are expected to penetrate the Israel consumer oriented market, creating a positive impact on the Israeli plastics industry.

4. During this decade, Building and Construction is expected to become the second major consumer for plastic products, moving agricultural applications to a third place.

5. In the opinion of the writers, plastic applications in agricultural uses - which have always been a very important consumption outlet in Israel- are expected to increase only at a relatively low growth rate, as it is considered that this market is very mature and close to saturation.

6. Plastics consumption for furniture components, especially garden and outdoor furniture is expected to continue growing at a steady pace and is considered to be relatively steady, at the optimistic and realistic scenarios. A sharp drop is expected for the pessimistic scenario.

7. No significant growth is predicted at this time for "Other Uses". Since this is a "catch-all" unforeseen classification, some new application may appear, which may well change these forecasts.

7.2.3.3 EXPECTED PER-CAPITA CONSUMPTION BY END-USES

Table 7.2.3.2 shows expected Plastics Per Capita consumption in Israel, for the various major end-uses for 1995 and for the year 2000, compared to per capita consumption in 1990.

TABLE 7.2.3.3 PER-CAPITA PLASTICS CONSUMPTION (Kg/person/year)

SCENARIO		OPTIMISTIC GROWTH				REALISTIC GROWTH				PESSIMIST	
Immigrat. Rate		High		Moderate		High		Moderate		Moderate	
CASE-Table7.2	Base year	OHI		OMI		RHI		RMI		PMI	
Kg/person/yr	1990	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000
Population-M	4.75	5.58	6.10	5.37	5.88	5.58	6.10	5.37	5.88	5.37	5.88
END-USE: PACKAGING	22.0	24.9	29.2	25.4	29.7	22.7	24.7	23.2	25.0	22.1	22.3
AGRICULTURAL APPLICATIONS	13.7	15.1	17.5	15.6	17.8	13.2	13.9	13.6	14.0	13.6	14.0
BUILDING & CONSTRUCTION	12.1	15.8	19.6	16.1	19.9	15.3	17.5	15.6	17.7	13.9	15.2
CONSUMERS PRODUCTS*	6.7	7.8	9.4	8.0	9.5	7.3	8.2	7.5	8.3	7.2	7.7
INDUSTRIAL APPLICATIONS*	7.1	8.6	11.3	8.8	11.6	8.2	10.2	8.4	10.3	8.0	9.0
FURNITURE COMPONENTS	4.3	5.1	6.0	5.2	6.1	4.8	5.3	4.9	5.4	4.7	4.9
OTHER USES	2.7	3.0	3.6	3.1	3.7	2.8	3.0	2.8	3.0	2.9	3.0
TOT. PLASTICS	68.7	80.2	96.7	82.1	98.2	74.4	82.7	76.0	83.8	72.5	76.2

* includes clothing,household,toys,sport and recreation articles.
**includes electrical,electronics,automotive,military applications

COMMENTS AND DISCUSSION:

From the above table it can be seen that :

1. It should be noted that the results of the Moderate Immigration cases show somewhat higher per-capita consumption than the correspondent per-capita consumption for the High Immigration case, as consumption of new immigrants is initially lower than the consumption of the existing population. Thus, while total consumption increases with increased immigration, the per-capita consumption decreases somewhat due to increased population, which has not yet reached it`s consumption power possibilities.

2. Plastics per capita consumption in Israel is expected to grow from less than 70 Kg/person/year to over 80 Kg/person/year by 1995 and almost 97 kg/person/year by the turn of the century - at the optimistic high immigration rate scenario.

At the Pessimistic Scenario the per capita consumption rate is only expected to increase slightly up to 1995, to 72.5 kg/person/year and somewhat faster to 76 kg/person/year by the year 2000.

3. For the Pessimistic Scenario - although there is expected to be only an 11% per capita increase cumulative over the decade -it is foreseen that there will be a change-over in the application emphasis of the per capita consumption; Packaging, and Agricultural applications are expected to increase only very slightly on a per-capita consumption basis, over the decade -while building and construction and industrial applications are expected to increase by about 25% cumulative per-capita growth for the same period. Plastics consumption for Consumer Goods and for Furniture Components are expected to increase by less than 15% per-capita over the decade for the Pessimistic Scenario.

4.For the Optimistic Scenario - the per-capita consumption of plastics in Israel is expected to increase by a cumulative 40-43% over the decade; this corresponds to somewhat less than 4% average annual per-capita increase; for this scenario the per-capita consumption for industrial applications and construction are expected to increase at an average of about 6% per annum per capita over the decade, while all the other applications are expected to increase at about 3% per capita per annum.

7.3 CORRESPONDENT POLYMER CONSUMPTION.

Tables 7.3 present expected growth of polymers in Israel over the next decade for three of the Scenarios evaluated.

The following Scenarios have been evaluated from a correspondent polymer consumption standpoint:

TABLE	GROWTH SCENARIO	IMMIGRATION SCENARIO
7.3.OHI	Optimistic	High Rate
7.3.RMI	Realistic	Moderate
7.3.PMI	Pessimistic	Moderate

Forecasts have been prepared based on consumption rates for each polymer in various end-uses, based on the approximate usage of different types of polymers for each application, as discussed in Section 6, but applied to Israel.

Table 7.3-Basis 1990 (on page 24)- presents the split taken in 1990. Changes in the split are expected to take place in the coming years, due to inter-changeability of materials; i.e. local materials taking preference over imported materials, improvements, innovations, etc.

Table 7.3S summarizes the expected ranges of consumption for the various polymer for 1990, 1995 and the year 2000, for the three scenarios evaluated, as well as the ranges of average yearly growth over the ten year period evaluated (years 1990-2000).
Ranges of Per-capita consumption and corresponding average yearly per-capita growth for each polymer are also presented in the table.

TABLE 7.3S EXPECTED POLYMER CONSUMPTION REQUIREMENTS -1995 AND 2000										
SCENARIO		OPTIMISTC		REALISTIC		PESSIMIST		OPTIM.	REALST	PESSM
Immigrat. Rate		High		Moderate		Moderate		High	Moder.	Moder
	Base year 1990	OHI		RMI		PMI		OHI	RMI	PMI
		1995	2000	1995	2000	1995	2000	Between 1990-2000		
POLYMER	CONSUMPTION - Thousand Tons/year							Average % Growth/yr		
LDPE	85	113	151	103	123	101	131	5.9%	3.7%	3.1%
HDPE	39	54	73	49	59	47	82	6.3%	4.1%	3.2%
POLYPROPYLENE	49	79	116	70	96	67	89	9.1%	6.9%	5.9%
POLYSTYRENE	26	33	42	31	37	30	34	6.0%	3.8%	2.8%
P.V.C.	41	57	70	50	59	46	53	5.4%	3.6%	2.3%
PET	17	28	44	24	34	23	29	9.7%	7.0%	5.8%
OTHER POLYMER	69	83	94	81	85	77	18	3.1%	2.2%	<1.0%
TOT. PLASTICS	326	447	590	408	493	390	448	6.1%	4.2%	3.2%
POLYMER	PER-CAPITA CONSUMPTION-Kg/pers/yr							Average % per annum		
LDPE	18	20	25	19	21	19	20	3.3%	1.5%	<1.0%
HDPE	8	10	12	9	10	9	9	3.7%	1.9%	<1.0%
POLYPROPYLENE	10	14	19	13	16	13	15	6.5%	4.7%	3.8%
POLYSTYRENE	5	6	7	6	6	6	6	2.5%	1.5%	<1.0%
P.V.C.	9	10	12	9	10	7	9	2.8%	1.5%	<1.0%
PET	4	5	7	5	6	4	5	7.3%	4.9%	1.7%
OTHER POLYMER	14	15	15	15	14	14	13	<1.0%	---	-1.3%
TOT. PLASTICS	69	80	97	76	84	73	76	3.4%	<2.0%	~1.0%

COMMENTS AND DISCUSSION :

7.3.1 Low Density Polyethylene (LDPE)-including LLDPE:

LDPE is currently primarily used in packaging and agricultural applications; a relatively low amount being utilized in Consumer`s Products, Building and other applications.
An average of about a 3.7 % average annual growth is foreseen over the next ten years; this increase is primarily due to the increasing population; without the increase in population, the average realistic growth would only be 1.5% per year.

LDPE growth expectations are low considering that the agricultural film application is practically saturated and that exports of LDPE film are expected to decrease. New applications in construction and consumer goods will cause slight increases in LDPE consumption.

The realistic estimates show an expected consumption of over 100 thousand tons by 1995, and over 120 tons by the year 2000.
The high consumption potential - based on the optimistic scenario and increased rate of immigration - is estimated at about 150 thousand tons by the turn of the century; this represents close to a 6 % yearly average growth over the next ten years; this optimistic outlook represents a 3.3% yearly growth on a per-capita consumption basis.

The pessimistic scenario shows a 3% per year average increase, mainly stemming from increased population, through new immigrants.

7.3.2 High Density Polyethylene (HDPE)

High Density Polyethylene is expected to grow at a somewhat higher rate than LDPE, due to its variety of uses and relatively good price.

At the realistic scenario an average expected yearly growth of about 4.1 % is envisaged for for the period 1990-2000, including the additional consumption by new immigrants. On a per capita basis the growth has been calculated to be less than 2% per year, average over the 1990-2000 period.

Although some of the traditional uses of HDPE are expected to be captured by Polypropylene, as soon as this polymer will be manufactured in Israel, no drastic decrease is envisaged in HDPE consumption in Israel.

Consumption is forecast at 49 thousand tons for 1995 and 59 thousand tons for the year 2000, for the realistic outlook. At the optimistic scenario, the consumption by the year 2000 is estimated to reach 73 thousand tons per year. By that time, it is certainly expected that HDPE will be produced in Israel.

7.3.3 Polypropylene (PP)

In Israel, the same as in other parts of the world, polypropylene is expected to continue to be the leader in the commodity polymers field, mainly because of its new and varied applications as a carpet material on the one hand, and as the low-priced commodity polymer which can be utilized instead of engineering polymers in mechanical, medical electrical and other industrial uses.
As soon as polypropylene will be produced in Israel it is expected to penetrate HDPE and other polymer markets, and is expected that various polypropylene co-polymers and polypropylene based compounds will displace more expensive engineering plastics.

Based on the realistic, modest immigration scenario, an average growth of 6.9 % per year is expected in Israel for the period 1990 to 2000, which would bring the consumption to some 70 thousand tons in 1995, and to 96 thousand tons by the year 2000. These estimates correspond to a 4.7% per year average per capita increase.
Even for the pessimistic scenario there is expected to be a 5.9% average yearly growth of polypropylene over the next ten years, to reach a total of 89 thousand tons by the year 2000. This amounts to about a 3.8% yearly increase in per-capita consumption.

Polypropylene, is such a diversified polymer, that even if there would be curtailed consumption in some applications, increased consumption for other existing and new applications would compensate for it.

7.3.4 Polystyrene (PS)

The annual growth is expected to be relatively low, as polystyrene is being replaced by polypropylene in many applications. An average per capita growth of 1.5% per year is expected over the next ten years This corresponds to a consumption of some 30 to 33 thousand tons per year (range between the pessimistic and optimistic scenarios). For the year 2000 this corresponds to a total consumption ranging between 34 and 42 thousand tons per year average.

7.3.5 Polyvinyl Chloride (PVC).

PVC is bound to increase on the one hand, considering that construction is on the increase and new PVC consuming projects -such as PVC window frames- are expected to be implemented sooner or later; on the other hand - environmental considerations will rule out PVC manufactured products in food and drugs packaging. In view of this situation PVC increase between 1990 and the year 2000 is assumed to remain lower than the polyolefins; i.e. 3.8% average growth per year for the realistic scenario. This leads to an expected consumption of 50 thousand tons in 1995, and 59 thousand tons in the year 2000. With the population increase due to immigration, this corresponds to 1.5% average yearly per capita increase, entirely due to additional construction.

A pessimistic recessionary scenario would decrease the per-capita increase to less than 1% average per year - for a total of about 46 thousand tons in 1995 and 57 thousand tons in the year 2000 (from the present 41 thousand tons consumption).

Since construction activities -and therefore PVC- benefit strongly from a prosperity optimistic scenario, the per-capita growth is expected to increase to 2.8% average per year- to a total forecast consumption of 70 thousand tons for the year 2000, if an Optimistic/High Immigration Rate Scenario prevails.

7.3.6 Polyethylene Terephthalate (PET)

The consumption of this polymer, which showed a meteoric rise in the last years in Israel, is expected to continue to increase; at a 7.0 % average yearly growth rate for the next ten years, corresponding to a per capita increase of almost 5% per year, and a consumption of 24 thousand tons in 1995, and 34 thousand tons by the year 2000. It is expected that the increase will be in packaging - large, medium and small bottles- as well as in engineering and industrial applications.

7.3.7 Other Plastics

Since this category includes all types of plastics, from polyurethanes, epoxys and thermosetting plastics - all of which are expected to either remain constant or decrease- to ABS and other engineering plastics - which should increase considerably- it is rather difficult to generalize. A relatively low overall growth factor has been assumed for this overall category -for all three scenarios- considering that copolymers and compounding of the polyolefins, as well as PET will penetrate part of the markets, presently being manufactured from such "other plastics".

TABLE # 7.3 -Basis 1990

CONSUMPTION OF PLASTICS IN ISRAEL - ESTIMATES FOR 1990

CALCULATION OF POLYMER CONSUMPTION FROM END-USE ESTIMATES

POLYMER ----------> / APPLICATION	TOTAL CONSUMPTION	LDPE	HDPE	PP	PS	PVC	PET	OTHERS	TOTAL
PACKAGING	104,416	35%	20%	13%	10%	3%	10%	9%	100%
		36,546	20,883	13,574	10,442	3,132	10,442	9,397	104,416
AGRICULTURAL APPLICATIONS	65,260	55%	8%	17%	3%	12%		5%	100%
		35,893	5,221	11,094	1,958	7,831		3,263	65,260
BUILDING/CONSTRUCTION USES	57,429	5%	5%	8%	5%	45%	4%	28%	100%
		2,871	2,871	4,594	2,871	25,843	2,297	16,080	57,429
CONSUMERS PRODUCTS*	31,977	14%	12%	9%	25%	6%	8%	26%	100%
		4,477	3,837	2,878	7,994	1,919	2,558	8,314	31,977
INDUSTRIAL APPLICATIONS**	33,609		12%	18%	4%	5%	6%	55%	100%
			4,033	6,050	1,344	1,680	2,017	18,485	33,609
FURNITURE COMPONENTS	20,557			50%	3%	3%		44%	100%
				10,279	617	617		9,045	20,557
OTHER USES	13,052	39%	19%	5%	3%	3%		31%	100%
		5,090	2,480	653	392	392		4,046	13,052
TOTAL	326,300	84,877	39,326	49,121	25,618	41,414	17,313	68,631	326,300
PERCENT OF TOTAL POLYMERS		26%	12%	15%	8%	13%	5%	21%	100%
Population-million of people		4.75							
PER CAPITA CONSUMPTION Kg/person/year	68.7	17.9	8.3	10.3	5.4	8.7	3.6	14.4	68.7

* Includes clothing, household articles, toys, sport and recreation articles.

** Includes electrical, electronics,automotive and militarry appliances.

TABLE # 7.3 OHI
ALTERNATIVE: OPTIMISTIC GROWTH AND HIGH IMMIGRATION RATE

FORECASTS OF POLYMER CONSUMPTION IN YEARS 1995 AND 2000.
CALCULATION OF POLYMER CONSUMPTION FROM END-USE ESTIMATES (See Table # 7.2 OHI)

POLYMER → / APPLICATION	EXPECTED CONSUMPTION FOR YEAR 1995—TONS/YEAR: TOTAL CONSUMPTION	LDPE	HDPE	PP	PS	PVC	PET	OTHERS	TOTAL
PACKAGING	138,804	35% 48,581	18% 24,985	16% 22,209	8% 11,104	3% 4,164	14% 19,433	6% 8,328	100% 138,804
AGRICULTURAL APPLICATIONS	84,128	56% 47,112	8% 6,730	19% 15,984	3% 2,524	9% 7,572	0% 0	5% 4,206	100% 84,128
BUILDING/CONSTRUCTION USES	87,988	5% 4,399	5% 4,399	11% 9,679	5% 4,399	44% 38,715	4% 3,520	26% 22,877	100% 87,988
CONSUMERS PRODUCTS*	43,769	14% 6,128	17% 7,441	11% 4,815	25% 10,942	6% 2,626	6% 2,626	20% 8,754	99% 43,331
INDUSTRIAL APPLICATIONS**	47,771	0 0	15% 7,166	23% 10,987	6% 2,866	5% 2,389	5% 2,389	46% 21,975	100% 47,771
FURNITURE COMPONENTS	28,197		0	51% 14,380	3% 846	2% 564	0	44% 12,407	100% 28,197
OTHER USES	16,965	42% 7,125	17% 2,884	8% 1,357	4% 679	3% 509	0	26% 4,411	100% 16,965
TOTAL - ESTIMATE FOR 1995 PERCENT OF TOTAL POLYMERS	447,622 100%	113,345 25%	53,605 12%	79,411 18%	33,361 7%	56,538 13%	27,967 6%	82,958 19%	447,184 100%
CONSUMPTION IN 1990 %CUMULATIVE GROWTH FROM 1990 AVG.ANNUAL GROWTH-%	326,300 6.5%	84,877 34% 6.0%	39,326 36% 6.4%	49,121 62% 12.5%	25,618 30% 5.4%	41,414 37% 6.5%	17,313 62% 12.5%	68,631 21% 3.9%	326,300 37% 6.5%
POPULATION - Millions PER-CAPITA CONSUMPTION-Kg/person/year	5.58 80.2	20.3	9.6	14.2	6.0	10.1	5.0	14.9	0 0 80.1

POLYMER-> / TOTAL CONSUMPTION	EXPECTED CONSUMPTION FOR YEAR 2000—TONS/YEAR: LDPE	HDPE	PP	PS	PVC	PET	OTHERS	TOTAL
178,169	37% 65,923	18% 32,070	16% 28,507	8% 14,254	2% 3,563	15% 26,725	4% 7,127	100% 178,169
106,859	58% 61,978	8% 8,549	22% 23,509	2% 2,137	7% 7,480	0% 0	3% 3,206	100% 106,859
119,735	5% 5,987	5% 5,987	14% 16,763	4% 4,789	43% 51,486	6% 7,184	23% 27,539	100% 119,735
57,132	14% 7,998	19% 10,855	12% 6,856	25% 14,283	6% 3,428	8% 4,571	16% 9,141	100% 57,132
69,140	0 0	16% 11,062	24% 16,594	6% 4,148	4% 2,766	6% 4,148	44% 30,422	100% 69,140
36,601		0	63% 23,059	3% 1,098	2% 732	0	32% 11,712	100% 36,601
22,042	39% 8,596	19% 4,188	7% 1,543	7% 1,543	3% 661	5% 1,102	20% 4,408	100% 22,042
589,678	150,482 26%	72,711 12%	116,830 20%	42,252 7%	70,116 12%	43,731 7%	93,555 16%	589,678 100%
326,300 81% 6.1%	84,877 77% 5.9%	39,326 85% 6.3%	49,121 138% 9.1%	25,618 65% 6.0%	41,414 69% 5.4%	17,313 153% 9.7%	68,631 36% 3.1%	326,300 81% 6.1%
6.10								0 0
96.7	24.7	11.9	19.2	6.9	11.5	7.2	15.3	96.7

* Includes clothing, household articles, toys, sport and recreation articles. ** includes electrical, electronics, automotive and military appliances.

TABLE # 7.3 RMI
ALTERNATIVE: REALISTIC GROWTH AND MODERATE IMMIGRATION RATE

FORECASTS OF POLYMER CONSUMPTION IN YEARS 1995 AND 2000.
CALCULATION OF POLYMER CONSUMPTION FROM END-USE ESTIMATES (See Table # 7.2 RMI)

POLYMER → / APPLICATION / PLASTICS IN :	EXPECTED CONSUMPTION FOR YEAR 1995—TONS/YEAR— TOTAL CONSUMPTION	LDPE	HDPE	PP	PS	PVC	PET	OTHERS	TOTAL
PACKAGING	124,666	36% 44,880	18% 22,440	16% 19,947	8% 9,973	2% 2,493	13% 16,207	7% 8,727	100% 124,666
AGRICULTURAL APPLICATIONS	73,276	57% 41,767	8% 5,862	18% 13,190	3% 2,198	9% 6,595		5% 3,664	100% 73,276
BUILDING/CONSTRUCTION USES	83,710	5% 4,186	5% 4,186	11% 9,208	5% 4,186	42% 35,158	4% 3,348	28% 23,439	100% 83,710
CONSUMERS PRODUCTS*	40,091	14% 5,613	18% 7,216	10% 4,009	26% 10,424	6% 2,405	6% 2,405	20% 8,018	100% 40,091
INDUSTRIAL APPLICATIONS**	44,996		15% 6,749	22% 9,899	6% 2,700	5% 2,250	5% 2,250	47% 21,148	100% 44,996
FURNITURE COMPONENTS	26,296			50% 13,148	3% 789	2% 526		45% 11,833	100% 26,296
OTHER USES	15,583	43% 6,701	16% 2,493	6% 935	4% 623	3% 467		28% 4,363	100% 15,583
TOTAL - ESTIMATE FOR 1995	408,618	103,146	48,947	70,336	30,893	49,895	24,210	81,192	408,618
PERCENT OF TOTAL POLYMERS	100%	25%	12%	17%	8%	12%	6%	20%	100%
CONSUMPTION IN 1990	326,300	84,877	39,326	49,121	25,618	41,414	17,313	68,631	326,300
%CUMULATIVE GROWTH FROM 1990		22%	24%	43%	21%	20%	40%	18%	25%
AVG.ANNUAL GROWTH-%		4.1%	4.4%	7.5%	4.0%	3.7%	7.0%	3.3%	4.6%
POPULATION - Millions	5.37								
PER-CAPITA CONSUMPTION-Kg/person/year	76.1	19.2	9.1	13.1	5.8	9.3	4.5	15.1	76.1

POLYMER→ / TOTAL CONSUMPTION	EXPECTED CONSUMPTION FOR YEAR 2000--TONS/YEAR-- LDPE	HDPE	PP	PS	PVC	PET	OTHERS	TOTAL
147,109	38% 55,901	17% 25,009	16% 23,537	9% 13,240	2% 2,942	14% 20,595	4% 5,884	100% 147,109
82,405	58% 47,795	8% 6,592	21% 17,305	2% 1,648	8% 6,592		3% 2,472	100% 82,405
103,955	5% 5,198	5% 5,198	14% 14,554	4% 4,158	43% 44,701	6% 6,237	23% 23,910	100% 103,955
48,809	14% 6,833	20% 9,762	12% 5,857	26% 12,690	4% 1,952	7% 3,417	17% 8,298	100% 48,809
60,841		15% 9,126	24% 14,602	5% 3,042	3% 1,825	5% 3,042	48% 29,204	100% 60,841
31,808			60% 19,085	3% 954	2% 636		35% 11,133	100% 31,808
17,640	39% 6,880	19% 3,352	5% 882	8% 1,411	3% 529	4% 706	22% 3,881	100% 17,640
492,567	122,607	59,038	95,822	37,144	59,178	33,997	84,781	492,567
100%	25%	12%	19%	8%	12%	7%	17%	100%
326,300	84,877	39,326	49,121	25,618	41,414	17,313	68,631	326,300
51%	44%	50%	95%	45%	43%	96%	24%	51%
4.2%	3.7%	4.1%	6.9%	3.8%	3.6%	7.0%	2.2%	4.2%
5.88								
83.8	20.9	10.0	16.3	6.3	10.1	5.8	14.4	83.8

* includes clothing, household articles, toys,sport and recreation articles. ** includes electrical, electronics, automotive and military applications.

TABLE # 7.3 PMI
ALTERNATIVE:PESSIMISTIC GROWTH AND MODERATE IMMIGRATION RATE

FORECASTS OF POLYMER CONSUMPTION IN YEARS 1995 AND 2000.
CALCULATION OF POLYMER CONSUMPTION FROM END-USE ESTIMATES (See Table # 7.2 PMI)

POLYMER ----------> / APPLICATION PLASTICS IN :	EXPECTED CONSUMPTION FOR YEAR 1995—TONS/YEAR— TOTAL CONSUMPTION	LDPE	HDPE	PP	PS	PVC	PET	OTHERS	TOTAL
PACKAGING	119,014	36% 42,845	18% 21,423	16% 19,042	8% 9,521	2% 2,380	13% 15,472	7% 8,331	100% 119,014
AGRICULTURAL APPLICATIONS	73,276	57% 41,767	8% 5,862	18% 13,190	3% 2,198	9% 6,595		5% 3,664	100% 73,276
BUILDING/CONSTRUCTION USES	74,898	5% 3,745	5% 3,745	11% 8,239	5% 3,745	42% 31,457	4% 2,996	28% 20,971	100% 74,898
CONSUMERS PRODUCTS*	38,839	14% 5,437	18% 6,991	10% 3,884	26% 10,098	6% 2,330	6% 2,330	20% 7,768	100% 38,839
INDUSTRIAL APPLICATIONS**	42,992		15% 6,449	22% 9,458	6% 2,580	5% 2,150	5% 2,150	47% 20,206	100% 42,992
FURNITURE COMPONENTS	25,116			50% 12,558	3% 753	2% 502		45% 11,302	100% 25,116
OTHER USES	15,583	43% 6,701	16% 2,493	6% 935	4% 623	3% 467		28% 4,363	100% 15,583
TOTAL - ESTIMATE FOR 1995 PERCENT OF TOTAL POLYMERS	389,718 100%	100,495 26%	46,963 12%	67,306 17%	29,519 8%	45,882 12%	22,948 6%	76,606 20%	389,718 100%
CONSUMPTION IN 1990	326,300	84,877	39,326	49,121	25,618	41,414	17,313	68,631	326,300
%CUMULATIVE GROWTH FROM 1990		18%	19%	37%	15%	11%	33%	12%	19%
AVG.ANNUAL GROWTH-%		3.4%	3.5%	6.5%	2.8%	2.1%	6.5%	2.3%	3.5%
POPULATION - Millions	5.37								
PER-CAPITA CONSUMPTION-Kg/person/year	72.6	18.7	8.7	12.5	5.5	8.5	4.3	14.3	72.6

EXPECTED CONSUMPTION FOR YEAR 2000—TONS/YEAR— POLYMER-> TOTAL CONSUMPTION	LDPE	HDPE	PP	PS	PVC	PET	OTHERS	TOTAL
131,335	38% 49,907	17% 22,327	16% 21,014	9% 11,820	2% 2,627	14% 18,387	4% 5,253	100% 131,335
82,405	58% 47,795	8% 6,592	21% 17,305	2% 1,648	8% 6,592		3% 2,472	100% 82,405
89,226	5% 4,461	5% 4,461	14% 12,492	4% 3,569	43% 38,367	6% 5,354	23% 20,522	100% 89,226
45,285	14% 6,340	20% 9,057	12% 5,434	26% 11,774	4% 1,811	7% 3,170	17% 7,698	100% 45,285
53,188		15% 7,978	24% 12,765	5% 2,659	3% 1,596	5% 2,659	48% 25,530	100% 53,188
29,066			60% 17,440	3% 872	2% 581		35% 10,173	100% 29,066
17,640	39% 6,880	19% 3,352	5% 882	8% 1,411	3% 529	4% 706	22% 3,881	100% 17,640
448,145 100%	115,383 26%	53,767 12%	87,331 19%	33,754 8%	52,104 12%	30,275 7%	75,530 17%	448,145 100%
326,300 37% 3.2%	84,877 36% 3.1%	39,326 37% 3.2%	49,121 78% 5.9%	25,618 32% 2.8%	41,414 26% 2.3%	17,313 75% 5.8%	68,631 10% < 1.0%	326,300 37% 3.2%
5.88								
76.2	19.6	9.1	14.9	5.7	8.9	5.1	12.8	76.2

* includes clothing, household articles, toys,sport and recreation articles. ** includes electrical, electronics, automotive and military applications.

7.4 COMPARISON OF EXPECTED ISRAELI AND GLOBAL CONSUMPTION GROWTH.

Table # 7.4 shows comparisons of global and Israeli market consumption forecasts split by major applications and by major polymers.

TABLE 7.4 COMPARISON OF EXPECTED ISRAELI & GLOBAL CONSUMPTION GROWTH

	AVERAGE % GROWTH PER YEAR PLASTICS CONSUMPTION BETWEEN YEARS 1990-1995				AVERAGE % GROWTH PER YEAR PLASTICS CONSUMPTION BETWEEN YEARS 1996-2000			
	GLOBAL Weighted Avg		ISRAEL Real(Range)^		GLOBAL Weighted Avg		ISRAEL Real(Range)^	
END-USE	%Tot<	Avg%/y	%Tot<	Avg%/y	%Tot>	Avg%/y	%Tot>	Avg%/y
PACKAGING	30%	4.0%	32.0%	3.6% (3-6%)	27%	3.0%	29.9%	3.4% (2-5%)
AGRICULTURAL APPLICATIONS	3%	4.0%	20.0%	2.3% (2-5%)	3%	4.0%	16.8%	2.4% (2-5%)
BUILDING AND CONSTRUCTION	20%	7.5%	17.6%	7.8% (5-9%)	23%	4.5%	21.1%	4.4% (3-6%)
CONSUMERS PRODUCTS *	11%	4.5%	9.8%	4.6% (4-6%)	11%	5.5%	9.9%	4.0% (3-5%)
INDUSTRIAL APPLICATIONS **	20%	4.5%	10.3%	6.0% (4-7%)	23%	7.5%	12.4%	6.2% (5-8%)
FURNITURE COMPONENTS	6%	3.0%	6.3%	5.0% (4-6%)	5%	3.0%	6.5%	3.9% (3-5%)
OTHER USES	10%	5.0%	4.0%	3.6% (3-5%)	8%	3.0%	3.6%	2.5% (2-5%)
TOT. PLASTICS	100%	4.9%	100%	4.6% (3-6%)	100%	4.5%	100%	3.8% (3-6%)

NOTES: ^ For Israel, the % average growth is based on the Reakistic Moderate Immigration Scenario. Figures in ( ) denote the range in growth between the pessimistic and optimistic Scenarios.
< % of total consumption of plastics in 1990.
> % of total consumption of plastics, expected in year 2000.
* includes clothing,household, toys, sport and recreation articles.
**includes electrical,electronics,transport & military applications
BASIS OF REFERENCE: Tables # 6.1.3.1 and Tables 7.2

SECTION 8
CONCLUSIONS AND SUMMARY

GENERAL NOTE:
Each section of the study presents discussions and analyses based on statistical figures, economic and financial data, calculated factors and future forecasts. However, in order to emphasize major findings, a brief summary of conclusions is presented.

8.1. Sales of the Plastics Industrial Sector was over 1.06 Billion Dollars in 1989, which is about 4% of total industrial sales. Sales from exports represents about 24% of total sales. The industry employs almost 11,000 people. Sales per employee is about 100 thousand dollars.

The Plastics Industry in Israel is a mature industry, with sales during 1989 of 2.05 billion NISh, equivalent to 1.066 billion dollars. Sales have increased in nominal NISh between 1986 and 1989 by an average of about 12% per year but, this only corresponds to an increase of about 2% average per year over the same period.
The unit sales value - which has deteriorated over the 1986-1989 period- was about 3,200 $/ton.
Sales of plastics products represents about 4% of total industrial sales in Israel.
Export Sales - which has been consistently on the increase was 255 million dollars in 1989, representing 24% of total sales, but only 2.6% of total Israeli industrial exports.
The plastics industry engages some 11,000 employees, and the 1989 sale per employee was 98,800 dollars .
This factor -expressed in constant dollars (1989 basis) has remained practically constant since 1986.

8.2. Local market consumption of plastics products in 1989 amounted to 970 million dollars, equivalent to 247 thousand tons; and to 68 kg/per capita/year. Imports of plastics amounted to almost 160 million dollars in 1989, corresponding to 1.2% of total industrial imports to Israel, and about 16% of total plastics consumption.

Local market plastics consumption -in nominal dollars increased between 1986 and 1988- from 727 million dollars to 970 million dollars; however there was practically no increase in constant values. Based on the calculated unit values, the corresponding tonnage increase was from 257 thousand tons in 1986 to 309 thousand tons in 1989, which represents an average annual increase of 6.3%.
Total imports of plastics -increased between 1986 and 1988, but decreased in 1989 to 160 million dollars, representing some 62 thousand tons. An important positive factor is that there has been a continuous switch from imports of finished goods to semi-finished materials, which require additional local processing and therefore add value to the local industry.
The plastics sector -per se- has had a positive balance of trade by almost 100 million dollars; however combining plastic products with polymers, exports and imports are balanced at about 400 million dollars in either direction.
Per-capita consumption increased by 8% in 1987, after which there was only a 6% increase between 1987 and 1989.

8.3. **Investments in the Plastics Industry are only 60 million dollars. Added Value of the industry is about 40%, and expenses in research and development are only about 3.4 million dollars.**

New Investments in Plastic industries has been on the decrease in the last years; in 1987 new investments amounted to 117 million dollars, while in 1989 it decreased to 60 million dollars.

Capital Stock (Total Net Assets) of the combined Rubber and Plastics Industry is 1 billion dollars, which corresponds to a 1.2 Sales/Assets ratio.

The Value Added of the combined Rubber and Plastics industry in 1989 was over 380 million dollars, equivalent to almost 40% of turnover, and corresponding to about 27 thousand dollars per person. There are no separate values for the plastics industry alone, but the factors are expected to be somewhat higher.

Research and Development, was carried out by only 18 factories (out of a over 500) engaging about 100 people in such activities at a total cost of about 3 million dollars, corresponding to 0.3% of sales.

8.4. **About 38% of total plastics sales -of 1 billion dollars- are from products made by extrusion processes; 31% by injection molding. Largest increase in sales has been in Pipes. Regarding exports - about 43.5% of total export sales -of 255 thousand dollars- stem from extruded products, about 40% from injection molded products.**

All the combined products from extrusion processes represent about 38% of total sales; films shows the largest sales (13% of total plastics sales), followed by sheets, profiles, pipes and conduits, (about 8% of total plastics sales -each). Injection molded articles account for 31.4%. Other sales stem from Coating and Lamination (~7%), Blow Molding (5.5%), Vacuum Forming (3.7%) expandable (foam) products (3.2%) and other processes.

The strongest growth in sales between 1988 and 1987 (no information available for 1989) was in pipes and coatings (29%); followed by vacuum-forming (~24%). (Increases exclude smaller processes representing less than 2.5% of total sales)

Exports are primarily based on extruded (43.5% of total plastics) and injection molded (~40%) products. Sheets (~13%), Films (10%), Pipes and Conduits (~10%) and Profiles (9%) are the main extruded export products. Of all the other processes the only significant export came from Coating and Lamination products (5.5%).
As for total sales, the largest increase in exports has been for pipes and conduits (~57%).

Employment distribution shows that the injection molding sub-sector is more labor intensive than the extrusion sub-sector. Pipes and conduits manufacturing and sheets manufacturing have the highest sales per employee (~150,000 $ per employee); injection molding, blow-molding, vacuum forming and film extrusion show the lowest sales per employee (~90,000 $ per employee).
New investments - which decreased considerably for all processes, showed an increase only for Pipes and Conduits manufacturing.

8.5. Packaging is the largest end-use application for plastic products in Israel (32.4% of total plastics sales of 1 billion dollars),followed by agricultural applications(~20%), construction applications (~17%), consumer goods (~9%), industrial applications(7%) and furniture components (~6%). The highest increase was for industrial applications. Agricultural components -made from plastics- have been the largest plastics-made export article (~28%), followed by packaging materials (~21%) and construction materials (~20%).

As for sales, the factories producing packaging articles have the largest number of employees (~33% of total employees in the plastics industry), followed by the factories producing components for construction applications (14.5%), agriculture (14%), consumer goods (~13%), and industrial applications (10%).

Investments, although on the decrease, have been in machinery for packaging articles (~28%) and in industrial application (~21%), followed by agricultural (~15%) and construction uses (~11%).

The highest sales per employee factor is in the agricultural applications sub-sector ($145,100/employee), followed by military applications (~$141,500/employee). In the industrial applications sub-sector the factor is about 107 thousand dollars/employee) and for packaging applications (about 100,000 $/employee). Manufacturers for all other applications (consumer goods, toys, furniture, industrial applications) show sales per employee below 75,000 $.

8.6. In comparing the Plastics industry to other Industrial Sectors, in Israel, it was found that in almost all cases the economic factors and the rate of growth of the plastics industry are higher than similar factors for the tires, rubber goods, wood, glass metal and paper and cardboard, industries. The only industrial sector - of the ones analyzed in the comparison -which shows higher total sales and export growth factors, higher sales per employee, higher investment and higher research and development activities - than the plastics industry is the chemical industrial sector. However, this industrial sector is highly capital incentive.

This can best seen in the following comparative table for 1989.

Sector→	Total Industr	Plast.	Tires& Rubber	Chemic	Wood & Produc	Paper& Cardbr	Glass	Metals
Sales M$	24,234	1,066	164	1,130	674	751	42	1,246
ExportM$	6,976	255	88	857	48	26	6	170
Employee	288,636	10,785	2,319	5,593	11,936	6,848	782	15,375
InvestM$	1,285	60	5	260	17	21	n.a.	n.a.
Captl M$	19,580	1,022	n.a.	3,248	316	434	n.a.	n.a.
R&D M$	300	3	-	29	n.a.	n.a.	n.a.	11
FACTORS	*=Thousand Dollars/employee.#=number employees/M$capital							
%exp/sal	29%	24%	53%	76%	7%	3%	14%	14%
sal/emp*	84	99	71	202	57	110	53	81
%sal/cap	124 %	120 %	n.a.	35 %	213 %	173 %	n.a.	n.a.
emp/cpt#	15.4	12.8	n.a.	1.7	37.8	15.8	n.a.	n.a.
GROWTH-	Average % per year - in nominal dollars between 1986-89							
Sales	+ 10%	+12.4%	-12.3%	+20 %	+ 6 %	+7 %	-17 %	+13 %
Exports	+ 5%	+17.4%	+ 5.4%	+26 %	+ 7 %	+15 %	+ 5 %	+11 %

8.7. Comparing Israel to various European countries with population between 4-10 million, it was found that Israel:

a. has the lowest consumption of plastics materials,
b. has the lowest production of local raw materials,
c. has the lowest per capita consumption in this group except France and England.
d. has a lower income/employee factor than either Belgium, Denmark or Switzerland, but a higher one than Finland and Austria.
e. had an increase in tonnage of plastics consumed, but a declining sales between 1988 and 1989, indicating a reduction in Unit Sales Value.
f. has an end-use application pattern similar to other countries, except agriculture application - represents 20% of total consumption.

Comparisons to other countries is shown in the following table :

YEAR 1989							
Country Populat.M	ISRAEL 4.6	Belgium 9.9	Austria 7.6	Suisse 6.7	Denmark 5.1	Finland 5.0	Norway 4.2
Sales M$	1,066	2,730	1,356	2,445	1,749	1,279	n.a.
Consum KT	309	1,426	776	627	470	420	310
Factories	478	137	300	1,400	338	615	300
Employees	K 10.8	15.2	14.2	22.9	15	13.1	6.5
FACTORS	*=Thousand Dollars sales per employee. #=Unit in $/ton						
sales/emp	* 99	180	96	107	118	98	n.a.
kg/pers/y	68	144	102.	93	91	84	73
Unitvalue	# 3,450	1,892	1,747	3,900	3,721	3,045	n.a.
GROWTH-	Percent increase in 1989 over previous year						
Sales $	-2.6%	+6.2%	+7.3%	n.a.	-7.9 %	+14.3%	n.a.
Consum. T	+6.6%	+5.1%	-11 %	+ 5 %	-0.2 %	+ 9.1%	+17.9%

8.8. Global plastics consumption is expected to grow at close to 5% average per annum to 1995, and at 4.5% per annum to the year 2000 as a result of :

Low Oil and Gas prices, Post Gulf-War prosperity and reconstruction, low-cost replacement penetration against other materials, new innovations and wider applications, high expected growth in the Far East and in highly populated countries of low-base consumption and steady growth in the World's developed industrial areas. The above positive factors outweigh by far the negative factors : maturity and saturation, environmental restriction, and possibilities of recession. The highest growth is expected to be in the Far East, followed by Japan, and Third World countries.

Major growth is expected to be in Building and Construction applications (@ 7.5% per annum average), followed by Transportation and Industrial Applications (6.5% per annum).

The following tabulation summarizes the expected global consumption in thousand metric tons for the major applications, and the foreseen distribution by regions for 1990, 1995 and the year 2000.

	in 1990		in year 1995			in year 2000		
Sector-->	M Tons Consum	%Total Plastc	Growth %/yr*	M Tons Consum	%Total Plastc	Growth %/yr**	M Tons Consum	%Total Plastc
DISTRIBUTION BY MAJOR APPLICATIONS								
Packaging	27.0	30%	4.0%	32.8	29%	3.0%	38.1	27%
Building	18.0	20%	7.5%	25.8	23%	4.5%	32.2	23%
Consumer	9.9	11%	4.5%	12.3	11%	5.5%	16.1	11%
Electricl	9.0	10%	2.5%	10.2	9%	5.0%	13.0	9%.
Furniture	5.4	6%	3.0%	6.3	5%	3.0%	7.3	5%
Transport	5.4	6%	6.5%	7.4	6%	8.5%	11.1	8%
Industry	3.6	4%	6.5%	4.9	4%	10.0%	7.9	6%
Agricultr	2.7	3%	4.0%	3.3	3%	4.0%	4.0	3%
Other Use	9.0	10%	5.0%	11.5	10%	3.0%	13.3	9%
Total	90.0	100%	4.9%	114.6	100%	4.5%	143.0	100%.
DISTRIBUTION BY MAJOR REGIONS								
U. S. A.	28	31.1%	4.3%	34.6	30 %	3.7%	41.4	29 %
W. Europe	22	24.4%	4.0%	26.8	23 %	3.7%	32.1	22 %
Japan	11	12.2%	6.0%	14.7	13 %	5.4%	19.1	13 %
OtherAsia	10	11.1%	6.5%	13.7	12 %	5.9%	18.2	13 %
RestWorld	19	21.1%	5.5%	24.8	22 %	5.3%	32.1	22 %
Total	90	100.0%	4.9%	114.6	100 %	4.5%	143.0	100 %

*=% Avrg.Annual Growth 1990-95. **=% Avrg.Annual Growth 1996-2000

8.9. Plastics consumption in Israel is expected to grow at average rates ranging between 3.5% and 6.5% per annum to 1995, and between 2.9- 5.7% per annum between 1996 to the year 2000. The wide range results from various Alternatives depending on the economic environment in Israel and on the rate of immigration.
At such growth rates plastics consumption would reach 390-448 thousand tons per year by 1995, for a turnover of 1.25-1.4 billion dollars. For the year 2000, the forecast ranges between 448-590 thousand tons for a maximum turnover of about 1.9 billion dollars.

Domestic economic environment, international market growth, especially the penetration of new and wider applications, export possibilities, and the effect of local production are all elements expected to affect natural growth; however the direct and indirect effect of increasing immigration is expected to be the strongest factor influencing growth. Immigration is expected to increase plastics growth rates by over 1% per annum, up to 1995 and by about 0.4-0.6% per annum thereafter. Immigration's strongest effect is expected to be construction, consumer goods and packaging applications.

The plastics per-capita consumption is expected to increase by about 40-43 percent over the decade, representing an average increase of about 3.5% per annum.

The major growth is expected to be in construction applications until 1995,(5.5-8.8% average per annum depending on the alternative) and in industrial applications thereafter (4.6-7.7% average per annum).

PET (5.8-9.7% average per annum) and Polypropylene (5.9-9.1%) are expected to be the polymers showing the highest growth rate in Israel over the decade; polyethylenes and polystyrene are expected to grow at moderate rates (~3-6% per annum). PVC is expected to grow between 2.3-5.4% per annum, depending on construction trends.

The following tabulation summarizes the expected range in plastics consumption in Israel for the various Alternatives considered.

	in 1990		in year 1995		in year 2000	
Sector→	K Tons Consum	%Total Plastc	Growth Av.%/yr	Consumptn. K Tons	Growth Av.%/yr	Consumptn. K Tons
DISTRIBUTION BY MAJOR APPLICATIONS						
Packaging	104	32.0%	2.7-5.9%	119 - 138	2.0-5.1%	131 - 178
Agricultr	65	20.0%	2.3-5.3%	73 - 84	2.3-4.8%	82 - 107
Building	57	17.6%	5.5-8.8%	75 - 88	3.6-6.4%	89 - 120
Consumer^	32	9.8%	3.9-6.5%	39 - 44	3.1-5.5%	45 - 57
Industry#	34	10.3%	5.0-7.3%	43 - 48	4.6-7.7%	53 - 69
Furniture	21	6.3%	4.1-6.5%	25 - 28	3.0-5.4%	29 - 37
Other Use	13	4.0%	3.5-5.4%	16 - 17	2.6-5.4%	18 - 22
Total	326	100%	3.5-6.5%	390 - 448	2.9-5.7%	448 - 590
DISTRIBUTION BY MAJOR POLYMERS ***						
LDPE	85	26 %		101 - 113	3.1-5.9%	115 - 151
HDPE	39	12 %		47 - 54	3.2-6.3%	54 - 73
PP	49	15 %		67 - 79	5.9-9.1%	87 - 116
PS	26	8 %		30 - 33	2.8-6.0%	34 - 42
PVC	41	13 %		46 - 57	2.3-5.4%	52 - 70
PET	17	5 %		23 - 28	5.8-9.7%	30 - 44
OTHERS	69	21 %		77 - 83	<1.0-3.1%	75 - 94
Total	326	100%		390 - 448	3.2-6.1%	448 - 590

*=% Avrg.Annual Growth 1990-95. **=% Avrg.Annual Growth 1996-2000
*** = % Average Annual Growth 1990-2000.
^=includes clothing,household,toys,sport and recreation articles.
#=includes electrical,electronics,transport and military uses.

הטכניון - מכון טכנולוגי לישראל
מוסד ש. נאמן למחקר מתקדם במדע ובטכנולוגיה

תעשית הפלסטיקה בישראל
מצב כלכלי נוכחי וחלופות עתידיות

תקציר מנהלים מורחב

ד"ר דוד פרנקל
ד"ר שמואל קניג

אוגוסט 1991

1. הקדמה

מוסד ש. נאמן למחקר מתקדם במדע ובטכנולוגיה עורך מחקר מקיף על "**חלופות לקידום תעשיית הפלסטיקה והפולימרים בישראל**". העבודה כוללת שלושה שלבים עיקריים.

א. איסוף נתונים על מצב תעשיות הפולימרים והפלסטיקה בישראל ובעולם מבחינה טכנולוגית, כלכלית ושיווקית.

ב. ניתוח משולב - טכנולוגי, כלכלי ושיווקי, אודות מצבה העתידי של תעשית הפולימרים והפלסטיקה בישראל.

ג. ניתוח חלופות עתידיות לתעשיות הפולימרים והפלסטיקה בישראל.

דו"ח זה עוסק במצבה הכלכלי הנוכחי של תעשית הפלסטיקה בישראל ובעולם, ומציג חלופות כלכליות עתידיות לתעשית הפלסטיקה בישראל, בהתבסס על גידול טבעי של השוק המקומי, השפעת גורמים עולמיים, העליה ממזרח אירופה, היכולת של יצרנים מקומיים ליצא לשווקי העולם וכושר הייצור המקומי של פולימרים.

המידע המובא בדו"ח זה מבוסס על לוחות הלשכה המרכזית לסטטיסטיקה, טבלאות התעשיה של משרד התעשיה והמסחר, בסיס מידע הקיים במוסד נאמן על המפעלים המייצאים, דוחות של הפדרציה הבריטית לפסלטיקה (British Plastics Federation), דוחות הבנק העולמי, SRI International ומחקרי שוק של Chem. Systems.

2. תעשית הפלסטיקה בישראל - מצב נוכחי

תעשית הפלסטיקה בישראל הגיעה בשנת 1989 לייצור של כ-330 אלף טון מוצרים (ציור מס. 1) בהיקף מכירות של מעל למיליארד דולר. במונחים קבועים של הדולר מצטיירת ירידת מה ביחס למכירות שנת 1987 ו-1988. (ציור 2). ניתוח המכירות במושגים של מכירות שנתיות למשקל חומר נצרך, מצביע שקיימת ירידה מתמדת משנת 1986 (3,868 דולר/טון) לשנת 1989 (3,210 דולר/טון), ראה ציור מס. 3. מבחינה כלכלית שנת 1987 ו-1988 היו שנים טובות לתעשית הפלסטיקה ואילו שנת 1989 היתה שנה גרועה יחסית.

יצוא תעשית הפלסטיקה בישראל גדל במשך השנים 89-1986 גם במונחים שוטפים וגם במונחים קבועים והגיע בשנת 1989 ל-255 מליון דולר (כ-25% מכלל המכירות), ראה ציור מס. 4. זאת בהשוואה לירידה

מכירות תעשית הפלסטיקה מתחלקות בהתאם לשימוש הסופי, כמתואר בציור 13. האריזה היא השימוש הסופי העיקרי (32.4%), חקלאות כ-20%, בניה - 17%, מוצרי צריכה קרוב ל-9%, שימושים תעשייתיים - 7%, ריהוט מעל 6%, שימושים צבאיים - 3.3% ושימושים שונים כ-5%. היצוא לפי שימושים סופיים ב-1989 מתואר בציור 14. ניתן להבחין שמוצרים לחקלאות מובילים את היצוא בכ-28%, האריזה - 21%, מוצרי בניה קרוב ל-20%, מוצרי צריכה כ-11%, שימושים תעשייתיים - 7.6%, ריהוט כ-7%, שימושים צבאיים - 2.2%, ושימושים שונים 38%.

התעסוקה לפי שימושים סופיים מתוארת בציור 15.

4. תעשית הפלסטיקה בישראל - השוואה לענפים תעשייתיים אחרים

פרק 4 בדו"ח מציג נתונים השוואתיים, במונחים כספיים וכלכליים בין תעשית הפלסטיקה בישראל לבין תעשיות הגומי והצמיגים, הכימיקלים והנפט, ותעשיות שונות שמוצריהן ברי החלפה עם מוצרים פלסטיים כמו: זכוכית, נייר וקרטון, עץ ומתכת.

המכירות של ענף הפלסטיקה ב-1989 הגיעו ל-86.7% מכלל המכירות, ל-74.3% מכלל היצוא ו-82.3% מכלל המועסקים במגזר המשותף של הפלסטיקה והגומי. במשך שנת 1987 ו-1988 כוונו רוב ההשקעות (כ-90%) לענף הפלסטיקה. בהשוואה לענף הגומי, מפגין ענף הפלסטיקה המשכיות בגידול היצוא ודומיננטיות בשוק המקומי., לענף הגומי קשיים בשוק המקומי.

בהשוואה לתעשית הפלסטיקה, תעשית הכימיקלים הכסיסיים היא בעלת קצב גידול גבוה יותר של מכירות ויצוא, עם מספר מועסקים המהווה כמחצית ממספר העובדים בתעשית הפלסטיקה. שיעור ההשקעות בענף זה הוא גדול והגיע בשנת 1989 ל-250 מליון דולר.

בהשוואה לתעשיות העץ, הנייר, הזכוכית והמתכת, תעשית הפלסטיקה היא בעלת ערך היצוא הגבוה ביותר. תעשיות אלה מאופיינות במכירות לשוק המקומי ויצוא קטן יחסית.

מבחינת המכירות לעובד תעשית הכימיקלים עוברת את הערך של 200 אלף דולר לעובד ותעשית הנייר מתקרבת ל-110 אלף דולר לעובד. שאר התעשיות הן בעלות מכירות לעובד הקטנות מאילו של תעשית הפלסטיקה, המגיעות לכ-100 אלף דולר לעובד.

10.6% ובאיטליה - 13%. ישראל מובילה בשימושים לחקלאות (20%). נורבגיה היחידה שבה קיים שימוש גבוה לחומרים פלסטיים בחקלאות (11%). בתחבורה ומכוניות נעשה שימוש בחומרים פלסטיים בכמויות גדולות, בגרמניה (13%), יפן (9%) ואיטליה (7%). למוצרי צריכה משמשים פולימרים בארה"ב באחוז הגבוה ביותר (10%), וביפן (8.4%). בישראל האחוז גבוה יחסית - 8.7%.

מבחינת ציוד לעיבוד, גרמניה מובילה במכירות - 3.5 מיליארד דולר, איטליה 2.2 מיליארד דולר, ויפן 1.9 מיליארד דולר. בקבוצת המדינות השניה בולטת שויצריה במכירות בהיקף 600 מליון דולר ואוסטריה - 340 מליון דולר.

6. תעשית הפלסטיקה בעולם - תחזית לשנת 2000

מצבה של תעשית הפלסטיקה בעולם בשנות ה-90 עד שנת 2000 מושפעת בעיקר מהמצב המקרו-כלכלי העולמי ובעיקר במצבן הכלכלי של ארה"ב, גרמניה ויפן.

כתוצאה מסיום משבר המפרץ הפרסי יש לצפות לתקופה של בניה ופריחה עד אמצע שנות ה-90 ולקראת סוף העשור - למיתון כלכלי. המדינות התעשייתיות תגענה לגידול של 3% בתוצר המקומי הגולמי (GDP) בשנות ה-90. קצב הגידול ביפן יגיע ל-5%. קצבי הגידול יושפעו בעתיד מאיחוד גרמניה ,פתיחת השווקים המזרח-אירופאיים ואיחוד אירופה ב-1992. בארצות הכלכלה המתפתחות (קוריאה, מלזיה, תאילנד, טיוואן, סינגפור והונג קונג) יגיע קצב הגידול השנתי לממוצע של 6% ואחוז נמוך יותר בארצות אפריקה ואסיה.

בהסתמך על נתוני העבר, קצב הגידול בחומרים פלסטיים ברוב הארצות גבוה ב-1% עד 2% מעל קצב הגידול של ה-GDP. זאת עקב ההחלפה המתמדת של מתכות, נייר וזכוכית בחומרים פלסטיים בשימושים לאריזה, הנדסה ובניה.

האוירה הבינלאומית תעודד גידול של שוק הפלסטיקה וחדירה של חומרים פלסטיים לשימושים חדשים על אף המגבלות לשמירת הסביבה ורווית השוק בחלק מהשימושים. יש לצפות להמשך החדירה של חומרים פלסטיים לשימוש במוצרי אריזה על חשבון זכוכית, נייר ומתכת, להרחבת השימוש בחומרים פלסטיים למגזר ההנדסי והחלפת מתכות בחומרים פלסטיים לשימושי מבנה. ההתפתחות הכלכלית של המדינות המתפתחות החדשות במזרח הרחוק תביא בעקבותיה להעלאת הצריכה בפולימרים קונבנציונליים, בהשוואה לרויה במדינות המפותחות.

* **מוצרי תעשיה ומכונות** - השוק כולל מיכון תעשייתי וחקלאי, מנועים, ציוד לתעשיה הכימית. הצריכה הנוכחית היא כ-4% מכלל השימושים. קצב גידול שנתי חזוי עד שנת 1995 הוא 6.5% ו-10% בחצי השני של העשור עד שנת 2000.

* **חקלאות** - כ-3% מכלל הצריכה העולמית של חומרים פלסטיים מכוון לשוק זה הכולל: בתי צמיחה, מערכות השקיה ואריזות תוצרת חקלאית. קצב גידול עולמי שנתי של 4% צפוי לכל העשור עד שנת 2000.

בהסתמך על קצבי הגידול החזויים תגיע הצריכה של חומרים פלסטיים בשנת 1995 ל-115 מליון טון. החלוקה לפי שימושים מתוארת בציור 20. בשנת 2000 תגיע הצריכה ל-143 מליון טון, כשהחלוקה לפי שימושים סופיים נתונה בציור 21.

7. תעשית הפלסטיקה בישראל עד שנת 2000

תעשית הפלסטיקה בישראל תהיה מושפעת מ-5 גורמים עיקריים בעשור הנוכחי:

* האוירה הכלכלית המקומית וצמיחה טבעית של המשק.
* התפתחות השוק העולמי בפלסטיקה ובעיקר שימושים חדשים והתרחבות השימוש בחומרים פלסטיים.
* השפעת העליה ממזרח אירופה.
* הייצור המקומי של חומרי גלם פלסטיים.
* היכולת של השוק המקומי לשמור על שווקי יצוא קיימים וחדירה לשווקים חדשים.

בהסתמך על גורמים אלו, הוכנו 3 חלופות לגידול תעשית הפלסטיקה בישראל - אופטימית, ריאלית ופסימית ובנוסף שתי חלופות הלוקחות בחשבון את העליה הצפויה - קצב גבוה וקצב נמוך.

* גידול אופטימי - חלופה זו מניחה גידול בתוצר הלאומי הגולמי של 3.3-3.6% עד סוף העשור. גידול בשימושים לחומרים פלסטיים יגיע ל-5% בממוצע.
* גידול ריאלי - חלופה זו מניחה קצב גידול של התוצר הלאומי הגולמי של 2.7% עד שנת 1995 ולאחר מכן 2.3% עד שנת 2000. קצב הגידול בפלסטיקה מוערך ב-1% מעבר לגידול בתוצר הלאומי הגולמי - 3.7% עד שנת 1995 ו-3.3% לאחר מכן עד שנת 2000.
* גידול פסימי - חלופה זו מתבססת על קצב גידול שנתי בפלסטיקה של 2.6% עד שנת 1995 ו-2.2% לאחר מכן עד שנת 2000.

מבחינת חומרי הגלם, קצב גידול בשימוש של PET בישראל צפוי להיות הגבוה ביותר, בין 5.8% ל-9.7%, פוליפרופילן בין 5.9 ל-9.1%. השימוש בפוליאתילן ופוליסטירן יעלה בקצב בינוני של 3 עד 6% לשנה, ו-PVC בין 2.3 ל-5.4% לשנה.

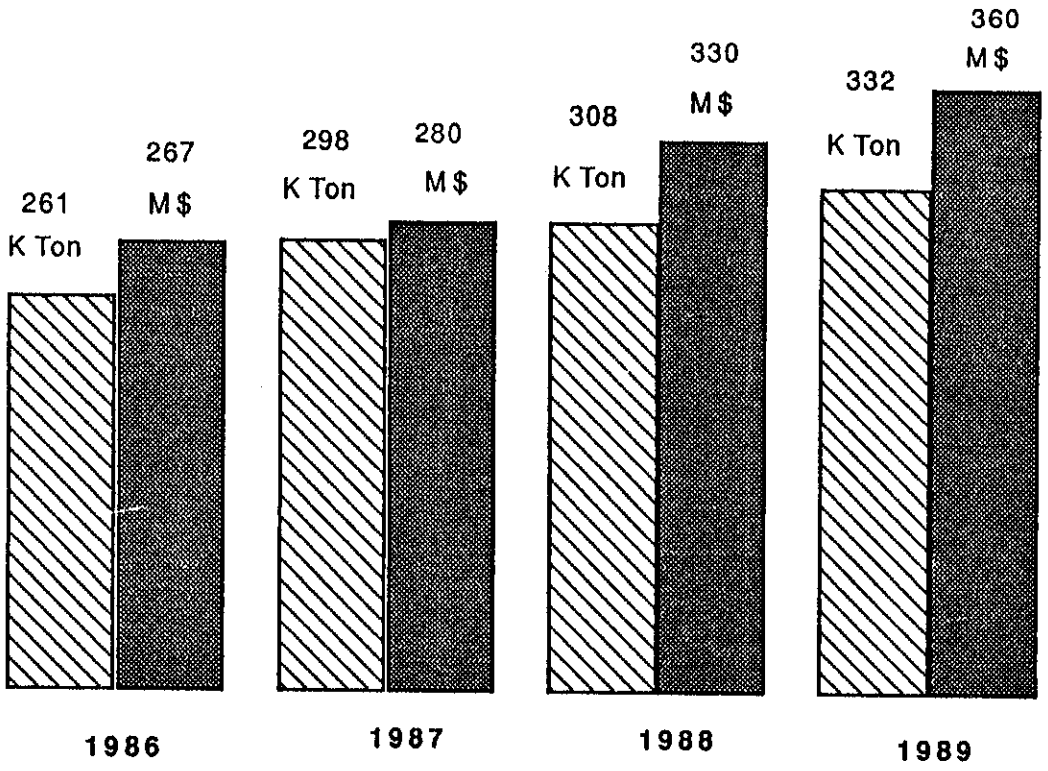
יוני 1991

ציור 1

ייצור חומרים פלסטיים בישראל

Figure 1

PLASTICS PRODUCTION IN ISRAEL

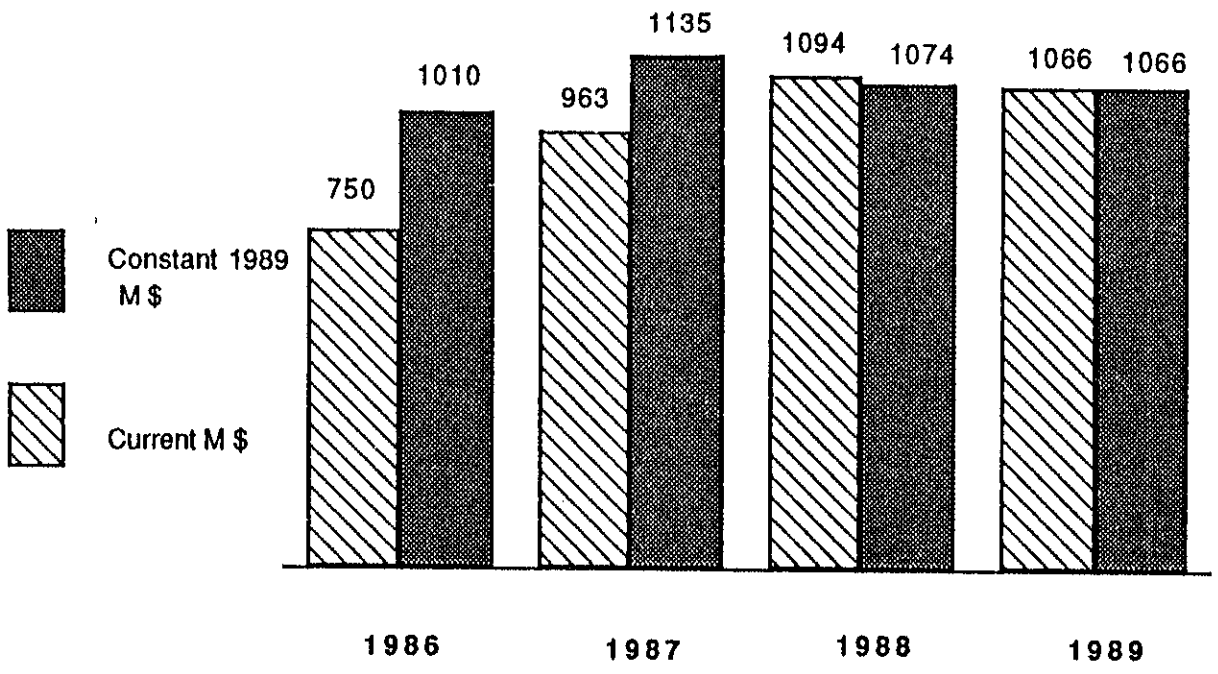


ציור 2

מכירות תעשיית הפלסטיקה בישראל

Figure 2

ISRAEL PLASTICS INDUSTRY SALES

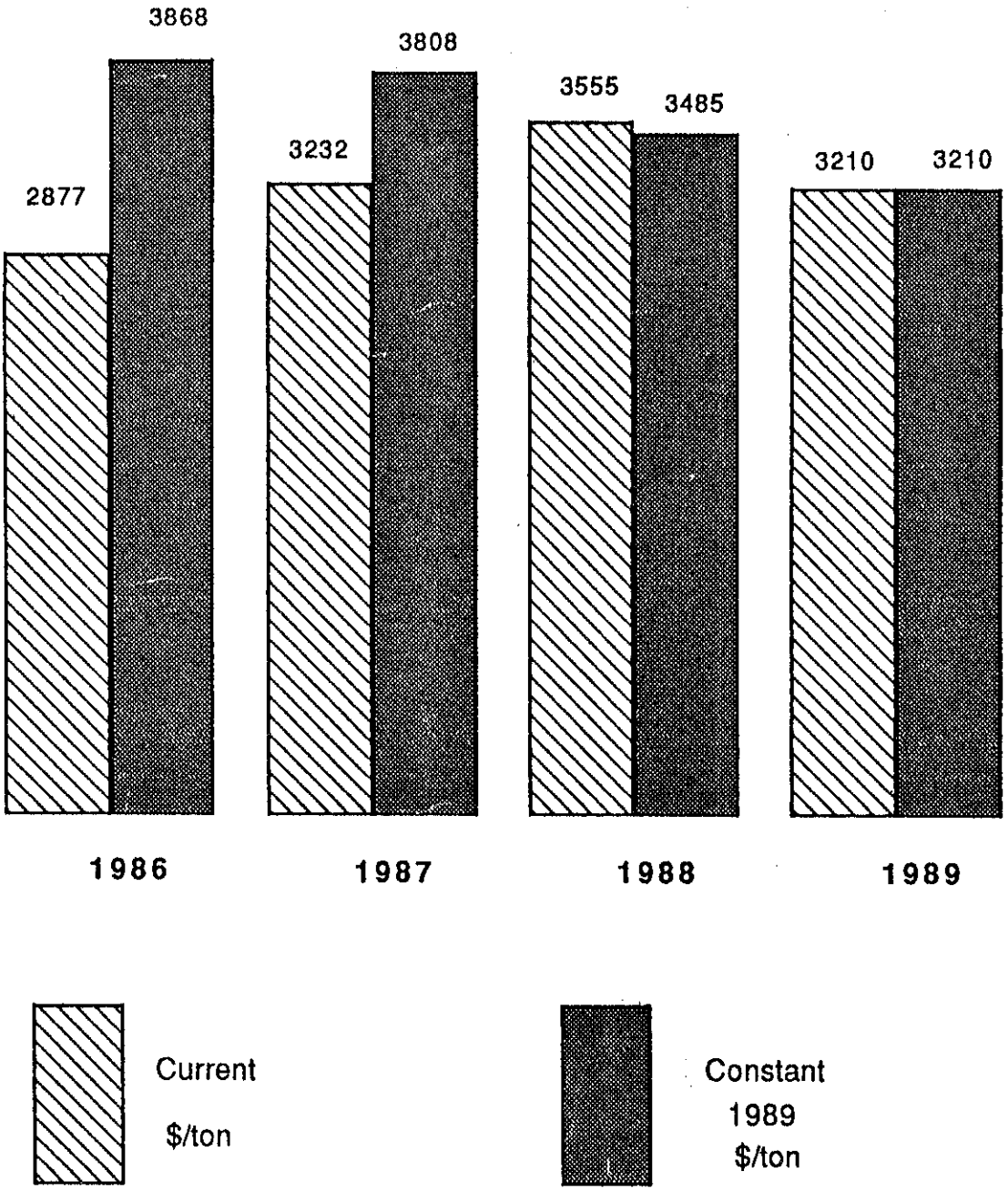


ציור 3

מכירות - יחידת ערך

Figure 3

SALES UNIT VALUE

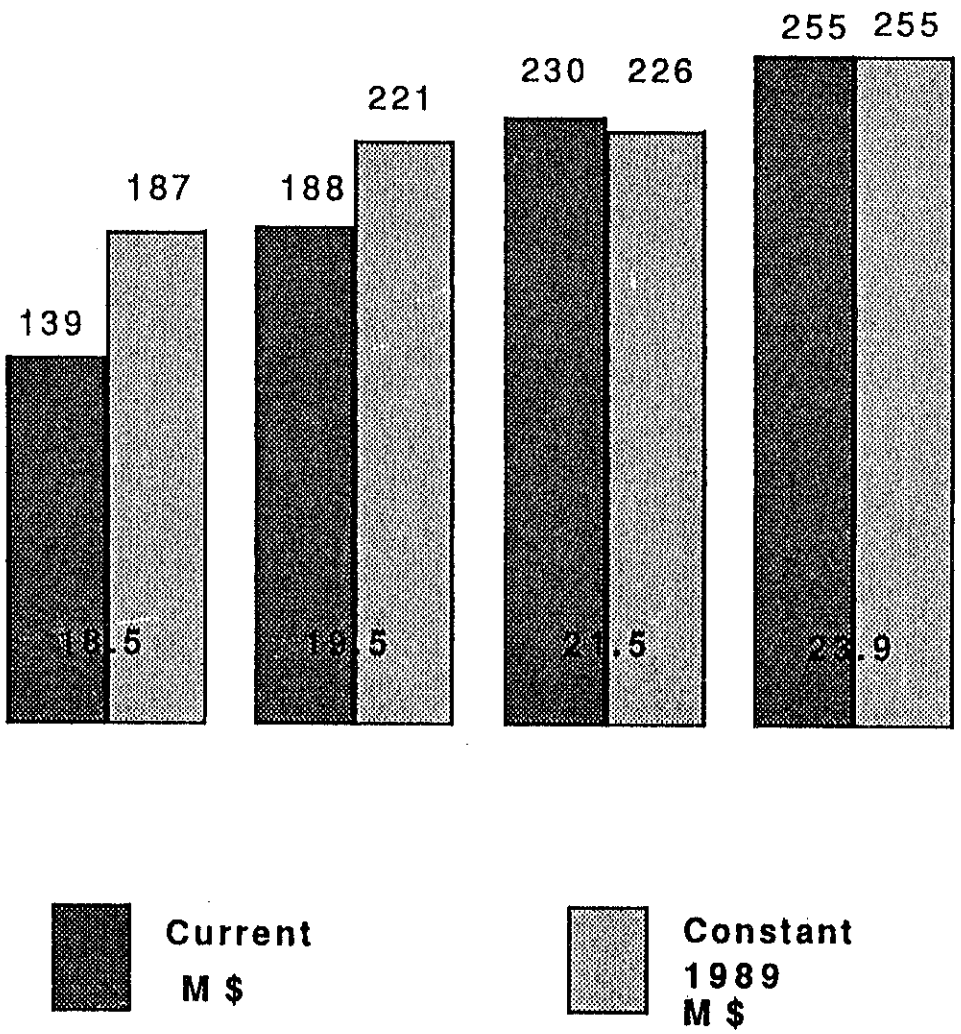


ציור 4

מכירות ליצוא בתעשית הפלסטיקה

Figure 4

PLASTICS INDUSTRY EXPORT SALES

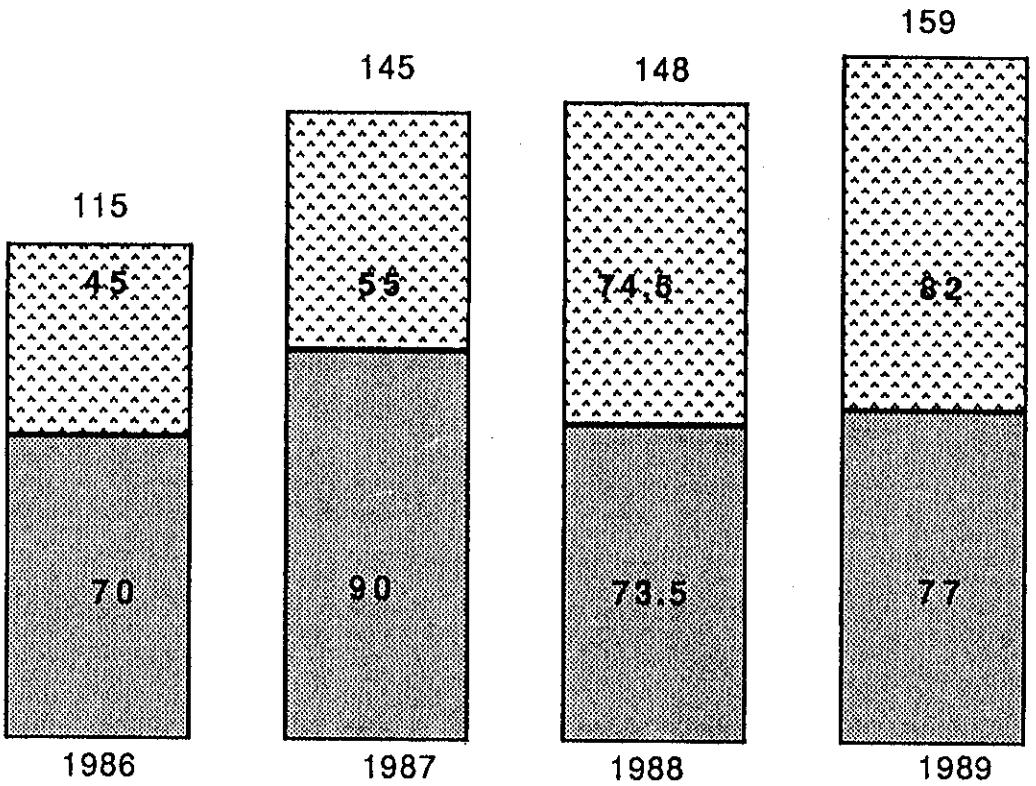


ציור 5

יבוא מוצרים פלסטיים

Figure 5

IMPORTS OF PLASTICS PRODUCTS



ציור 6

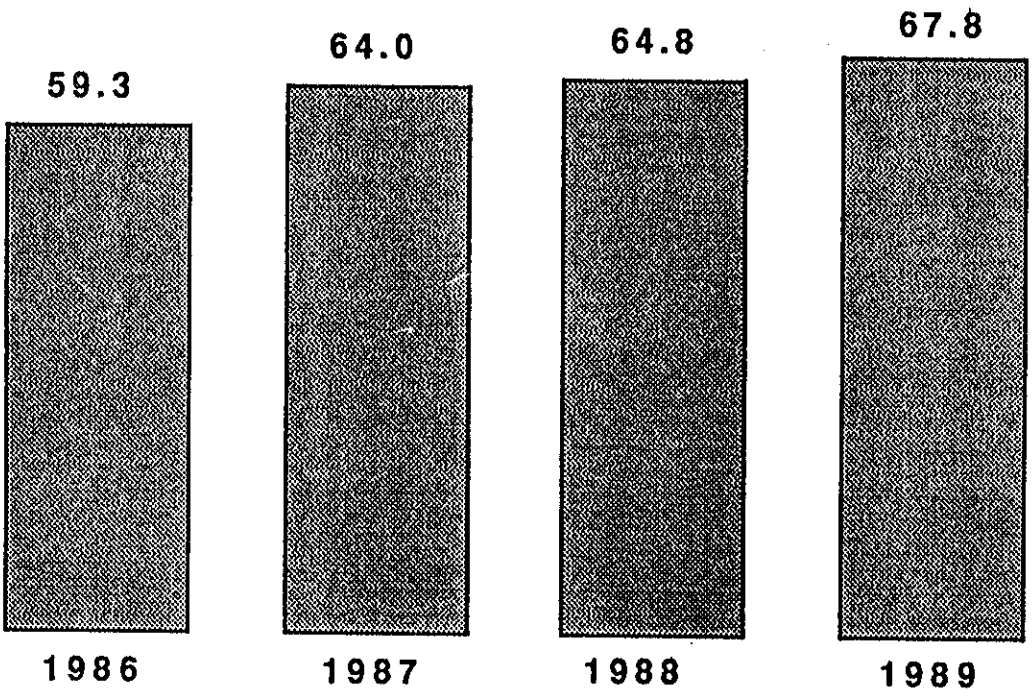
צריכת חומרים פלסטיים בישראל

(ק"ג/נפש/שנה)

Figure 6

CONSUMPTION OF PLASTICS IN ISRAEL

(kg/capita/year)

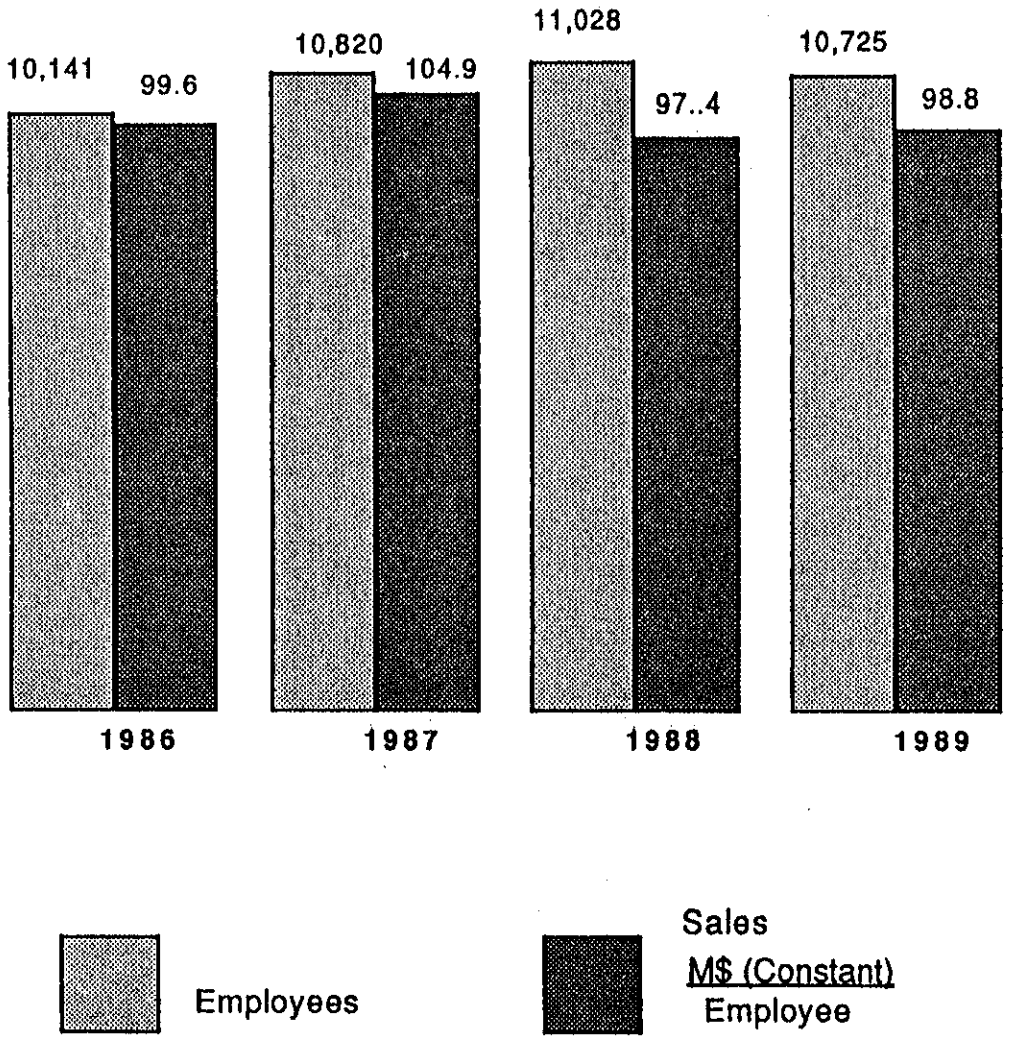


ציור 7

עובדים ומכירות לעובד

Figure 7

EMPLOYEES AND SALES PER EMPLOYEE

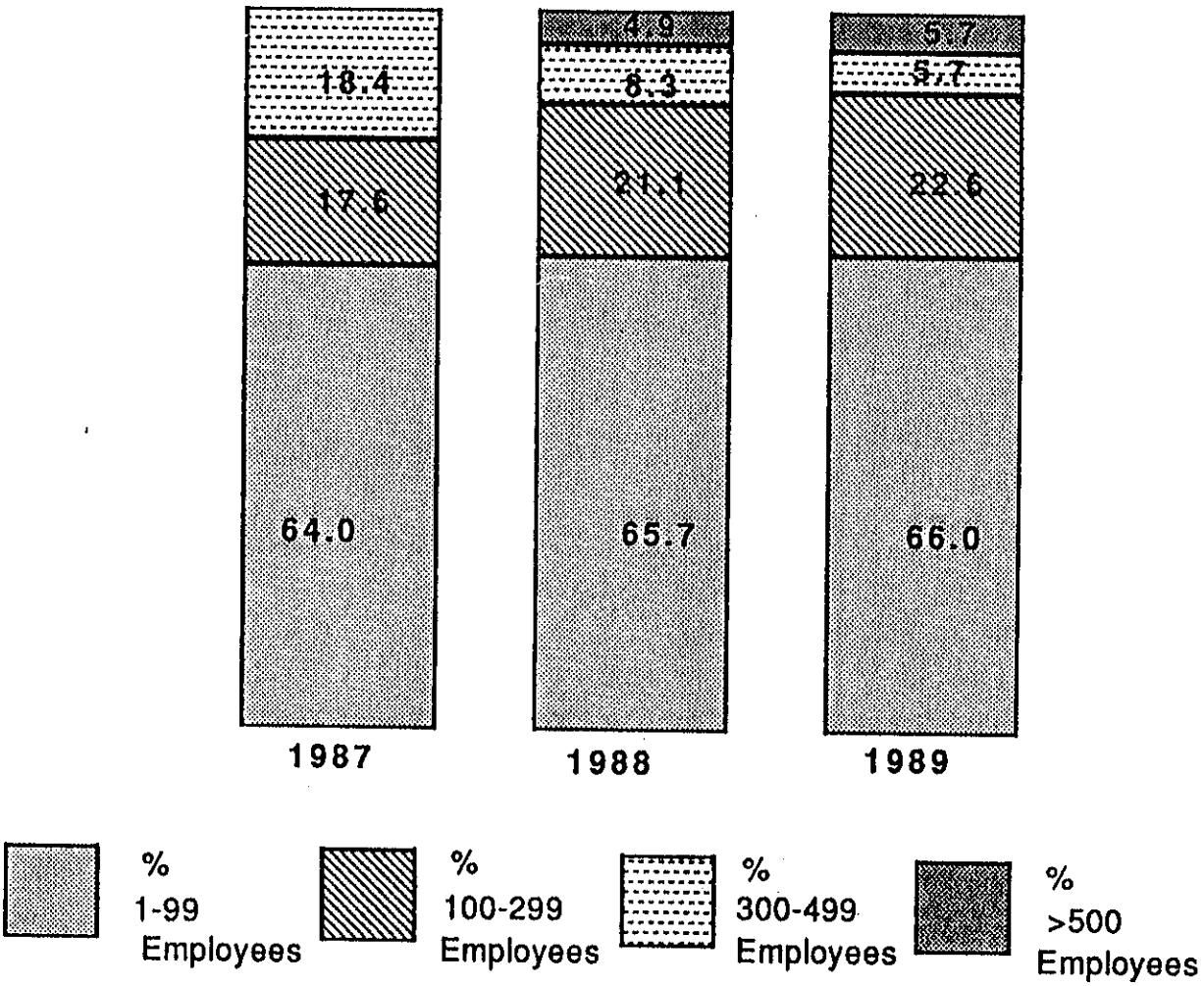


ציור 8

גודל מפעלי פלסטיקה

Figure 8

SIZE OF PLASTICS FACTORIES



ציור 9

תעשיית חגומי והפלסטיקה

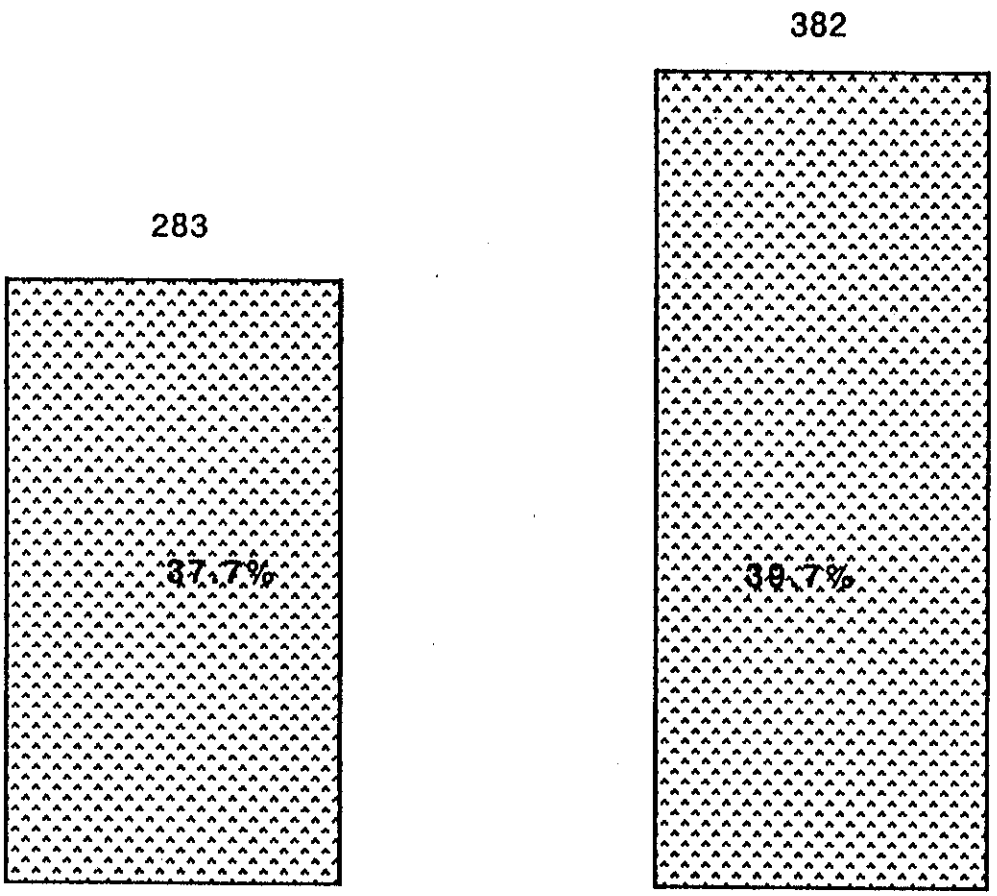
ערך מוסף

Figure 9

RUBBER AND PLASTICS INDUSTRY

VALUE ADDED

(Current M $)



ציור 10

תעשית הגומי והפלסטיקה

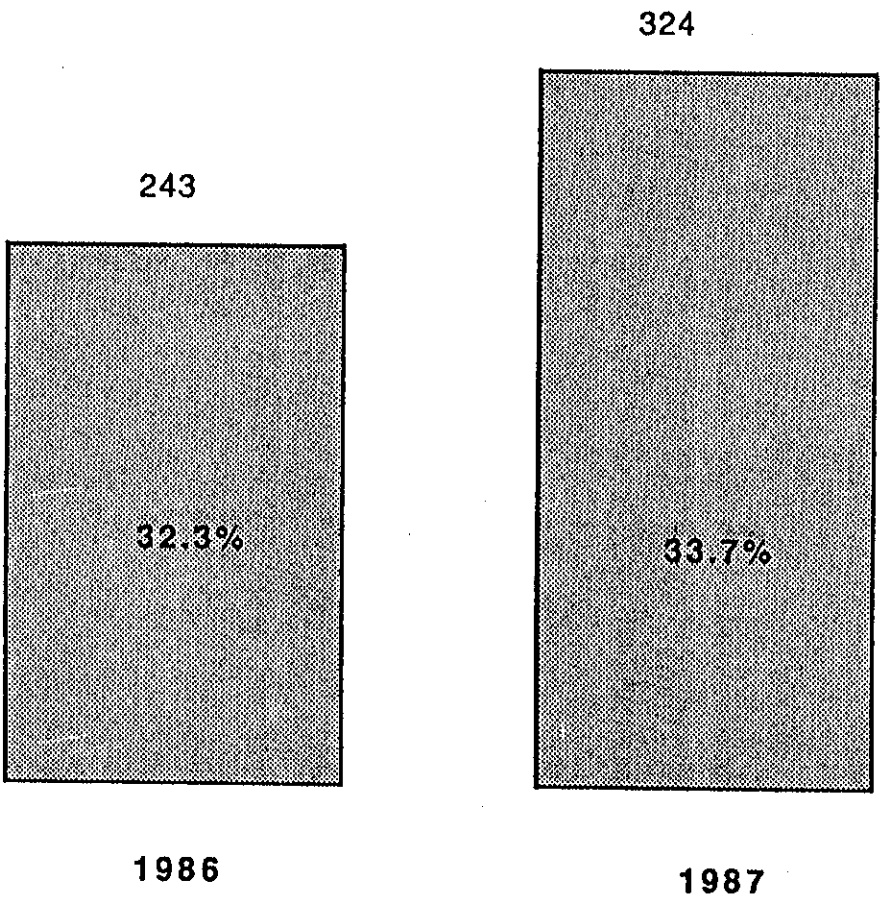
תוצר מקומי גולמי

Figure 10

RUBBER AND PLASTICS INDUSTRY

GROSS DOMESTIC PRODUCT (GDP)

(Current M$)



ציור 11

מוצרים פלסטיים ופולימרים

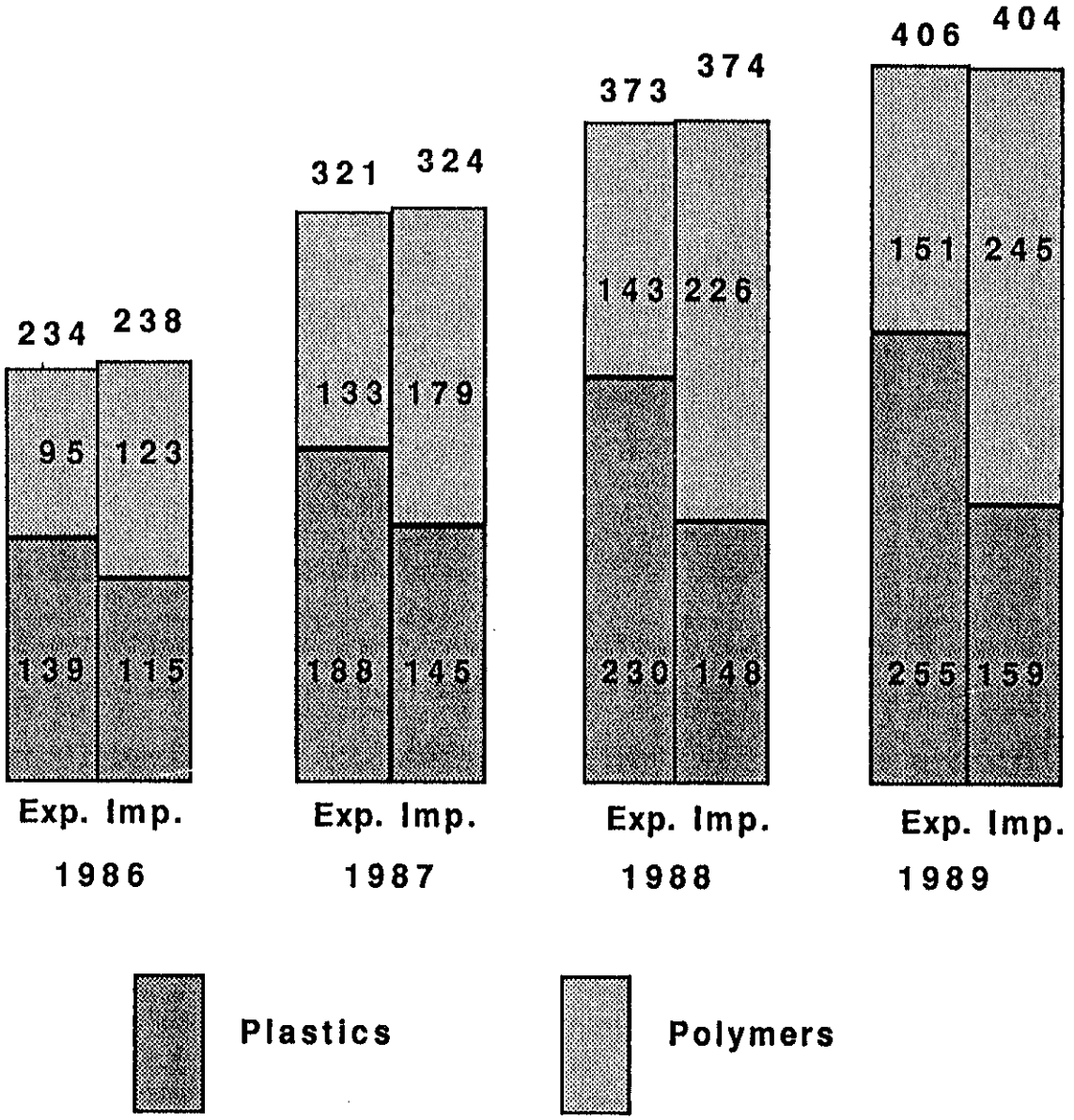
מאזן מסחרי

Figure 11

PLASTIC PRODUCTS AND POLYMERS

BALANCE OF TRADE

(M$)



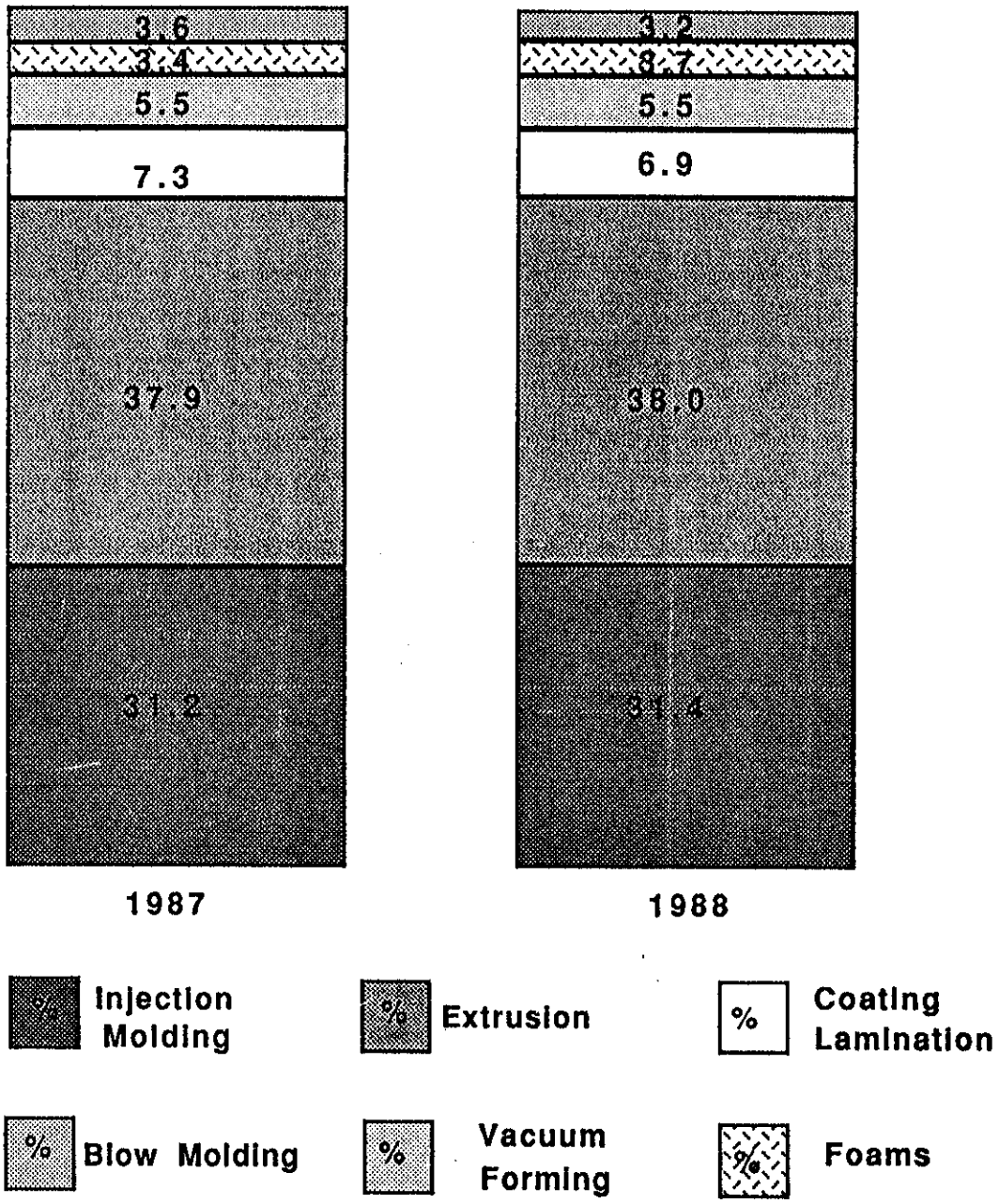
ציור 12

מכירות לפי שיטות ייצור (%)

Figure 12

SALES BY PROCESSING METHODS

(%)

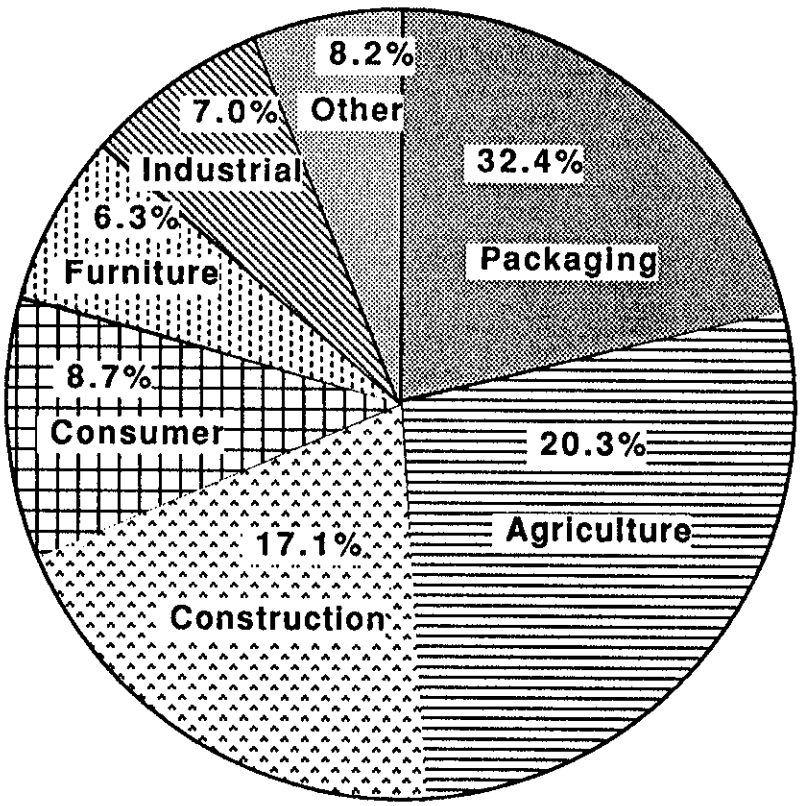


ציור 13

מכירות לפי שימוש סופי (1988)

Figure 13

END USE SALES (1988)

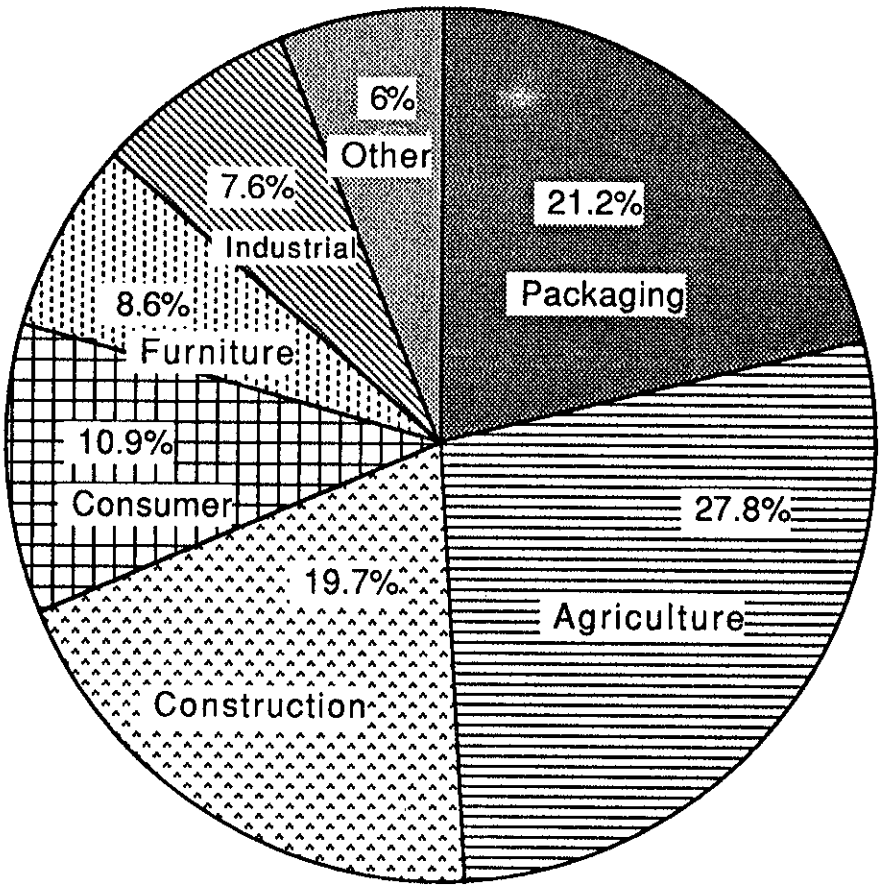


ציור 14

מבירות יצוא לפי שימוש סופי (1989)

Figure 14

END USE EXPORTS (1989)

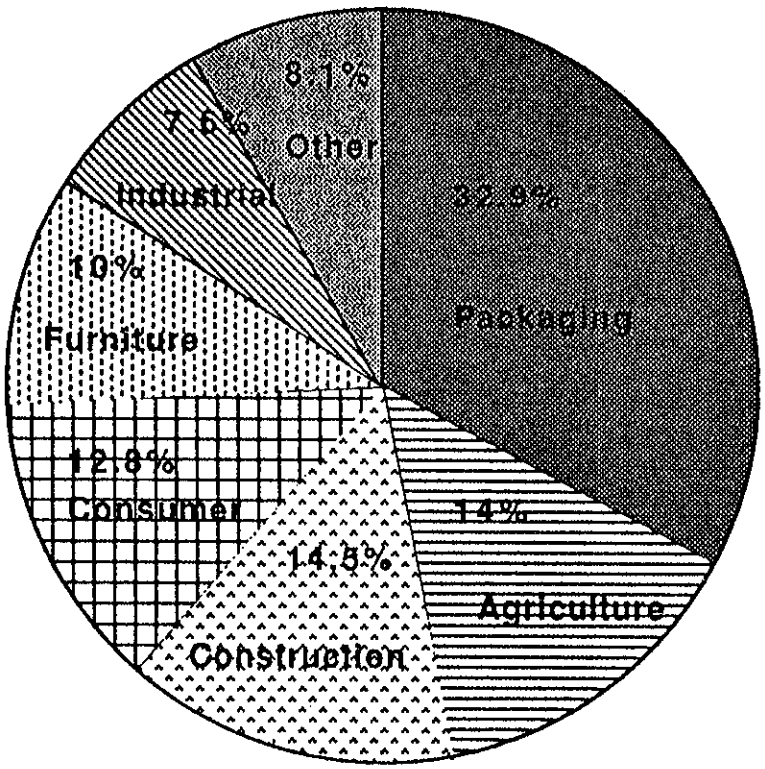


ציור 15

תעסוקה לפי שימוש סופי (1989)

Figure 15

END USE EMPLOYMENT (1989)



ציור 16

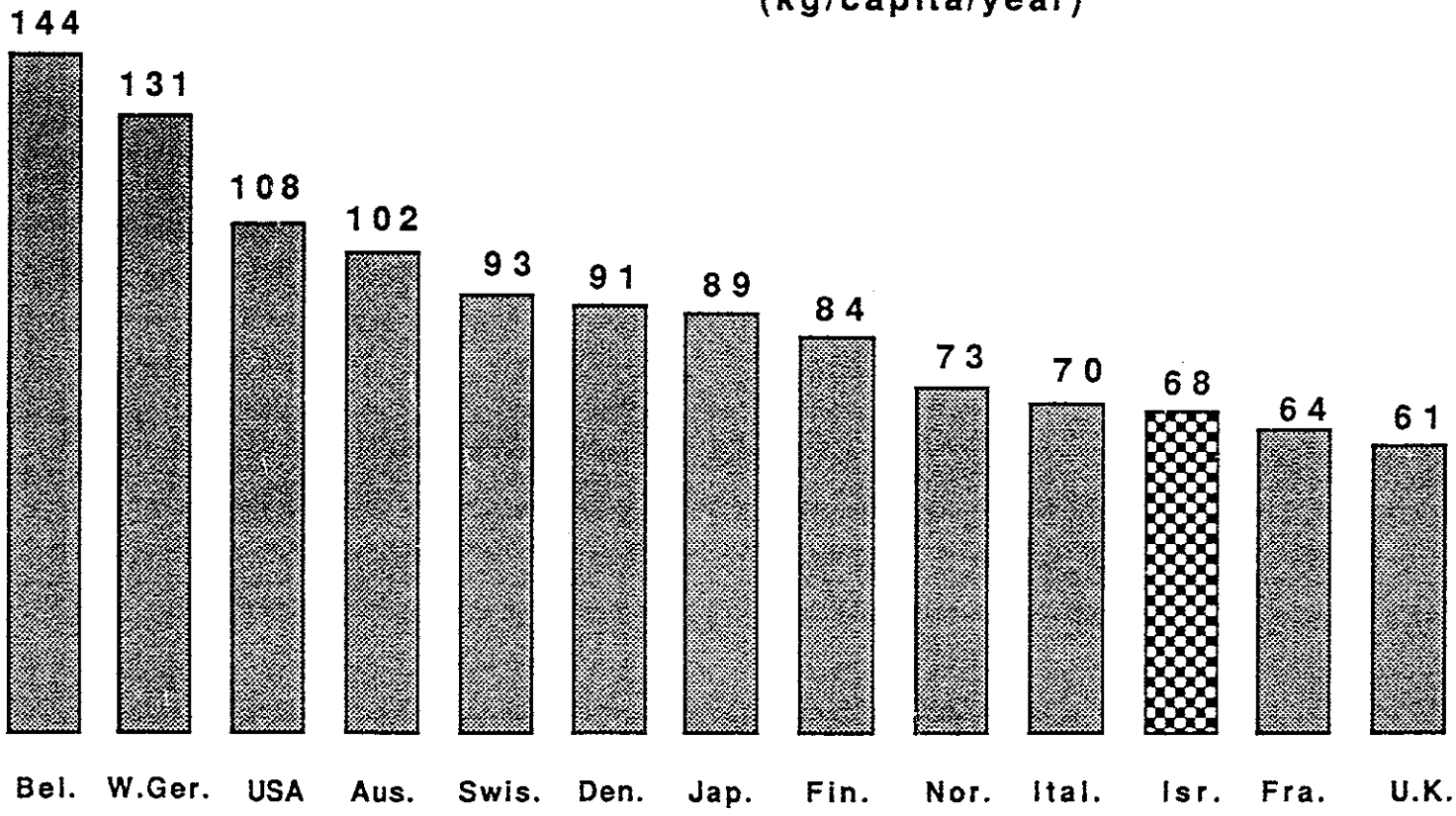
צריכת חומרים פלסטיים לנפש - 1989

(ק"ג/נפש/שנה)

Figure 16

PLASTICS CONSUMPTION PER CAPITA - 1989

(kg/capita/year)



ציור 17

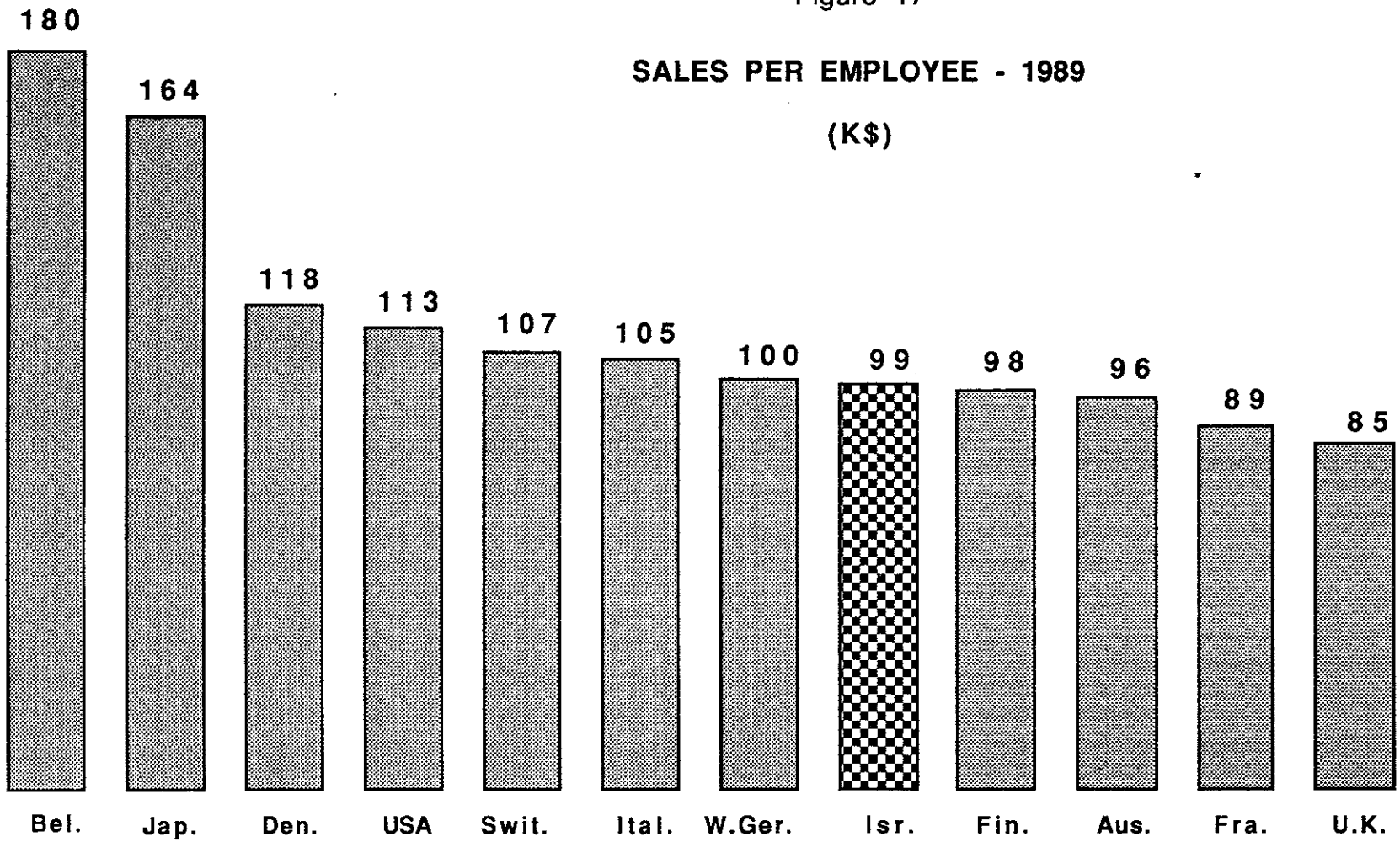
מכירות לעובד - 1989

(אלפי דולר)

Figure 17

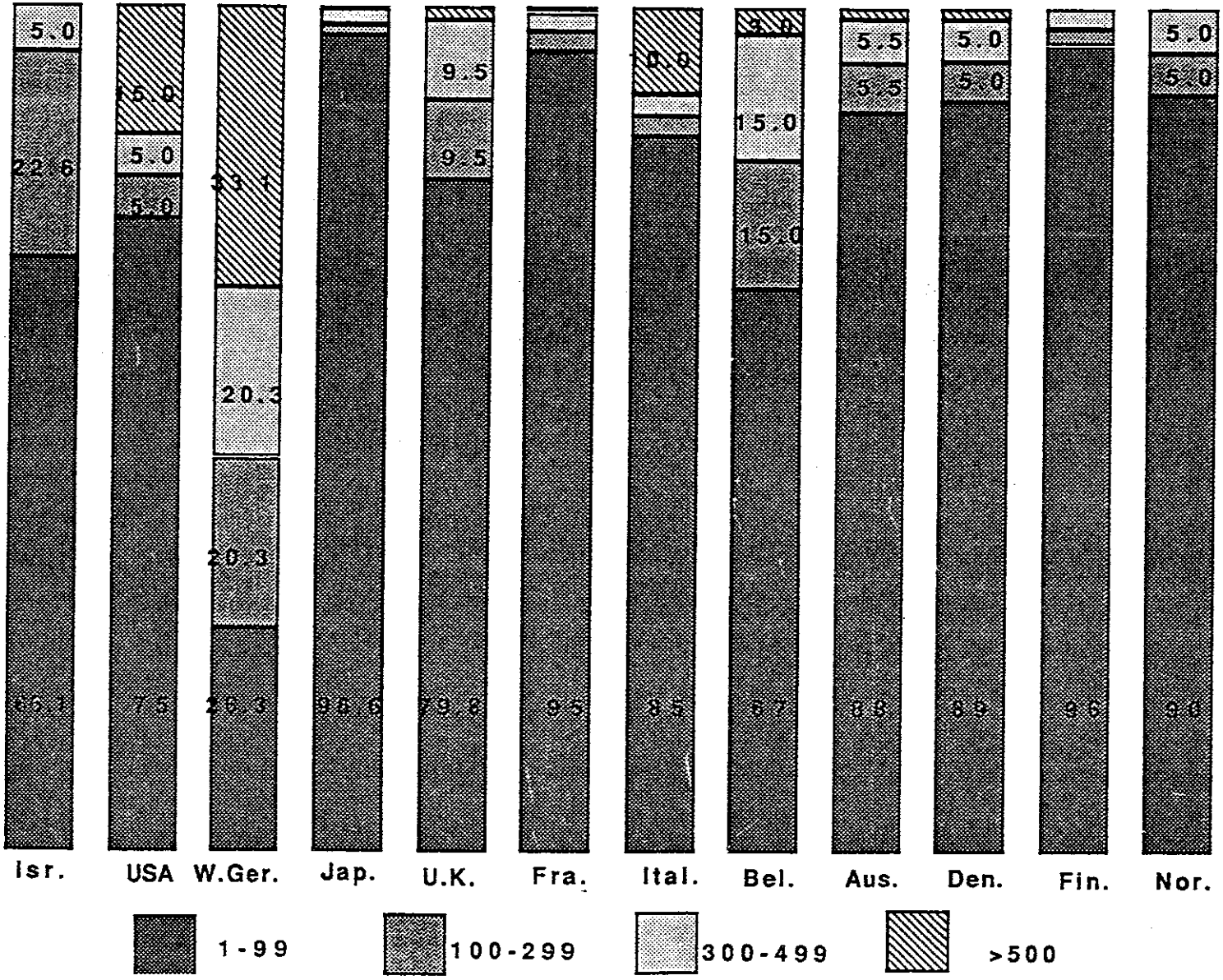
SALES PER EMPLOYEE - 1989

(K$)



ציור 18 פיזור גודל המפעלים - 1989 (%)

Figure 18 **PLANT SIZE DISTRIBUTION - 1989 (%)**



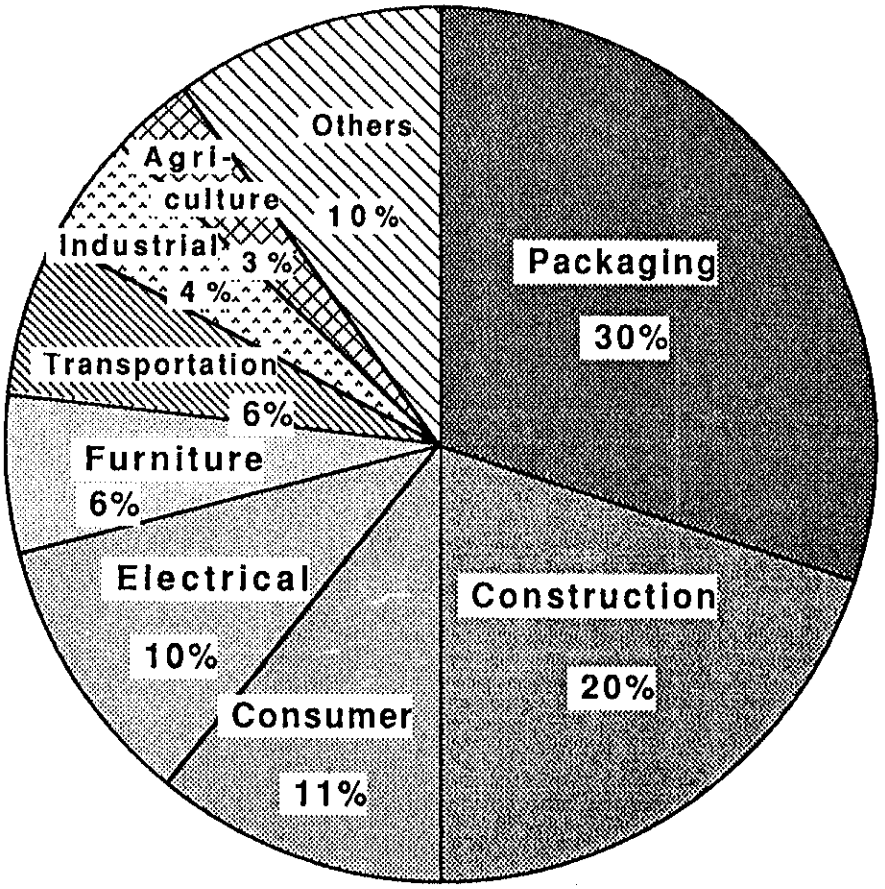
ציור 19

צריכת חומרים פלסטיים בעולם - 1990

Figure 19

PLASTICS CONSUMPTION WORLDWIDE - 1990

Total 90 x 10^6 tons



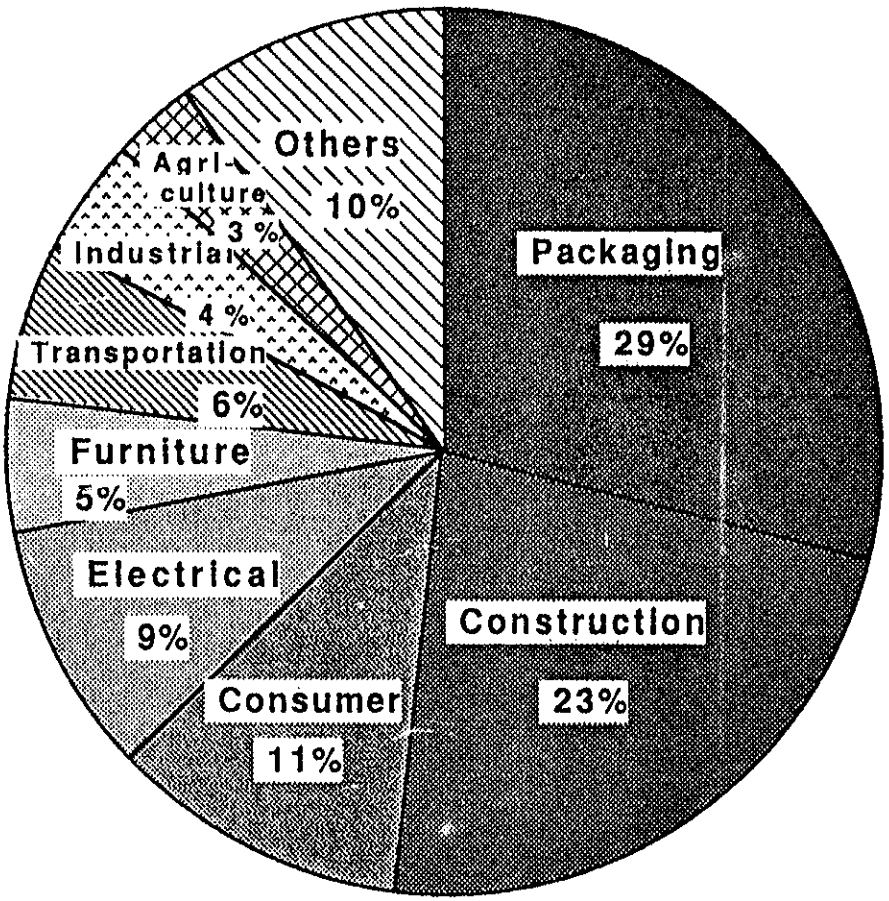
ציור 20

צריכת חומרים פלסטיים בעולם - 1995

Figure 20

PLASTICS CONSUMPTION WORLDWIDE - 1995

Total 115×10^6 tons



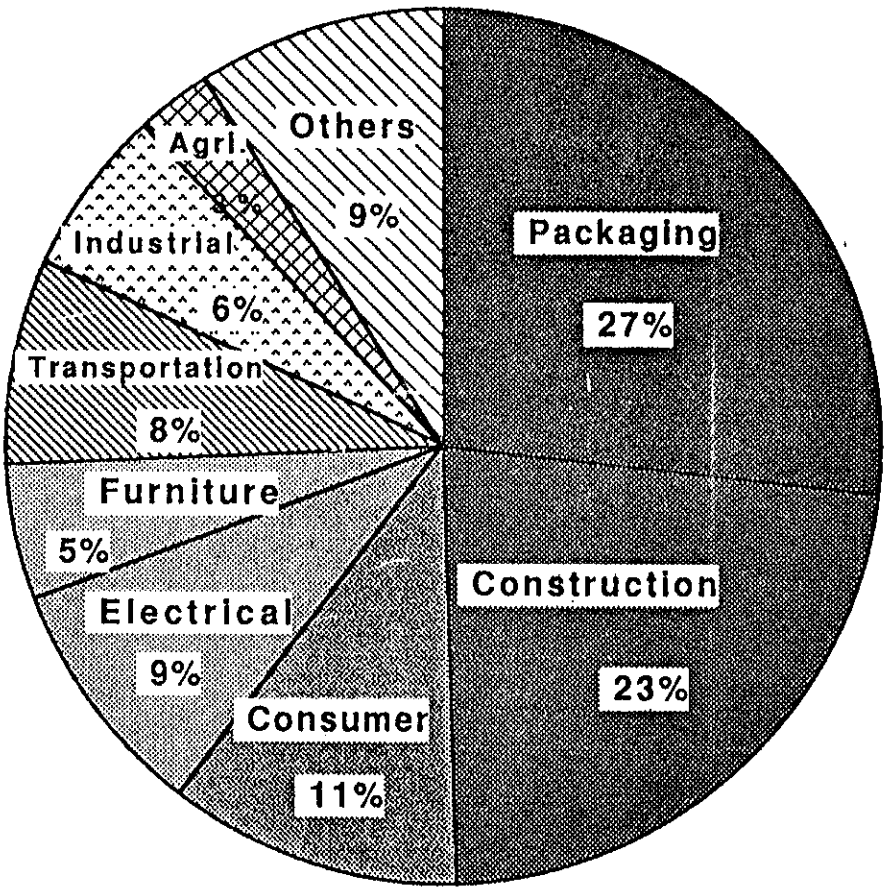
ציור 21

צריכת חומרים פלסטיים בעולם - 2000

Figure 21

PLASTICS CONSUMPTION WORLDWIDE - 2000

Total 143×10^6 tons



OHI- Optimistic High Imm.

OMI- Optimistic Moderate Imm.

RHI- Realistic High Imm.

RMI- Realistic Moderate Imm.

PMI- Pessimistic Moderate Imm.

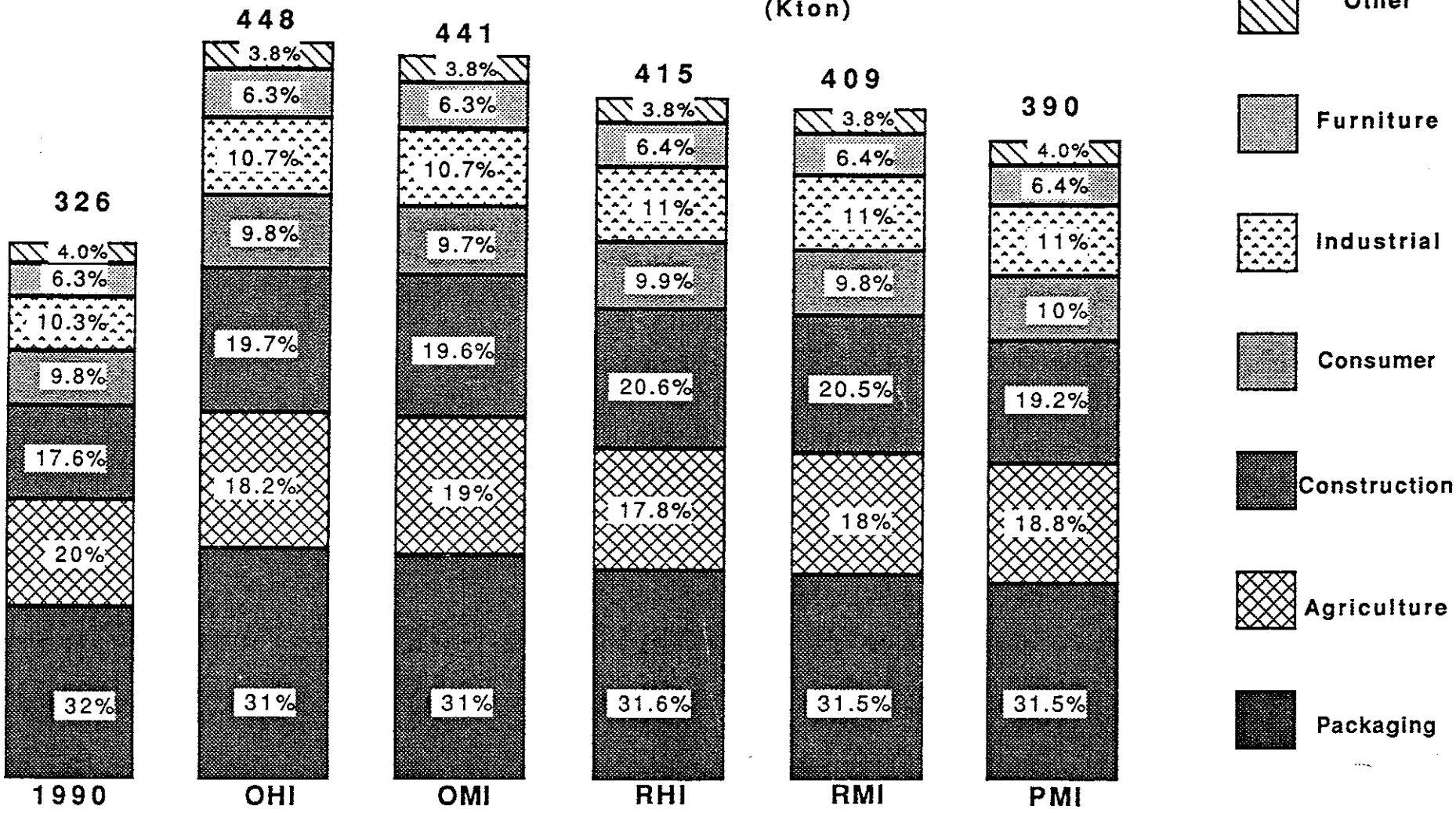
ציור 22 תעשית הפלסטיקה בישראל

צריכה בשנת 1995 - חלופות כלכליות (אלפי טון)

Figure 22 ISRAEL PLASTICS INDUSTRY

1995 CONSUMPTION - ECONOMIC ALTERNATIVES

(Kton)



OHI- Optimistic High Imm.

OMI- Optimistic Moderate Imm.

RHI- Realistic High Imm.

RMI- Realistic Moderate Imm.

PMI- Pessimistic Moderate Imm.

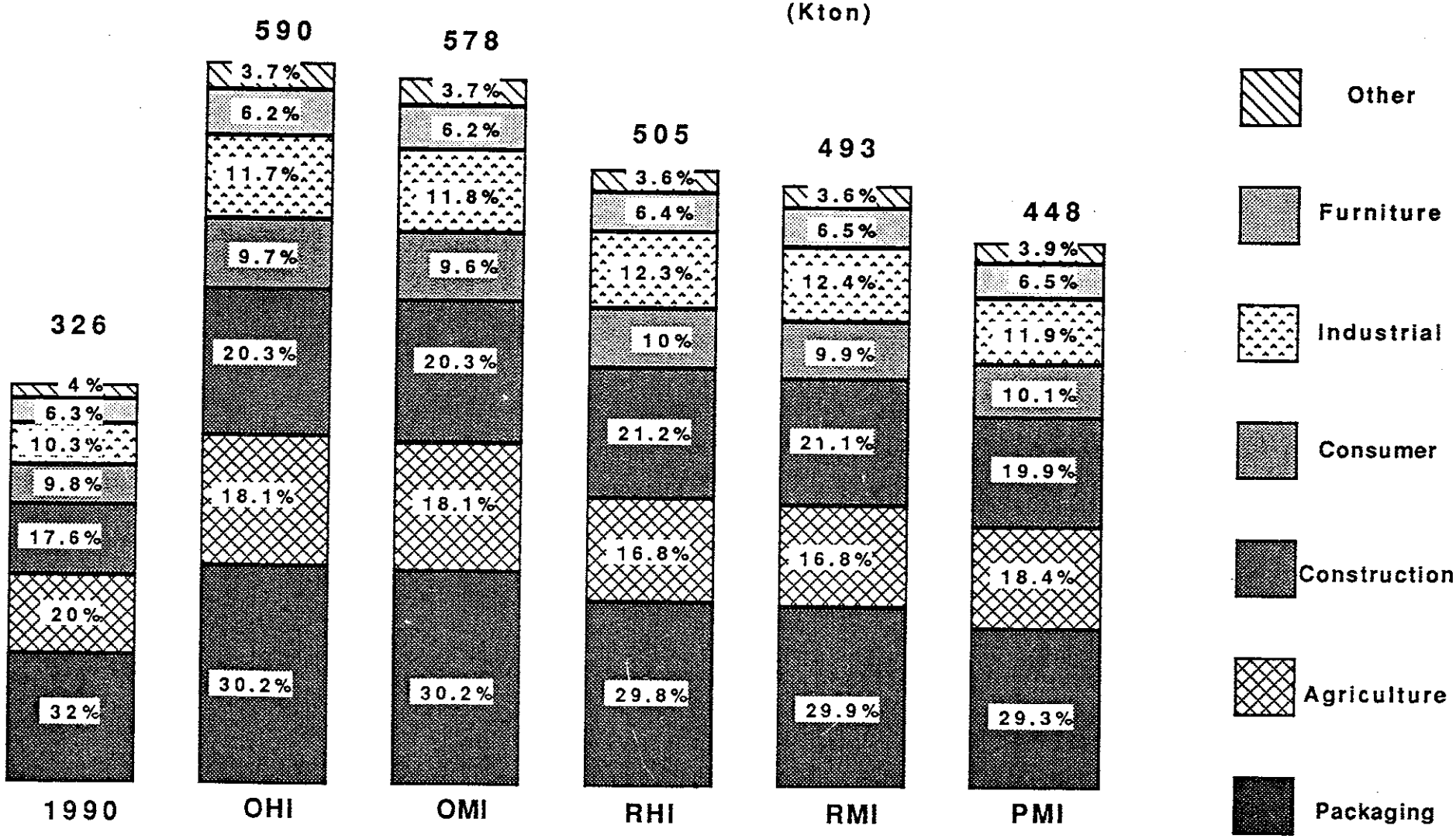
ציור 23 תעשית הפלסטיקה בישראל

צריכה בשנת 2000 - חלופות כלכליות (אלפי טון)

Figure 23 ISRAEL PLASTICS INDUSTRY

2000 CONSUMPTION - ECONOMIC ALTERNATIVES

(Kton)



ציור 24

תעשית הפלסטיקה בישראל

צריכה ב-1990 - 326 אלף טון

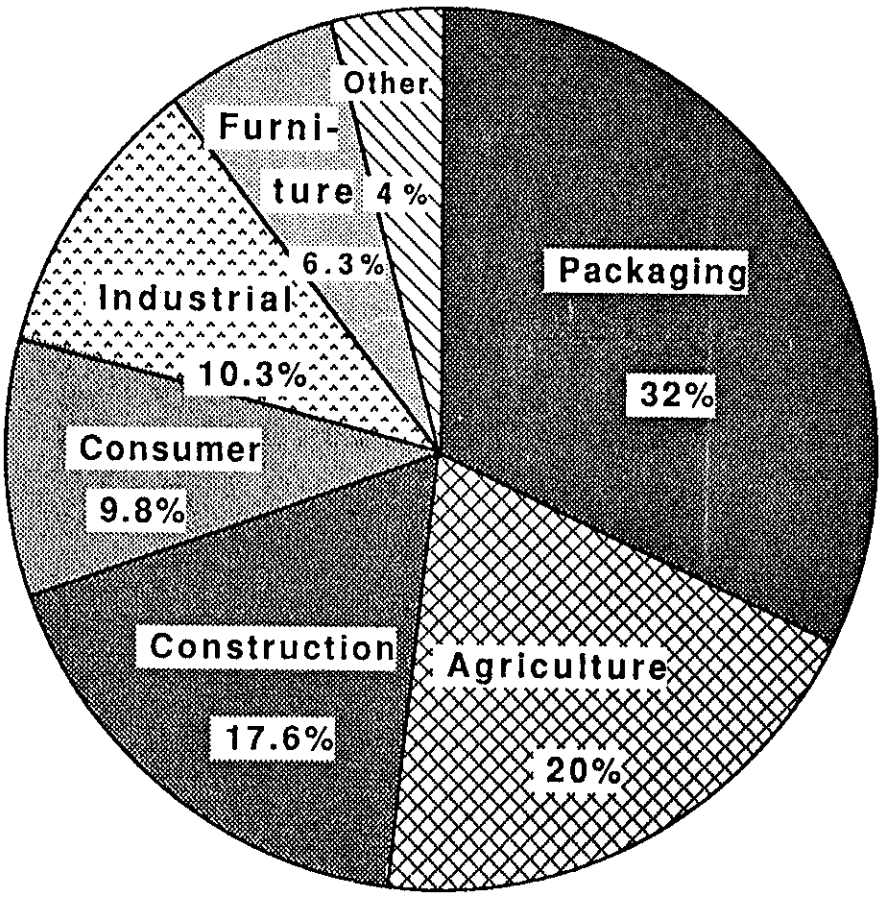
אוכלוסיה - 4.75 מליון

Figure 24

THE PLASTICS INDUSTRY IN ISRAEL

1990 CONSUMPTION - 326,000 tons

Population - 4.75 million



ציור 25

תעשית הפלסטיקה בישראל
צריכה 1995 - 415 מליון טון
קצב גידול 1% מעל תל"ג
100 אלף עולים לשנה עד 1995
אוכלוסיה 5.6 מליון

Figure 25

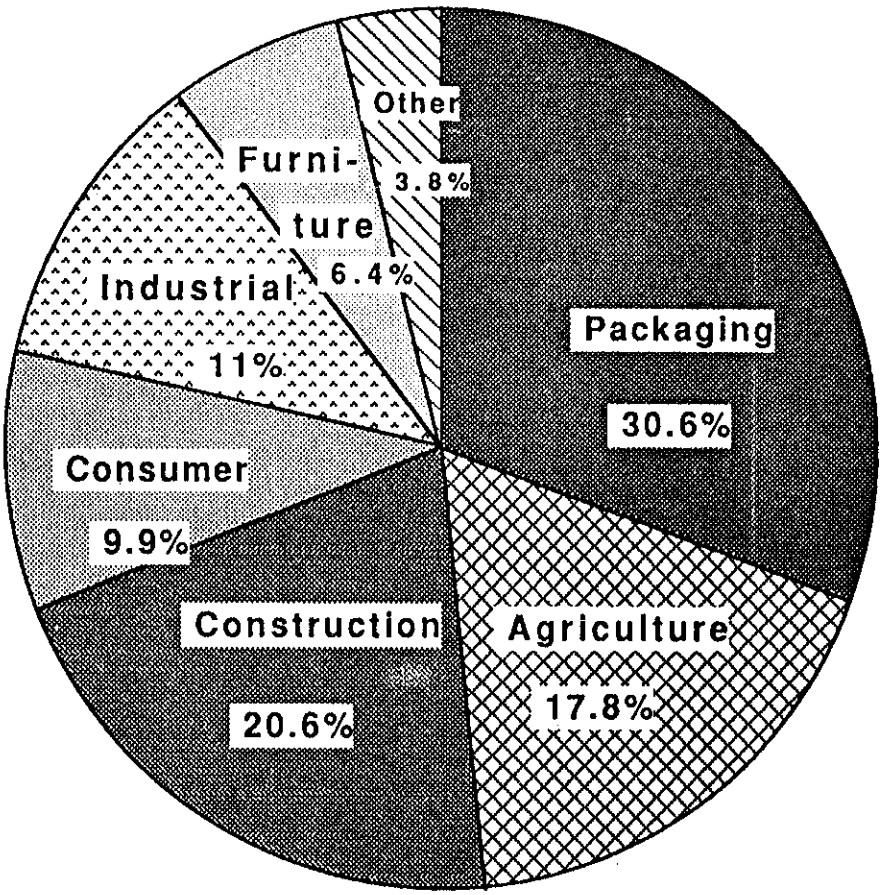
THE PLASTICS INDUSTRY IN ISRAEL

1995 Consumption - 415,000 tons

1% plastics growth above GNP

100,000 immigrants/year to 1995

population 5.6 million



ציור 26

תעשית הפלסטיקה בישראל
צריכה 2000 - 505 מליון טון
קצב גידול 1% מעל תל"ג
100 אלף עולים לשנה עד 1995
אוכלוסיה 6.1 מליון

Figure 26

THE PLASTICS INDUSTRY IN ISRAEL

2000 Consumption - 505,000 tons

1% plastics growth above GNP

100,000 immigrants/year to 1995

population 6.1 million