APPENDICES TO
THE STUDY ON A DEVELOPMENT PLAN
FOR
PETROCHEMICAL DOWN-STREAM INDUSTRIES
IN
THE EMPIRE OF IRAN

SEPTEMBER, 1978

JAPAN INTERANTIONAL COOPERATION AGENCY

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ABBREVIATIONS

General

C&F	Cost & Freight
FOB	Free on Board
GDP	Gross Domestic Products
GNP	Gross National Products
ROE	Return on Equity
ROI	Return on Investment
NA	Not available

Company & Organization

APC	Abadan Petrochemical Co.
ICDC	Iran Chemical Development Co.
IJPC	Iran Japan Petrochemical Co.
IRNIP	Iran Nippon Petrochemical Company
JETRO	Japan External Trade Organization
MITI	Ministry of International Trade & Industry, Japan
NIOC	National Iranian Oil Co.
NPC	National Petrochemical Co.
OPEC	Organization of Petroleum Exporting Countries

Units

ton	metric ton
lb	libra (pound)
bbl	barrel
MMBTU	million British Thermal Unit
KW	kilowatt
KWH	kilowatt hour

Platics

ABS	Acrylonitrile-butadiene-styrene Copolymer
AS	Acrylonitrile-styrene Copolymer
DOP	Dioctyl Phthalate
EDC	Ethylene Dichloride
EVA	Ethylene-vinyl-acetate Copolymer
PE	Polyethylene
HDPE	High Density Polyehtylene
LDPE	Low Density Polyethylene
PP	Polypropylene
OPP Film	Oriented PP Film
CPP Film	Cast PP Film
PS	Polystyrene
HI, HIPS	High Impact Polystyrene
GP, GPPS	General Purpose Polystyrene
FS	Foamed Polystyrene, Expandable Polystyrene
PU	Polyurethane
PVC	Polyvinyl Chloride
uPVC	Unplasticized PVC
SF	Structural Foam
VCM	Vinyl Chloride Monomer

Synthetic Rubber

BR	Butadiene Rubber
IIR	Isobutylene-isoprene Rubber
NR	Natural Rubber
SBR	Styrene Butadiene Rubber
H-SBR	High Styrene SBR
SBR-MB	SBR Master Batch
SR	Synthetic Rubber

Synthetic Fiber Raw Material

AH Salt	Nylon 66 Salt
AN	Acrylonitrile
DMT	Dimethyl Terephthalate
FY	Filament Yarn
o-Xylene	Ortho-xylene
p-Xylene	Para-xylene
SF	Staple Fiber
TPA	Terephthalic Acid
p-TPA	Pure Terephthalic Acid

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1. Macroscopic Methods for Plastics Materials

1-1 Demand forecast methods

The currently used demand forecast methods may be categorized as follows:

(1) Application of individual theories

Analysis by Time Series Method: Deduction on the future trend by applying the theory of chronological trends

Analysis by econometric models (correlation analysis): Deduction on the basis of the theory concerning the past cause-effect relationship and the quantitative relationships

(2) Analogy: Deduction on the basis of similar phenomena

(3) Direct survey of intension to purchase: Direct interviewing of consumers concerning their intension to purchase certain goods in the future

(4) Logical deduction: Estimation of future extent of demand on the basis of new cause-effect relationship to take place in the future in the case that products are newly introduced to the market and actual figures of the past cannot be obtained

This category encompasses the following methods:

(a) Basic consumption unit method

(b) Deduction on the basis of complimentary relationship between and among various materials

(c) Deduction on the basis of substituion relationship between and among various products/materials

(d) Calculation of maximum utilization extent deemed to be possible in both economical and technological viewpoints

(e) Element enumeration method

(f) Symptom method

The causes which generate demand may be classified into two categories, i.e., the distant causes and the immediate causes. For instance, a forecast on the immediate causes may be formulated as a result of calculations as follows:
Caustic soda is used in the following fields:

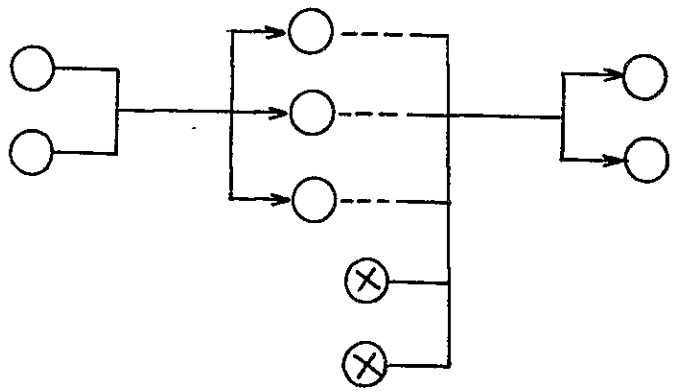
Sheet glass products, glass products, pulp/paper products,

chemical industrial products, iron/steel products, etc.

The calculations on the basis of the immediate causes to obtain a forecast are conducted by first obtaining a forecast on the future glass production, and then by computing the caustic soda demand on the basis of the caustic soda consumption basic unit for glass production.

On the other hand, a forecast on the basis of the distant causes is based on calculations of caustic soda demand on the basis of national economic indexes on an assumption that the consumption of the products turned out in such various fields as mentioned above eventually depends on the trend of the consumption expenses by individual consumers, the mining/manufacturing indexes, the progress of time, etc. Therefore, this method of forecast formulation on the distant causes may be called a forecast method by means of the macroscopic model.

The difference between these two sets of forecasting methods may be illustrated as follows:



(Ultimate cause) (Primary results) (Secondary results)
(Direct cause) (Demand)

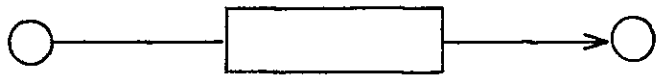
(X) : Newly added causes

Several results will be produced by the ultimate causes. Other causes will be newly added to these results, thereby forming the direct causes for generating the demand. These direct causes will in turn determine the demand which is the secondary result. If the newly added causes as marked by (X) are negligibly small, it would be possible to explain the demand as the results of the ultimate causes are significant in their effects, it would be necessary to formulate the model in such a manner that a maximum extent of explana-

tion as to the demand can be made in terms of the direct causes.

This correlation can be explained by introducing a notion called the Black Box.

The Black Box stands for a notion within which the existing quantitative relationships among the elements is empirically known, although no confirmation has been made as to the cause-effect relationship among the elements. An illustration may be made as follows in this respect.



(Ultimate cause) (Black box) (Demand)

In this set-up, an empirical measurement is made as to the extent of the output (demand) on the basis of the input (ultimate causes), without involving the cause-effect relationship within the Black Box. If the behaviour of the elements inside the Black Box is constant, this empirical theory can be applied to the future circumstances.

The method of forecasting on the basis of the ultimate causes is called the macroscopic forecasting method, while that on the basis of the direct causes is called the cumulative forecasting method.

Theoretically, the forecasting method based on the direct causes should be more accurate than the macroscopic method. However, when there are a number of direct causes to be analyzed, a considerable difficulty will be present in forecasting the future status of these causes. If the forecasting of these causes are conducted macroscopically, the consequentially formulated forecast becomes highly similar to the forecast originally conducted macroscopically. In some cases, mutually dependent relationships exist among the causes. For instance, steel products are used extensively in the automobile manufacturing industry. Therefore, if the basic unit of steel consumption in the automobile industry and the future production amount of the automobiles are clarified, it will be possible to forecast the demand for steel products in the automobile industry. However, automobiles are extensively used by the steel industry. Therefore, it becomes necessary to have the data on the steel production amount in order to forecast the production of automobiles. If such mutually dependent relationships are to be taken into consideration, it becomes absolutely necessary to utilize a number of equations such as stipulated in the input-output analysis. It is admitted that analyses on the basis of distant causes such as GDP, etc. have already taken these mutually dependent relatinships into consideration. In this case, however, it is necessary to pay attention to the fact that such analyses are based on

an assumption that the mode of change in the consumption structure is regular and consistent.

In this Study, both the macroscopic and cumulative methods of forecasting have been employed for the purpose of formulating a forecast on the demand for plastics materials. For the macroscopic forecasting method, (1) the application of individual theories and (2) the method by analogy, while the cumulative forecasting method employed the (3) direct survey of intension to purchase and (4) the logical deduction. However, while carrying out the cumulative forecast, the analysis of econometric models was also employed simultaneously when estimating the production of products in which plastics materials are used, e.g., household electric appliances, automobiles, etc. (Chapter 2)

1-2 Macroscopic forecasting methods

The major methods of macroscopic forecasting are as follows:

(1) Time series analysis

(2) Econometric model analysis

(3) International cross-section analysis

Time series analysis (extension of chronological trends):

When it is difficult to clearly confirm the cause-effect relationship involved, it becomes imperative to substitute the cause-effect relationship with the chronological trends. Various causes will produce various results. If there is some chronological regularity in the changes of the causes, it is deemed by deduction that the results therefrom will also involve a chronological regularity. When this assumption is deemed valid, an extension method is employed in which the past trends are extended towards the future. This method falls under a category of theory application in which the theory is the chronological regularity existed in the past.

Prior to the Oil Crisis, the prices of plastics materials displayed an annual fall because of the increase in the size of the manufacturing facilities, technical innovations, both of which resulted in the lowering of the production cost, and also because of keen price competition among the manufacturers. Along with the growth of demand due to the expansion of the scale of economy, plastics materials replaced a number of conventional materials such as metals, wood, pulp/paper, etc. Because of these conditions, the production of the plastics materials registered an extremely rapid growth. However, since the Oil Crisis, the plastics material prices have been acutely increasing, while the world economy has been suffering from overall slump. Thus, a number of impeding elements upon the growth of plastics materials became apparent. This being the circumstance,

it is now extremely difficult to directly apply the chronological regularity existing prior to the Oil Crisis to the period after the Oil Crisis. Therefore, this method was not employed in forecasting the demand for plastics materials.

Economic model analysis (correlation analyses):

One of the major ultimate causes determining the demand for plastics materials is GDP, while another important cause is the price. The price in this case does not necessarily signify the prices of plastics materials, but also includes the prices of other materials which are in competition with the plastics. However, the number of the materials competing with the plastics materials and with the products made from plastics materials is extremely high, thereby making it impossible to formulate individual forecasting models on the basis of the price and demand factors of each of these materials. Therefore, a concession was made here that, instead of focusing upon the prices of the plastics materials alone, the plastics material prices were divided by the overall price index in order to arrive at the real prices of the plastics materials. In other words, even if the plastics material prices grew by 1.5 times the original level, the price increase multiple here is deemed to be 1.2 instead of 1.5 if the overall price index grew in the meantime by a multiple 1.25. This signifies that the increase in the plastics material prices in this case is actually equivalent to 20% over the original level because of the fact that the prices of the competing materials will also increase along with the increase of the plastics material prices. The GDP deflator has been used as the overall price index.

International cross-section analysis (analogy):

Analogy on the basis of similar phenomena is a method which is commonly employed when no clear grasping is possible as to the cause-effect relationships or quantitative relationships in the subject. For instance, the deduction method is employed in estimating the future demand extent of plastics materials on the basis of the rate of popularization of the same materials in foreign countries. The international cross-section method is one of the methods in this category. In this international cross-section method, an assumption is basically made that the per capita plastics consumption should be the same in all the countries showing the same per capita GDP level. On this assumption, the future extent of the demand is forecast by formulating a regression formula.

1-2-1 Demand forecast by the analysis of econometric model

(1) Demand analysis on the basis of econometric model

(a) Elasticity analysis

If the demand for a certain commodity is expressed as Q, and price as p, the total sales amount S may be expressed as follows:

$$S = p \cdot Q$$

However, the extent of the demand for this commodity is assumed to be expressed as a function of the price as follows:

$$Q = f(p)$$

Further, it is assumed that when the price p is changed, the demand Q will change accordingly.

A case is assumed here in which the demand is increased by lowering the price, thereby the total sales is intended to be increased. If the demand generated by lowering the price p by an extent of Δp is equivalent to $Q+\Delta Q$, and the total sales then available is equivalent to $S+\Delta S$, the following equation will ensue:

$$\frac{\Delta S}{S} = \frac{\Delta Q}{Q} = -\frac{\Delta p}{p}$$

It is therefore possible to judge as to whether the total sales will decrease, remain unchanged, or increase due to the lowering of the price p in accordance with the status of $\Delta S/S$ as follows:

When $\frac{\Delta Q}{Q}/\frac{\Delta p}{p} > 1$, $\Delta S/S > 0$, therefore the total sales will increase along with the growth in the demand.

When $\frac{\Delta Q}{Q}/\frac{\Delta p}{p} = 1$, $\Delta S/S = 0$, therefore the total sales will remain unchanged.

When $\frac{\Delta Q}{Q}/\frac{\Delta p}{p} < 1$, $\Delta S/S < 0$, therefore the total sales will drop along with the growth in demand.

From the above-mentioned, the following equation will ensue:

$$e_p = \frac{\Delta Q}{Q}/\frac{\Delta p}{p} = \frac{\text{Rate of change in demand (\%)}}{\text{Rate of change in price (\%)}}$$

In the above equation, "e_p" is called the elasticity of demand Q as against the price p, or simply the price elasticity of demand.

The notion of elasticity of demand may be classified into three broad categories, i.e., the price elasticity, the income elasticity, and intersecting elasticity. Of these, the price elasticity and income elasticity are frequently employed in studying the future demand trend.

An assumption is made here that the change in the demand Q of a certain commodity can be explained by the following

formula in which $\ominus$ stands for income, and p representing the price of the commodity:

$$Q = A \ominus^{e_\theta - e_p} \cdot p \cdot v$$

In the above, v represents the probability error, and both e_θ and e_p are larger than 0.

This formula signifies that the demand for this commodity changes in proportion to the variation in the income and the price, so that e_θ and e_p represent the elasticity of income $\ominus$ and price p respectively.

If GDP and price are taken as the ultimate causes determining the extent of demand for plastics materials, it is possible to use the above formula directly as a demand model. In this case, Q stands for the extent of demand for plastics materials, $\ominus$ representing the real GDP, and p representing the real price. Therefore, the GDP elasticity is represented by e_θ while the price elasticity by e_p. The above formula can be re-expressed as follows:

$$\log Q = \beta + e_\theta \log \ominus - e_p \log p + u$$

Where;

$\beta = \log A$ and $u = \log v$ representing a constant and error respectively.

(b) Demand and prices

Table AI-1-1 shows the extent of demand and the level of prices in Iran concerning four types of plastics materials, i.e., PE, PP, PS, and PVC over a eight-year period from 1969 to 1976.

1) Demand

The amounts of demand shown in Table AI-1-1 represent the total amount of the Iran-destined exportation made by the major countries. The shipments to Iran from countries other than those named here (e.g., from East European countries) have also been made, so that the figure given in this table corresponds to about 80% of the total importation into Iran. Since PVC is domestically produced in Iran, the indigenous PVC production amount has been added to the imported PVC amount. Regarding the importation of PVC compound, an assumption has been made that the PVC resin content rate is 60% for converting the PVC compound amount into resin amount.

2) Prices

The price figure shown in Table AI-1-1 is an average figure of FOB prices quoted by the above-mentioned major exporting countries. The domestic Iranian price

Table AI-1-1 Importation Trend of Plastics Materials in Iran from Major Countries

(1) PE

	JAPAN	U.S.A	GERMANY, FR	FRANCE	ITALY	U.K.	NETHERLANDS	HONG KONG	SINGAPARE	(TOTAL)
1969										
QUANTITY (T)	1,728.2	1,270.1	6,614.2	200.0	125.0					9,937.4
RATIO (%)	17.4	12.8	66.6	2.0	1.3					100.0
VALUE(1000D)	352.7	321.5	2,072.6	42.8	76.8					2,816.5
RATIO (%)	12.5	11.4	73.6	1.5	1.0					100.0
U.PRICE(D/T)	204,066	253,163	313,360	214,105	214,472					283,418
1970										
QUANTITY (T)	4,037.4	1,455.1	5,404.9	362.0	320.8	201.4	1,280.0			13,061.6
RATIO (%)	30.9	11.1	41.4	2.8	2.5	1.5	9.8			100.0
VALUE(1000D)	904.6	408.5	1,667.5	100.4	88.0	52.2	319.4			3,540.6
RATIO (%)	25.6	11.5	47.1	2.8	2.5	1.5	9.0			100.0
U.PRICE(D/T)	224,065	280,755	308,514	277,243	274,220	259,048	249,557			271,069
1971										
QUANTITY (T)	8,656.2	553.8	3,537.0	590.0	116.5					13,453.5
RATIO (%)	64.3	4.1	26.3	4.4	0.9					100.0
VALUE(1000D)	1,624.9	116.3	1,169.9	210.2	34.4					3,155.6
RATIO (%)	51.5	3.7	37.1	6.7	1.1					100.0
U.PRICE(D/T)	187,714	209,942	330,747	356,244	295,270					234,556
1972										
QUANTITY (T)	15,077.6	420.5	4,305.5	440.0	72.5	2,075.0				22,471.0
RATIO (%)	67.1	1.9	19.5	2.0	0.3	9.2				100.0
VALUE(1000D)	2,697.2	95.1	1,254.5	102.0	17.1	406.9				4,572.8
RATIO (%)	59.0	2.1	27.4	2.2	0.4	8.9				100.0
U.PRICE(D/T)	178,885	226,093	286,062	231,929	235,448	196,097				203,496
1973										
QUANTITY (T)	10,540.6	5,150.1	8,338.2	6,771.0		258.0	487.0	4.1		31,548.9
RATIO (%)	33.4	16.3	26.4	21.5		0.8	1.5			100.0
VALUE(1000D)	3,403.8	2,488.5	3,279.3	2,177.8		112.5	241.5	1.7		11,705.0
RATIO (%)	29.1	21.3	28.0	18.6		1.0	2.1			100.0
U.PRICE(D/T)	322,919	483,193	393,288	321,633		435,868	495,895	413,767		371,010
1974										
QUANTITY (T)	10,126.7	1,491.9	5,355.3	828.0		85.9	469.0		967.0	19,323.8
RATIO (%)	52.4	7.7	27.7	4.3		0.4	2.4		5.0	100.0
VALUE(1000D)	7,300.5	1,454.0	5,788.4	474.0		42.4	411.5		937.4	16,608.1
RATIO (%)	45.2	8.8	34.9	2.9		0.3	2.5		5.6	100.0
U.PRICE(D/T)	740,660	974,600	1080,869	572,483		493,671	877,477		969,358	859,467
1975										
QUANTITY (T)	32,213.9	308.4	7,938.8	3,164.0		26.6	199.0			43,850.6
RATIO (%)	73.5	0.7	18.1	7.2		0.1	0.5			100.0
VALUE(1000D)	14,041.6	227.5	4,659.4	1,336.8		33.5	93.8			20,392.6
RATIO (%)	68.9	1.1	22.8	6.6		0.2	0.5			100.0
U.PRICE(D/T)	435,886	737,837	586,917	422,511		1257,572	471,105			465,045
1976										
QUANTITY (T)	27,935.8	2,342.4	14,606.7	2,554.0		323.2	2,744.0			50,506.1
RATIO (%)	55.3	4.6	28.9	5.1		0.6	5.4			100.0
VALUE(1000D)	16,570.3	1,370.8	10,734.5	1,431.2		202.1	1,879.1			32,188.0
RATIO (%)	51.5	4.3	33.3	4.4		0.6	5.8			100.0
U.PRICE(D/T)	593,156	585,217	734,905	560,371		625,265	684,810			637,310

(2) PP

	JAPAN	U.S.A	GERMANY, FR	FRANCE	ITALY	U.K.	NETHERLANDS	HONG KONG	SINGAPARE	(TOTAL)
1969										
QUANTITY (T)	80,0	38,6			5,0					123,6
RATIO (%)	64,7	31,2			4,0					100,0
VALUE(1000D)	27,4	18,6			2,4					48,4
RATIO (%)	56,7	38,4			4,9					100,0
U.PRICE(D/T)	342,687	482,323			474,600					391,398
1970										
QUANTITY (T)	408,6	158,8	151,0		58,4	220,3				997,0
RATIO (%)	41,0	15,9	15,1		5,9	22,1				100,0
VALUE(1000D)	107,4	85,0	59,2		24,0	74,0				349,6
RATIO (%)	30,7	24,3	16,9		6,9	21,2				100,0
U.PRICE(D/T)	262,893	535,198	392,125		411,198	335,766				350,615
1971										
QUANTITY (T)	582,0	300,3	237,0		505,2	49,9				1,674,4
RATIO (%)	34,8	17,9	14,2		30,2	3,0				100,0
VALUE(1000D)	153,7	146,1	74,8		155,6	14,0				544,3
RATIO (%)	28,2	26,8	13,7		28,6	2,6				100,0
U.PRICE(D/T)	264,156	486,427	315,687		308,042	281,119				325,058
1972										
QUANTITY (T)	822,0	176,0	159,9		230,2	332,0				1,720,1
RATIO (%)	47,8	10,2	9,3		13,4	19,3				100,0
VALUE(1000D)	195,2	74,3	61,5		64,8	108,5				504,2
RATIO (%)	38,7	14,7	12,2		12,8	21,5				100,0
U.PRICE(D/T)	237,468	422,128	384,765		281,307	326,734				293,151
1973										
QUANTITY (T)	1,651,7	1,958,6	45,0			5,0	23,0	49,4		3,732,8
RATIO (%)	44,2	52,5	1,2			0,1	0,6	1,3		100,0
VALUE(1000D)	867,0	1,026,3	17,8			1,4	15,9	43,5		1,971,9
RATIO (%)	44,0	52,0	0,9			0,1	0,8	2,2		100,0
U.PRICE(D/T)	524,890	524,002	394,622			278,800	692,826	880,081		528,263
1974										
QUANTITY (T)	2,612,0	428,6				2,9				3,043,5
RATIO (%)	85,8	14,1				0,1				100,0
VALUE(1000D)	2,531,5	306,2				0,3				2,837,9
RATIO (%)	89,2	10,8								100,0
U.PRICE(D/T)	969,160	714,344				98,739				932,455
1975										
QUANTITY (T)	5,771,8		1,813,4			61,7				7,646,9
RATIO (%)	75,5		23,7			0,8				100,0
VALUE(1000D)	2,549,8		917,2			42,3				3,509,3
RATIO (%)	72,7		26,1			1,2				100,0
U.PRICE(D/T)	441,769		505,811			685,332				458,921
1976										
QUANTITY (T)	5,388,0	467,3	2,087,7	234,0		119,3				8,296,3
RATIO (%)	64,9	5,6	25,2	2,8		1,4				100,0
VALUE(1000D)	3,402,1	357,0	1,614,7	118,3		54,6				5,546,7
RATIO (%)	61,3	6,4	29,1	2,1		1,0				100,0
U.PRICE(D/T)	631,419	763,904	773,450	505,598		457,557				668,574

(3) PS (Including AS and ABS resins)

	JAPAN	U.S.A	GERMANY, FR	FRANCE	ITALY	U.K.	NETHERLANDS	HONG KONG	SINGAPARE	(TOTAL)
1969										
QUANTITY (T)	2.5	846.0	2,773.9	369.0	103.1					4,094.4
RATIO (%)	0.1	20.7	67.7	9.0	2.5					100.0
VALUE(1000D)	0.9	206.9	1,101.9	133.3	43.9					1,487.0
RATIO (%)	0.1	13.9	74.1	9.0	3.0					100.0
U.PRICE(D/T)	374.400	244.620	397.237	361.303	426.104					363.179
1970										
QUANTITY (T)	262.1	517.1	4,097.8	529.0	312.1	127.6	2,193.0			8,038.7
RATIO (%)	3.3	6.4	51.0	6.6	3.9	1.6	27.3			100.0
VALUE(1000D)	74.8	182.8	1,535.6	251.8	93.9	70.1	655.8			2,865.0
RATIO (%)	2.6	6.4	53.6	8.8	3.3	2.4	22.9			100.0
U.PRICE(D/T)	285.506	353.588	374.746	476.013	300.822	549.776	299.053			356.397
1971										
QUANTITY (T)	297.0	418.2	1,745.3	186.0	238.0	116.5	2,198.0			5,199.0
RATIO (%)	5.7	8.0	33.6	3.6	4.6	2.2	42.3			100.0
VALUE(1000D)	85.8	165.6	761.6	94.0	65.1	44.6	603.3			1,820.0
RATIO (%)	4.7	9.1	41.8	5.2	3.6	2.5	33.1			100.0
U.PRICE(D/T)	288.838	396.032	436.395	505.317	273.380	382.959	274.457			350.061
1972										
QUANTITY (T)	1,431.0	301.0	2,389.2		67.4	367.0	2,778.0			7,333.6
RATIO (%)	19.5	4.1	32.6		0.9	5.0	37.9			100.0
VALUE(1000D)	318.1	120.4	894.8		19.9	121.9	767.2			2,242.2
RATIO (%)	14.2	5.4	39.9		0.9	5.4	34.2			100.0
U.PRICE(D/T)	222.287	399.654	374.498		294.785	332.136	276.171			305.739
1973										
QUANTITY (T)	322.6	1,233.4	3,820.5	553.0		67.0	4,195.0			10,191.5
RATIO (%)	3.2	12.1	37.5	5.4		0.7	41.2			100.0
VALUE(1000D)	171.2	896.6	2,226.4	181.2		35.3	1,865.8			5,376.5
RATIO (%)	3.2	16.7	41.4	3.4		0.7	34.7			100.0
U.PRICE(D/T)	530.771	726.932	582.754	327.632		526.686	444.765			527.547
1974										
QUANTITY (T)	840.2	1,406.1	3,024.8			305.6	2,629.0	104.8	75.0	8,385.5
RATIO (%)	10.0	16.8	36.1			3.6	31.4	1.2	0.9	100.0
VALUE(1000D)	926.8	1,737.3	4,163.9			319.2	2,798.9	76.7	81.0	10,105.7
RATIO (%)	9.2	17.2	41.2			3.2	27.7	0.8	0.8	100.0
U.PRICE(D/T)	1103.099	1236.904	1376.587			1044.351	1064.642	732.019	1079.706	1205.144
1975										
QUANTITY (T)	2,832.5		4,510.1	1,263.0		318.0	3,731.0		348.0	13,002.6
RATIO (%)	21.8		34.7	9.7		2.4	28.7		2.7	100.0
VALUE(1000D)	1,636.0		3,701.0	798.7		280.8	2,270.8		242.8	8,930.2
RATIO (%)	18.3		41.4	8.9		3.1	25.4		2.7	100.0
U.PRICE(D/T)	577.603		820.600	632.388		883.010	608.639		697.801	686.803
1976										
QUANTITY (T)	3,111.3	2,022.1	3,870.1	1,820.0		966.8	4,439.0			16,229.3
RATIO (%)	19.2	12.5	23.8	11.2		6.0	27.4			100.0
VALUE(1000D)	2,216.3	992.9	4,100.3	1,208.5		802.8	3,493.7			12,814.5
RATIO (%)	17.3	7.7	32.0	9.4		6.3	27.3			100.0
U.PRICE(D/T)	712.332	491.024	1059.491	663.384		830.351	787.048			789.598

(4) PVC resin (Not including compounds)

	JAPAN	U.S.A	GERMANY, FR	FRANCE	ITALY	U.K.	NETHERLANDS	HONG KONG	SINGAPARE	(TOTAL)
1969										
QUANTITY (T)	10,4	2,423,1	2,104,5		1,048,3					5,586,3
RATIO (%)	0,2	43,4	37,7		18,8					100,0
VALUE(1000D)	3,4	762,6	665,9		350,1					1,781,9
RATIO (%)	0,2	42,8	37,4		19,6					100,0
U.PRICE(D/T)	323,455	314,711	316,395		334,012					318,983
1970										
QUANTITY (T)	460,0	147,0	1,349,7		565,4					2,522,1
RATIO (%)	18,2	5,8	53,5		22,4					100,0
VALUE(1000D)	106,6	45,0	529,3		191,1					872,0
RATIO (%)	12,2	5,2	60,7		21,9					100,0
U.PRICE(D/T)	231,739	306,088	392,184		338,015					345,760
1971										
QUANTITY (T)	2,339,0	31,8	2,978,4		1,546,0	1,214,3				8,109,5
RATIO (%)	28,8	0,4	36,7		19,1	15,0				100,0
VALUE(1000D)	508,2	30,2	1,042,4		491,3	230,0				2,302,1
RATIO (%)	22,1	1,3	45,3		21,3	10,0				100,0
U.PRICE(D/T)	217,277	952,443	350,000		317,780	189,376				283,883
1972										
QUANTITY (T)	902,0		3,424,7		1,933,0	219,0				6,478,7
RATIO (%)	13,9		52,9		29,8	3,4				100,0
VALUE(1000D)	217,9		1,114,9		606,0	52,1				1,991,0
RATIO (%)	10,9		56,0		30,4	2,6				100,0
U.PRICE(D/T)	241,607		325,554		313,504	238,013				307,312
1973										
QUANTITY (T)	597,2	392,4	6,023,8			2,568,0			250,0	9,831,4
RATIO (%)	6,1	4,0	61,3			26,1			2,5	100,0
VALUE(1000D)	225,2	300,5	2,580,1			539,5			230,9	3,876,1
RATIO (%)	5,8	7,8	66,6			13,9			6,0	100,0
U.PRICE(D/T)	377,027	765,792	428,317			210,084			923,696	394,263
1974										
QUANTITY (T)		96,4	2,996,3			136,4			210,0	3,439,1
RATIO (%)		2,8	87,1			4,0			6,1	100,0
VALUE(1000D)		103,0	2,838,2			98,0			243,5	3,282,6
RATIO (%)		3,1	86,5			3,0			7,4	100,0
U.PRICE(D/T)		1067,648	947,226			718,674			1159,447	954,498
1975										
QUANTITY (T)	12,983,7		4,119,5			304,0			200,0	17,607,2
RATIO (%)	73,7		23,4			1,7			1,1	100,0
VALUE(1000D)	6,021,8		3,820,7			180,2			95,3	10,118,1
RATIO (%)	59,5		37,8			1,8			0,9	100,0
U.PRICE(D/T)	463,798		927,478			592,880			476,430	574,656
1976										
QUANTITY (T)	11,700,0		3,795,4	1,517,0		39,2			100,0	17,151,6
RATIO (%)	68,2		22,1	8,8		0,2			0,6	100,0
VALUE(1000D)	5,729,8		2,887,8	671,8		31,6			64,5	9,385,5
RATIO (%)	61,0		30,8	7,2		0,3			0,7	100,0
U.PRICE(D/T)	489,723		760,810	442,868		805,876			645,330	547,209

(5) PVC compound

	JAPAN	U.S.A	GERMANY, FR	FRANCE	ITALY	U.K.	NETHERLANDS	HONG KONG	SINGAPARE	(TOTAL)
1969										
QUANTITY (T)	161,0	285,3	456,6	42,0	387,1					1,332,0
RATIO (%)	12,1	21,4	34,3	3,2	29,1					100,0
VALUE(1000D)	52,9	132,3	192,7	21,1	110,1					509,0
RATIO (%)	10,4	26,0	37,9	4,1	21,6					100,0
U.PRICE(D/T)	328,298	463,604	421,995	501,214	284,440					382,105
1970										
QUANTITY (T)	31,0	319,8	1,303,9		175,0	33,5	29,0			1,888,2
RATIO (%)	1,6	16,9	69,1		9,3	1,8	1,3			100,0
VALUE(1000D)	8,5	168,7	602,5		63,5	18,9	15,0			877,0
RATIO (%)	1,0	19,2	68,7		7,2	2,2	1,7			100,0
U.PRICE(D/T)	272,612	527,392	462,092		362,714	563,976	600,520			464,471
1971										
QUANTITY (T)	522,0	284,4			276,9	20,9				1,104,2
RATIO (%)	47,3	25,8			25,1	1,9				100,0
VALUE(1000D)	197,4	149,8			100,4	13,0				460,6
RATIO (%)	42,9	32,5			21,8	2,8				100,0
U.PRICE(D/T)	378,243	526,573			362,535	621,930				417,126
1972										
QUANTITY (T)	386,8	326,1	221,3		609,1	26,0				1,569,3
RATIO (%)	24,6	20,8	14,1		38,8	1,7				100,0
VALUE(1000D)	179,0	227,4	107,1		171,5	14,6				699,6
RATIO (%)	25,6	32,5	15,3		24,5	2,1				100,0
U.PRICE(D/T)	462,771	697,111	484,048		281,628	559,884				445,774
1973										
QUANTITY (T)	324,4	154,2	575,5	2,401,0		44,0	14,0			3,513,1
RATIO (%)	9,2	4,4	16,4	68,3		1,3	0,4			100,0
VALUE(1000D)	231,4	88,1	349,6	629,4		22,8	17,7			1,338,9
RATIO (%)	17,3	6,6	26,1	47,0		1,7	1,3			100,0
U.PRICE(D/T)	713,190	571,299	607,492	262,121		517,500	1264,642			381,114
1974										
QUANTITY (T)	915,0	173,3	338,9			100,9	20,0			1,548,1
RATIO (%)	59,1	11,2	21,9			6,5	1,3			100,0
VALUE(1000D)	1,161,6	161,4	338,2			126,3	24,9			1,812,3
RATIO (%)	64,1	8,9	18,7			7,0	1,4			100,0
U.PRICE(D/T)	1269,484	931,241	997,857			1251,985	1246,550			1170,723
1975										
QUANTITY (T)	1,402,0		97,2			155,2	12,0			1,666,4
RATIO (%)	84,1		5,8			9,3	0,7			100,0
VALUE(1000D)	958,2		107,2			161,9	13,0			1,240,3
RATIO (%)	77,3		8,6			13,1	1,0			100,0
U.PRICE(D/T)	683,460		1102,572			1043,257	1085,083			744,310
1976										
QUANTITY (T)	2,520,0	5,919,6	426,5	712,0		55,9	22,0			9,655,9
RATIO (%)	26,1	61,3	4,4	7,4		0,6	0,2			100,0
VALUE(1000D)	1,983,0	4,563,7	372,6	420,3		44,5	22,4			7,406,4
RATIO (%)	26,8	61,6	5,0	5,7		0,6	0,3			100,0
U.PRICE(D/T)	786,886	770,950	873,540	590,339		796,390	1017,500			767,032

must be computed by incorporating the ocean freight cost and marine insurance premium into this FOB price in order to obtain the CIF price with further addition of unloading and other miscellaneous importation charges. Although it is highly difficult to accurately estimate these additional charges, it has been assumed that the corresponding Iranian domestic price of the commodity is about 125% of the average FOB price.

(c) GDP and GDP deflator

Table AI-1-2 shows the Iranian GDP and GDP deflator.

(d) Results of analysis of GDP elasticity and price elasticity

Here, the values shown in Table AI-1-1 have been taken as the demand amount, and the values obtained by dividing these figures by the GDP deflator were taken as the real GDP. By using the values shown in Table AI-1-2 together with a demand model as shown below, the GDP elasticity coefficient e_θ and the price elasticity coefficient e_p were calculated.

$$\log Q = \beta + e_\theta \log \ominus - e_p \log p$$

Where;

Q: Demand (ton/year)

$\ominus$: Real GDP (billion US$)

p: Real price (US$/ton)

Table AI-1-2 GDP and GDP Deflator in Iran

	Real GDP (billion 1970US$)	GDP Deflator
1969	10.4	0.971
1970	11.6	1.000
1971	13.0	1.0846
1972	13.7	1.2044
1973	17.2	1.5988
1974	23.3	1.9700
1975	27.9	1.8889
1976	29.3[1)]	2.0748[1)]

Source: UN Statistical Yearbook

Note: 1) Estimate

β: Constant

e_θ: GDP elasticity coefficient

e_p: Price elasticity coefficient

The obtained results are shown in Table AI-1-3.

Fig. AI-1-1 illustrates a comparison of the actually accomplished values and the calculated values concerning each of the plastics materials.

(2) Demand forecast by using an econometric model

A logarithmic equation employing the above-mentioned elasticity coefficients has been used here as an econometric model by means of which a forecast on the future extent of the demand was formulated. The prerequisite condition and at the same time the limitation of this method is an assumption that the mode of change in the demand structure will be constant and consistent.

(a) Forecast on the future trend of the elasticity coefficients

Even when no change takes place in the mode of change in the demand structure, the elasticity coefficients will vary in accordance with the scale of the GDP and the prices.

Table AI-1-3 Elasticities of GDP and Price of Major Plastics Materials

		Elasticity	Standard Error	F-value		Multiple Correlation (Adjusted)
				Parameter	Model	
PE	GDP	0.999	0.199	25.110**	31.076**	0.946
	Price	1.053	0.327	10.390*		
PP	GDP	2.318	0.925	6.286*	8.929*	0.833
	Price	1.164	1.286	0.818		
PS[1]	GDP	0.899	0.163	30.377**	15.548*	0.928
	Price	0.635	0.315	4.059[2]		
PVC	GDP	0.403	0.266	2.299	32.538**	0.949
	Price	2.906	0.774	14.081*		

Notes: * Significant at the 5% level of risk

** Significant at the 1% level of risk

1) $\log Q = \beta - e_p \log p + e_\theta \log\theta + \alpha D$

$D = 1$ for 1970 and -1 for 1971

2) The parameter is significant at the 10% level of risk

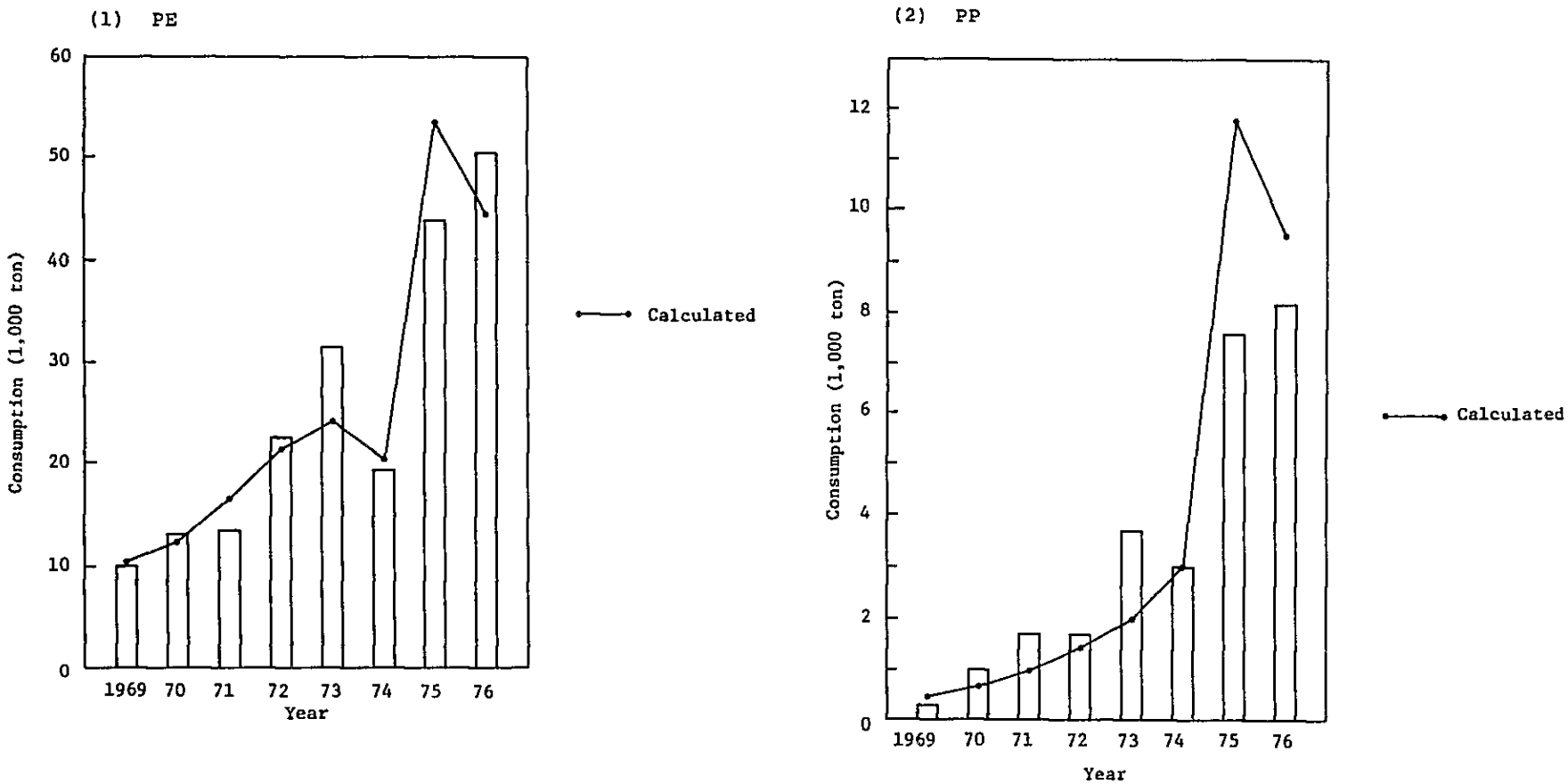
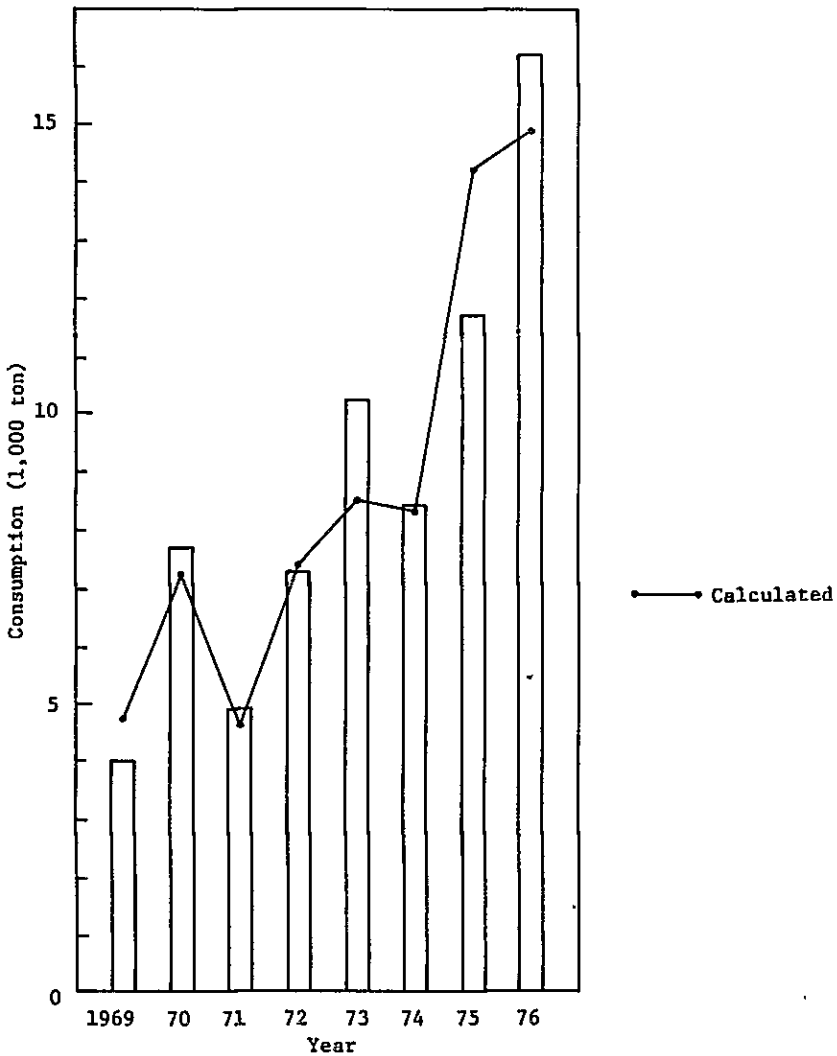
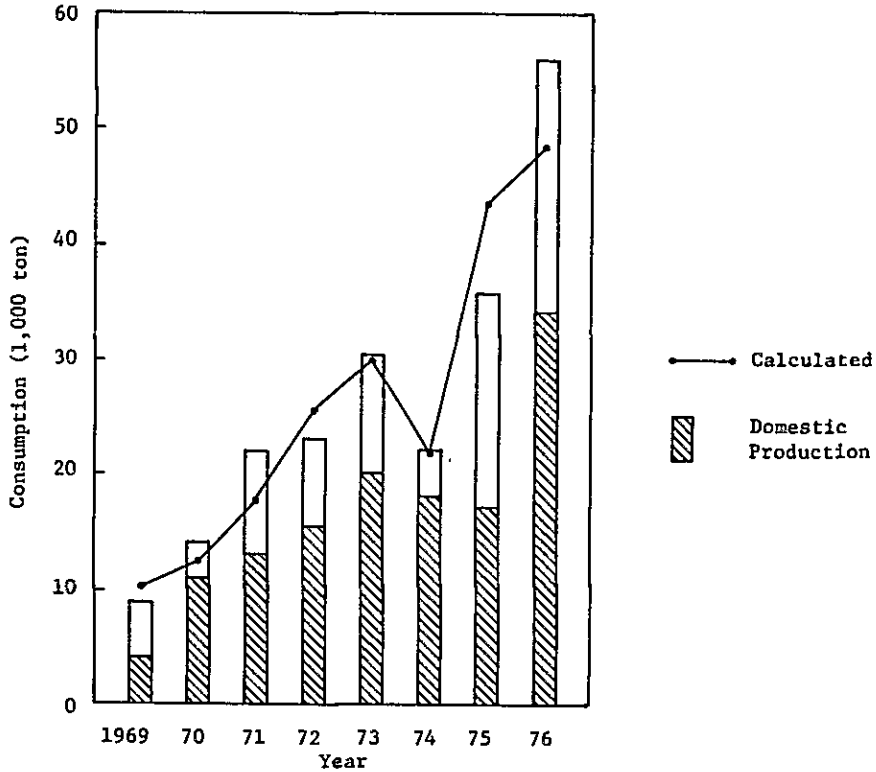


Fig. AI-1-1 Comparison between the Real Values and the Calculated Values by the Elasticity Analysis in Iran

(3) PS


Consumption (1,000 ton)
0
5
10
15
1969
70
71
72
73
74
75
76
Year
Calculated

(4) PVC


Consumption (1,000 ton)
0
10
20
30
40
50
60
1969
70
71
72
73
74
75
76
Year
Calculated
Domestic Production

1) GDP elasticity

On an assumption that there will be no change in the price, the following relationship should be valid between the demand Q and GDP Θ :

$$Q = A'(\Theta - \Theta_0)^{\bar{e}_\theta}$$

Here, Θ_0 stands for the GDP prevailing at the time of the introduction of the subject commodity. However, the following is valid in accordance with the definition of the elasticity:

$$Q = A\,\Theta^{e_\theta}$$

Therefore, it is possible to express the elasticity coefficient by using the "e_θ" of the formula stated earlier:

$$e_\theta = \bar{e}_\theta = \frac{\Theta}{\Theta - \Theta_0}$$

When the GDP Θ becomes extremely large, the $\bar{e}_\theta$ and e_θ will become identical. Therefore, the $\bar{e}_\theta$ shall be called here the "specific GDP elasticity". The major plastics materials as enumerated earlier will therefore show the following specific GDP elasticity figures in Iran:

PE	0.79
PP	1.13
PS	0.69
PVC	0.35

If there is no change in the demand structure, the GDP elasticity figures of these plastics materials should gradually approach these specific GDP elasticity figures along with the increase in the GDP.

2) Price elasticity

The mode of change of the price elasticity is much more complicated than the GDP elasticity. Generally speaking, a commodity becomes more competitive if its popularization is enhanced or the price is lowered. Therefore, it is likely that the price elasticity of the commodity will lower because it becomes increasingly indispensable within the framework of daily consumption.

3) Forecast on GDP and GDP deflator

As to the forecast values of the real GDP, the figures obtained from "World Casts" by Predicasts have been

employed as shown in Table AI-1-4. According to this table, the GDP growth rate from 1977 to 1980 is 9.3%/year, while from 1981 to 1985 will see a growth rate of 7.8%/year (ref. Fig. AI-1-2). Concerning the GDP deflator, the growth rate has been dropping since 1974 as shown in Fig. AI-1-3. It is however expected that an increase ranging from 8% to 10%/year will be materialized in the future. It is assumed here, however, that the exchange rate against U.S. dollars will not be affected by an inflation rate of this magnitude.

4) Forecast values of future elasticity coefficients

Table AI-1-5 shows the forecast values of the future GDP elasticity. Regarding the price elasticity values, it has been assumed that the current level will be maintained until 1980, and a slight fall will take place from 1981 onwards. Therefore, the forecast price elasticity values are as follows:

Table AI-1-4 Economic Outlook of Iran

	Population (million)	Gross Domestic Products (bil 1975 US$)	Per Capita GDP (1975 US$)
1975	33.0	52.7	1597
1976	33.9	55.4	1634
1980	38.1	79.1	2076
1985	44.0	115.2	2621

Source: Worldcasts, Predicasts Publication June 28, 1977

Notes: Figures in 1975 are actural and others are estimated.

Table AI-1-5 Estimation of Future GDP Elasticity of Plastics Materials in Iran

	1969/1976	1977/1980	1981/1985
PE	1.00	0.88	0.85
PP	2.32	1.51	1.38
PS	0.90	0.78	0.75
PVC	0.40	0.37	0.36

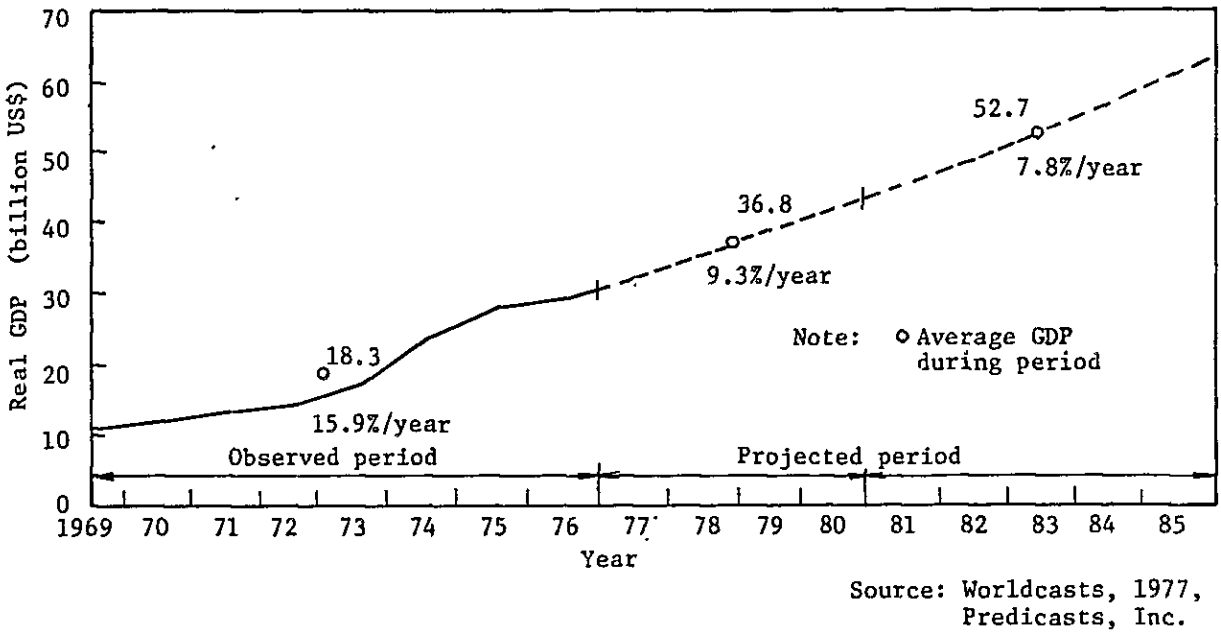


Fig. AI-1-2 Actual Records and Forecast of the Real GDP in Iran

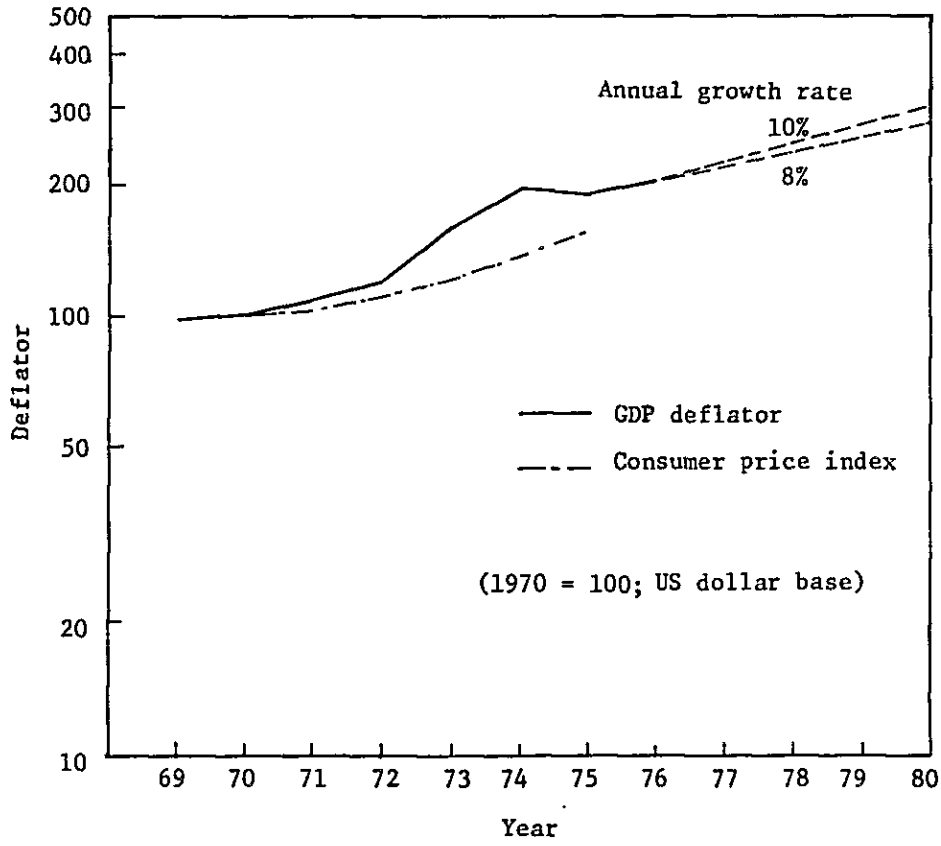


Fig. AI-1-3 Actual Records and Forecast of the GDP Deflators in Iran (1969 - 1980)

(b) Demand forecast

1) When the real prices remain constant:

If the real prices should remain constant, the growth of demand will depend only on the growth of the real GDP. The results of calculation in this case will be as shown in Table AI-1-6.

2) When the real prices should fall:

If the future average price increase rate is 5% to 7%/year, the nominal prices of plastics materials will increase by the same rate. However, if it is assumed as mentioned earlier that the Iranian GDP deflator should increase from now onwards by a rate ranging from 8% to 10%/year, the real prices of plastics materials will drop by 3%/year. Results of calculations in this case are shown in Table AI-1-7. It is therefore deemed reasonable to interprete the results of a forecast based on the analysis of the quantitative model as being limited by a lower limit, i.e., the case of the real price remaining unchanged, and by an upper limit, i.e., the case in which the real price drops by 3%/year.

1-3 Demand forecast by analogy

Of several methods of forecasting demand on the basis of deduction, the international cross-section analysis method was employed for this study. The future extent of the demand in Iran has been forecst on the basis of the relationship between per capita GDP and per capita material consumption recorded in several major plastics consuming countries of the world.

1-3-1 Relationship between per capita GDP and per capita plastic consumption

Figs. AI-1-4 and 5 show the relationship between per capita GDP and per capita plastic consumption in major countries of the world as of 1975.

The Oil Crisis was still one year ahead in 1972, so that the prices of all the plastics materials was at their lowest. In many countries, the consumption of plastics materials was record high. One year elaspsed since the Oil Crisis and the year 1975 saw a cooling down of the skyrocketing of plastics materials prices which ranged during 1974. Therefore, signs of recovery became apparent during 1975 in the general trend of demand for plastics materials.

A comparison of the data for these two years regarding per capita GDP and per capita plastic consumption display an approximate coincidence, thereby showing a position on the

Table AI-1-6 Demand Forecast by Elasticity Analysis in Iran
(In the Case of Real Price is Constant)

	1976	1977 1980		1981 1985	
	Actual (1,000 ton)	Quantity (1,000 ton/ year)	Growth Rate (%/year)	Quantity (1,000 ton/ year)	Growth Rate (%/year)
PE	60.0	82	8.1	113	6.6
PP	13.7	24	14.4	39	10.9
PS	18.5	24	7.2	32	5.8
PVC	60.3	69	3.3	79	2.7

Table AI-1-7 Demand Forecast by Elasticity Analysis in Iran
(In the case of Real Price is Decreased by 3%)

	1976	1980		1985	
	Actual (1,000 ton)	Quantity (1,000 ton/ year)	Growth Rate (%/year)	Quantity (1,000 ton/ year)	Growth Rate (%/year)
PE	60.0	93	11.7	149	9.9
PP	13.7	27	18.5	53	14.4
PS	18.5	26	9.3	38	7.4
PVC	60.3	98	12.9	152	9.2

Per Capita Consumption of Plastics Materials in Major Countries (1972)

(Unit: kg)

No.	Nation	G.D.P.	PE	PP	PS	PVC
1	Japan	4,005	9.10	4.14	4.04	8.36
2	U.S.A.	7,072	15.18	3.03	6.45	8.84
3	W. Germany	7,032	12.36	1.72	5.55	11.24
4	France	5,235	8.38	0.94	2.03	11.95
5	Italy	2,217	8.74	1.39	5.25	8.09
6	U.K.	3,008	7.32	2.17	3.20	5.42
7	Belgium	6,061	14.54	0.67	4.12	9.28
8	Netherland	5,887	13.75	1.85	9.85	9.25
9	Austria	4,372	9.87	0.41	3.40	5.05
10	S. Korea	427	1.97	0.88	0.96	2.26
11	Taiwan	835	5.04	1.83	1.43	8.87
12	Thailand	304	1.52	0.30	0.21	0.32
13	Malaysia	633	3.27	0.43	0.37	1.15
14	Philippines	322	0.92	0.59	0.18	0.32
15	Indonesia	193	0.35	0.07	0.06	0.06
16	India	140	0.10	0.0024	0.02	0.09
17	Pakistan	155	0.12	0.01	0.05	0.06
18	Israel	2,997	8.99	1.95	1.82	9.93
19	Turkey	757	0.76	0.11	0.24	0.42
20	Egypt	290	0.10	0.01	0.04	0.02
21	Nigeria	375	0.16	0.03	0.03	0.08
22	S. Africa	1,112	4.59	0.28	1.30	2.50
23	Colombia	492	0.46	0.09	0.31	0.75
24	Venezuela	2,223	3.58	0.31	1.82	1.45
25	Peru	728	1.31	0.22	0.26	0.10
26	Brazil	785	1.30	0.11	0.36	1.41
27	Argentina	1,818	2.35	0.53	1.20	1.95
28	Australia	6,000	6.87	1.29	1.64	4.89
29	Mexico	1,226	1.83	0.19	0.5	1.01
30	New Zealand	3,526	4.45	0.51	1.36	4.93
31	U.S.S.R.	2,809	0.75	0.01	0.23	0.68
32	Czechoslovakia	3,264	3.34	0.06	2.68	4.81
33	Hungary	2,067	3.48	0.62	0.56	3.28
34	Yugoslavia	1,317	2.31	0.14	0.63	1.45
35	Romania	1,660	4.29	0.07	0.32	3.99
36	Bulgaria	1,759	4.52	0.00058	2.56	2.77
37	Iran	848	0.96	0.091	0.29	0.88

Source: UNICO

Note: 1) According to Worldcasts, Predicasts, Inc.

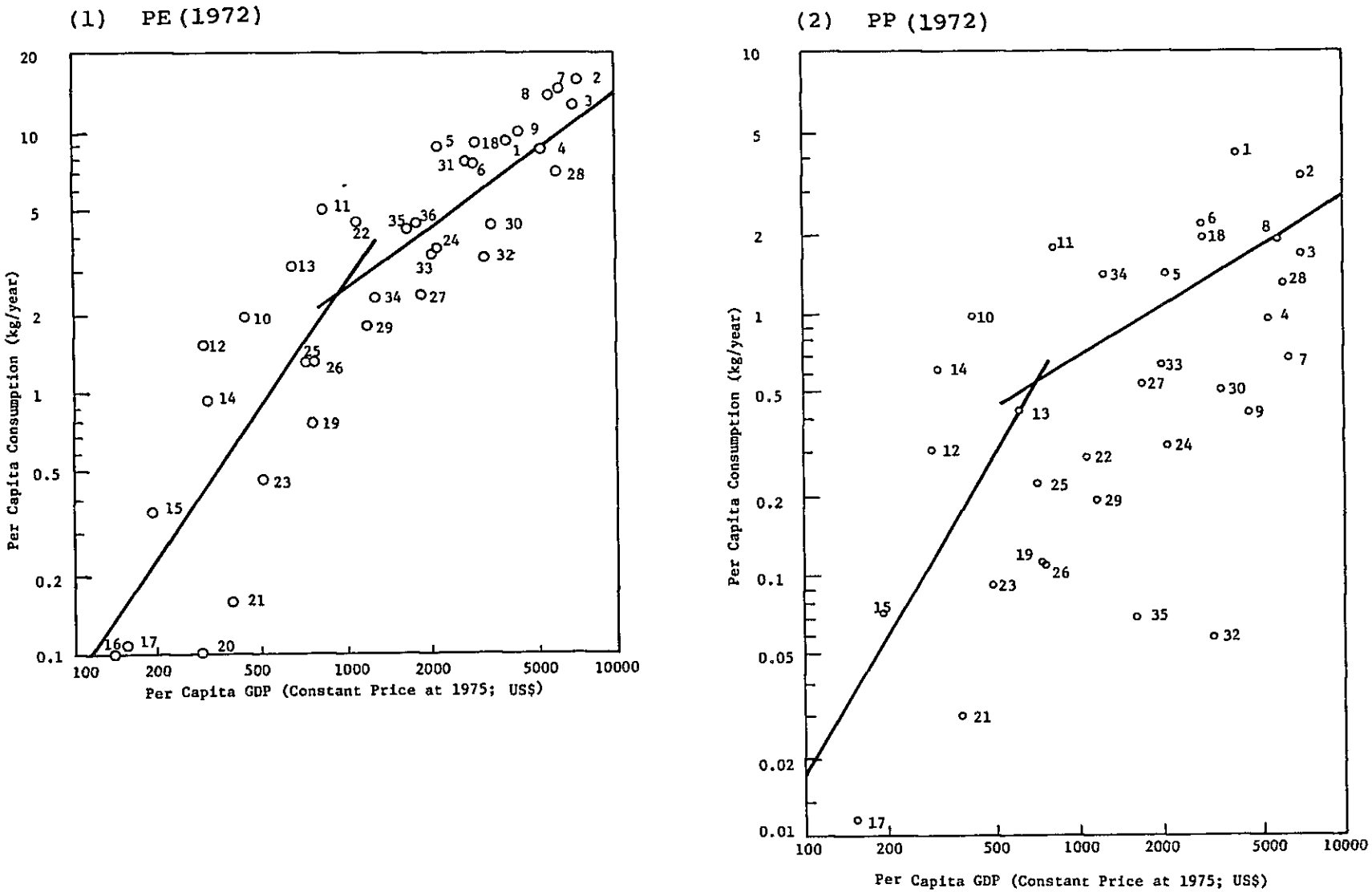
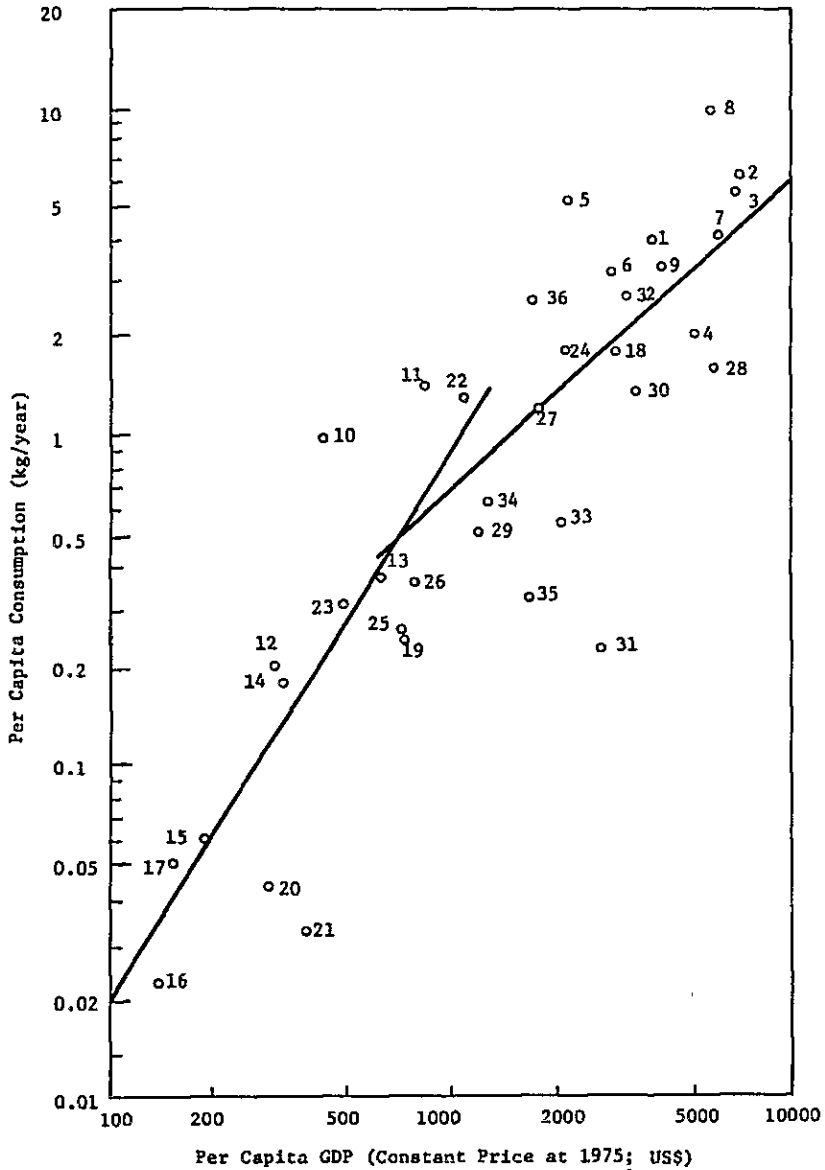
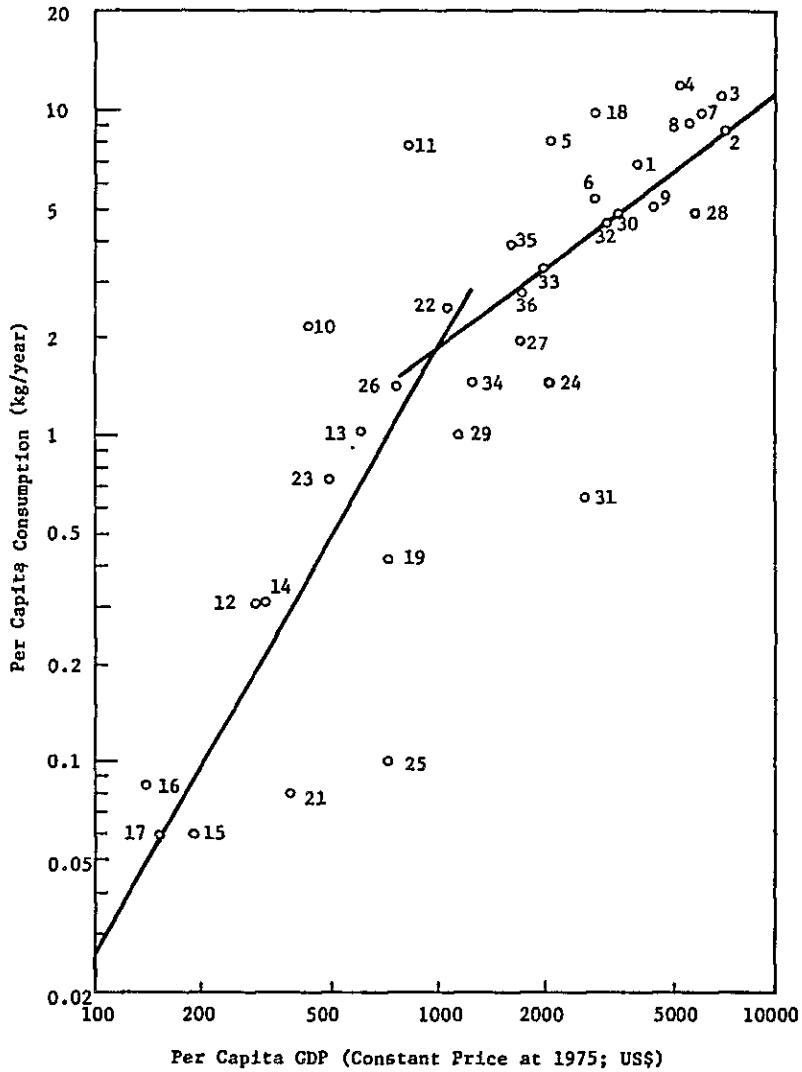


Fig. AI-1-4 International Cross-section Analysis (1972)

(3) PS (1972)



(4) PVC (1972)



Per Capita Consumption of Plastics Materials in Major Countries (1975)

(Unit: kg)

No.	Nation	Per Capita GDP (US$)1)	PE	PP	PS	PVC
1	Japan	4,316	7.98	3.98	3.70	9.00
2	U.S.A.	7,049	14.49	3.41	6.27	7.30
3	W. Germany	7,157	11.76	2.07	3.64	11.57
4	France	5,485	7.41	1.14	2.73	10.64
5	Italy	2,301	8.33	1.63	5.71	7.97
6	U.K.	3,132	7.61	2.69	2.19	5.28
10	S. Korea	550	2.5	1.8	0.5	2.1
11	Taiwan	917	4.4	2.1	1.3	9.8
12	Thailand	342	1.1	0.42	0.13	0.29
13	Malaysia	730	2.7	0.62	0.13	0.46
14	Philippines	356	0.92	0.57	0.15	0.31
15	Indonesia	225	0.46	0.17	0.04	0.11
16	India	147	0.10	-	0.02	0.07
17	Pakistan	159	0.13	0.02	0.03	0.04
18	Israel	3,166	9.2	-	6.0	7.7
19	Turkey	441	0.53	0.12	0.24	0.14
20	Egypt	310	0.13	-	0.08	0.06
21	Nigeria	431	0.27	0.02	0.02	0.16
22	S. Africa	1,169	4.7	2.0	0.33	2.2
23	Colombia	538	1.41	0.16	0.16	1.0
24	Venezuela	2,415	4.0	-	1.24	1.24
25	Peru	779	1.35	0.27	0.22	0.32
26	Brazil	922	1.95	0.24	0.35	1.31
27	Argentina	1,935	2.14	0.48	1.17	2.06
28	Australia	6,347	8.96	1.93	1.85	6.59
29	Mexico	1,314	2.20	0.43	0.51	0.76
30	New Zealand	1,749	3.46	0.50	0.60	3.61
31	U.S.S.R.	3,093	1.84	-	0.17	1.39
32	Czechoslovakia	3,757	4.05	2.40	3.20	6.19
33	Hungary	2,478	4.23	0.77	0.46	4.16
34	Yugoslavia	1,502	2.24	0.29	0.96	2.18
35	Romania	2,203	5.20	-	0.30	4.07
36	Bulgaria	2,188	6.20	-	2.7	3.58
37	Iran	1,597	1.75	0.38	0.43	1.27

Note: 1) According to Worldcast, Predicasts, Inc.

Source: UNICO

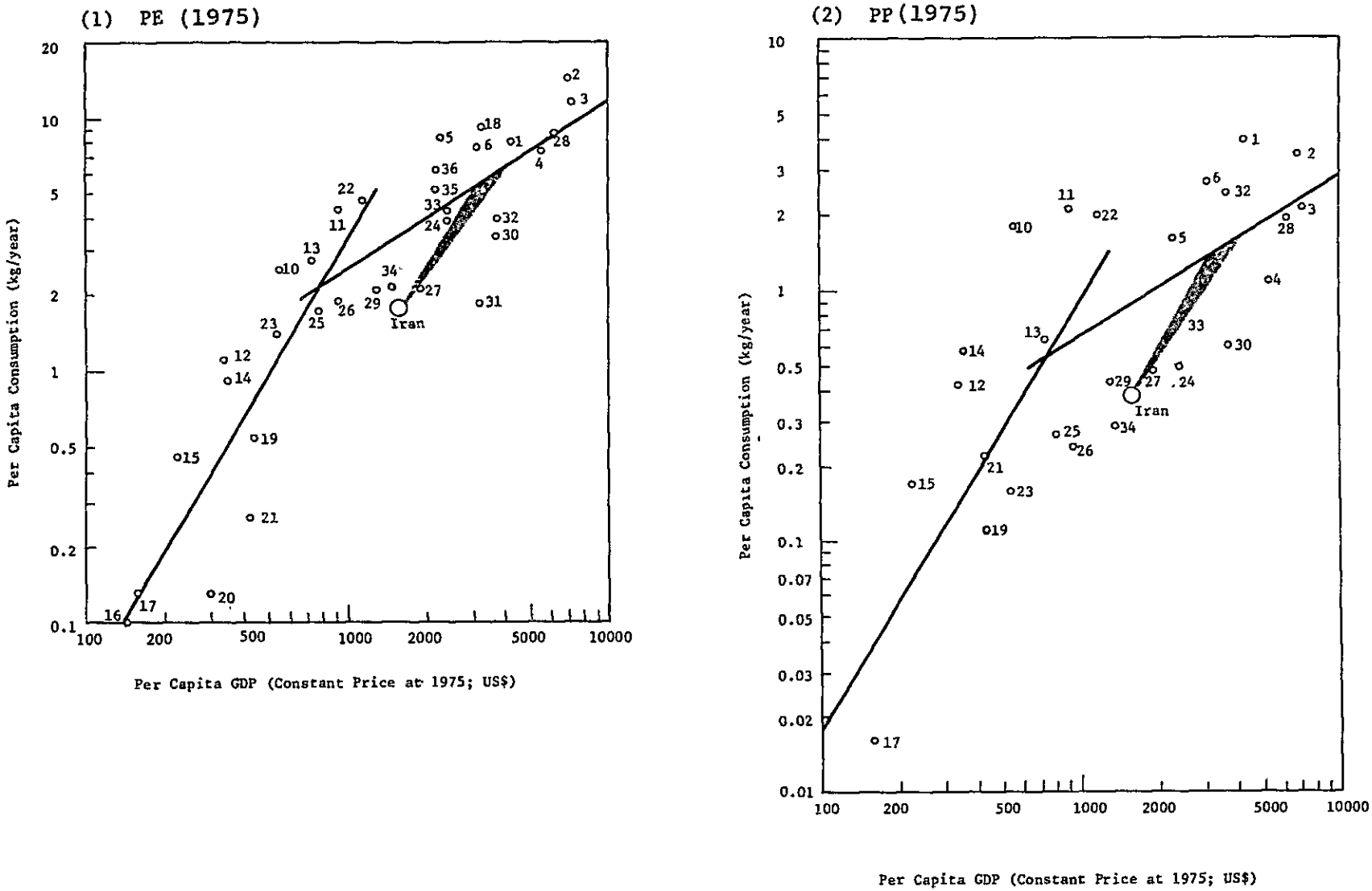
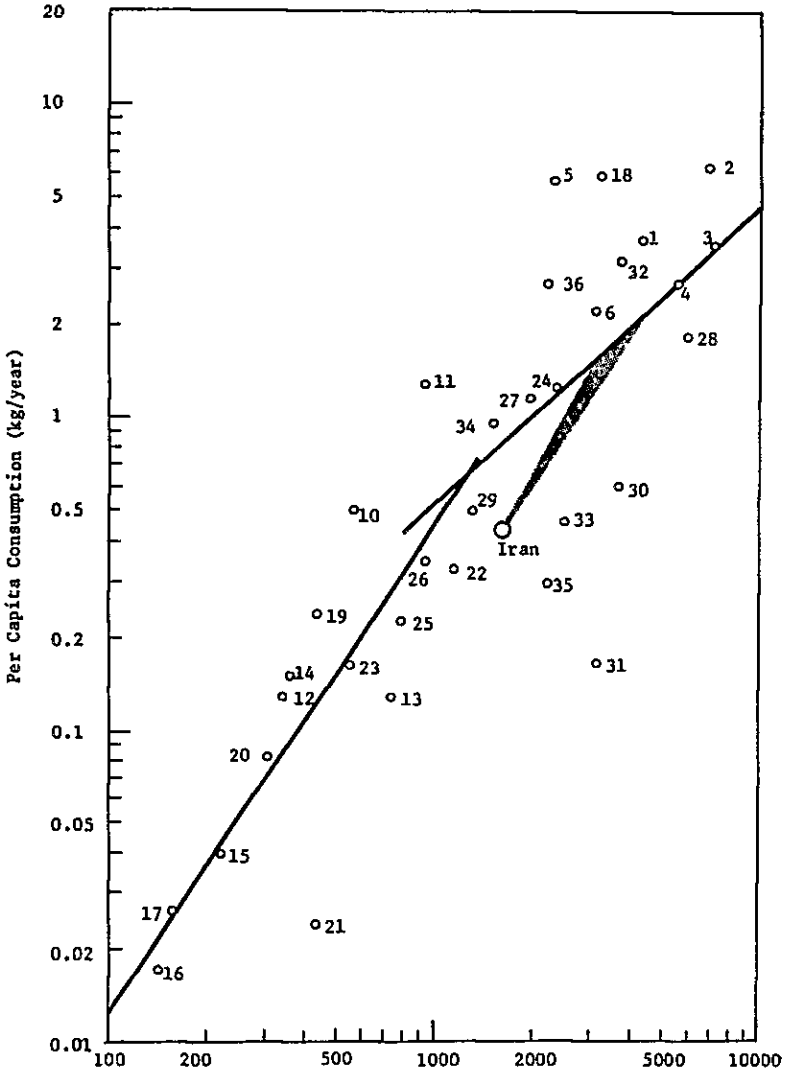
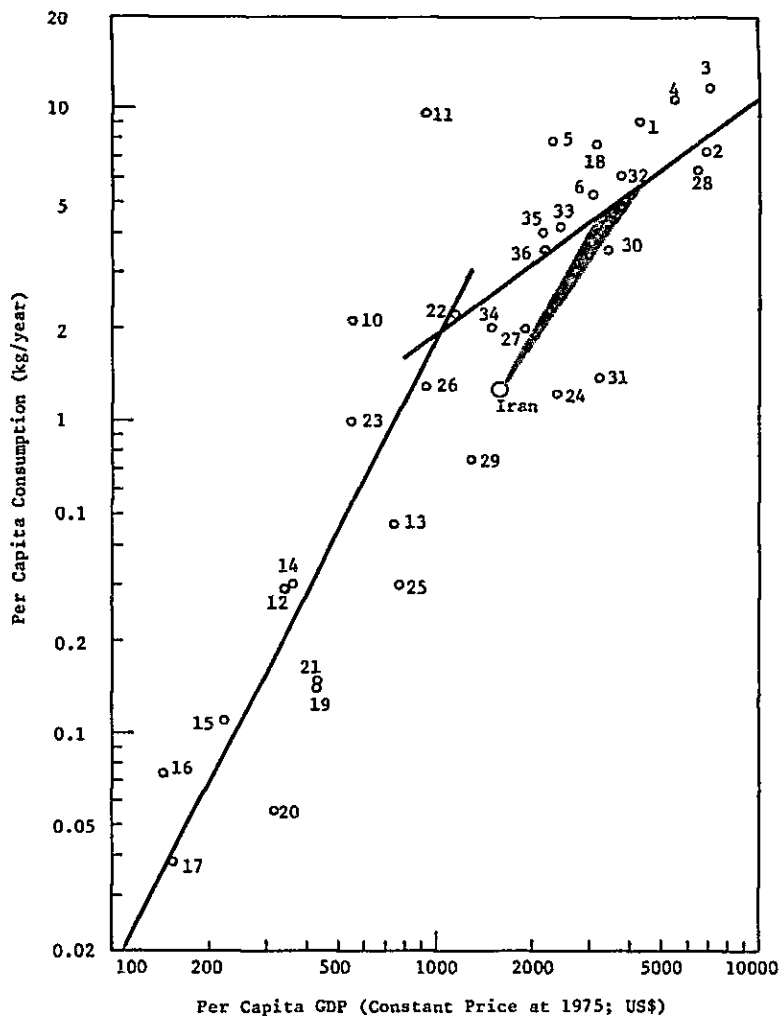


Fig. AI-1-5 International Cross-section Analysis (1975) and Demand Forecast by the International Cross-section Method

(3) PS (1975)



(4) PVC (1975)



same regression line. However, because of the fact that the growth of plastic consumption generally exceeds the growth of GDP, the relationship between per capita GDP and per capita plastic consumption changes from year to year. It is merely a coincidence that the relationship in 1972 and that in 1975 roughly coincide with each other.

The prices of plastics materials kept falling before the days of the Oil Crisis, thereby giving a great impetus to the remarkable expansion of the demand for plastics materials. From now onwards, it is unlikely that such a great price fall will take place. The plastics material prices are, on the contrary, expected to gradually rise in the future. Therefore, the growth of demand for the materials will considerably slow down in comparison to the status of the trend dispalyed during the pre-Oil-Crisis days. This being the circumstance, it is deemed reasonable to employ the cross-section figure shown in Figs. AI-1-4 and 5 as a yardstick for forecasting the future extent of the demand.

1-3-2 Demand forecast by the cross-section method

As mentioned in the foregoing, almost identical regression lines are displayed by most of the plastics materials in the cross-section chart for 1972 and 1975. Therefore, the chart for 1975 was selected for use as a basis for the forecast. The 1975 chart for plastics materials also show the per capita Iranian consumption of the materials during the same year.

The Iranian per capita plastics material consumption as against the corresponding amount of per capita GDP displays positions considerably lower than the regression line regarding all the plastics materials. It should be noted that the relationship between per capita GDP and per capita plastic consumption is not necessarily the same in all the countries. The relationship varies depending on the contents of the GDP of each country. The fact that Iranian per capita consumption is lower than the corresponding GDP seems to be due to the high importance of oil production within the framework of the total GDP of the country. The high oil production of Iran is not directly reflected upon the effective demand for plastics materials.

Along with the progress of industrialization of Iran and comparative decrease of the importance of oil production in the total GDP, the effective demand for plastics materials within the framework of the GDP will increase accordingly, thereby making it likely that the per capita plastic consumption will approach the regression line.

Table AI-1-8 shows the per capita consumption in 1980 and 1985, together with the total plastic consumption amount obtained by multiplying the estimated population figures with the per capita consumption. This table assumes that

the content of the Iranian GDP will change in the future so that the per capita plastic consumption in 1990 or the year 2000 will attain the regression line shown in Fig. AI-1-4.

According to this forecasting method, the demand for all the plastics materials will grow at a rate of 13% to 15%/year until 1980, and then the growth rate will be reduced by half to 7%/year from 1981 to 1985.

Table AI-1-8 Prediction of Major Plastics Consumption by the Cross Section Analysis in Iran (1980, 1985)

	Per Capita Consumption (kg)		Consumption (1,000 ton)		Average Growth Rate (%)	
	1980	1985	1980	1985	1980	1985
PE	2.6 ~ 2.9	3.1 ~ 3.4	100~109	136~151	12.7	6.5
PP	0.6 ~ 0.7	0.7 ~ 0.8	23 ~ 25	32 ~ 36	13.9	7.2
PS	0.7 ~ 0.8	0.9	27 ~ 29	38 ~ 41	14.5	7.1
PVC	2.1 ~ 2.3	2.5 ~ 2.8	80 ~ 88	111~125	14.9	7.0

2. Estimation of Potential Demand for ABS Resin in Iran

The estimation has been made for the following six groups:

(1) Electric appliances (Refrigerator, electric fan, TV, radio, air-conditioner, washing machine, etc.)

(2) Telephone equipment

(3) Other electric/electronic appliances and machinery

(4) Motor vehicles

(5) Other rolling stocks

(6) Sundry goods and others

Electric appliances

Concerning this category, the actual records of past production of electric appliances are known, so that the following growth curve has been established on the basis of the actual production records (ref. Table AI-2-1) for the purpose of estimating the potential demand. On the basis of this growth curve, the production forecast of the appliances has been made (Table AI-2-1, Fig. AI-2-1). The Japanese average unit consumption of ABS resin (Table AI-2-2) has been multiplied to the production forecast data in order to estimate the extent of the potential demand in this respect:

$$\log \left(\frac{Y}{K - Y} \times 10^3 \right) = A + BX$$

where;

Y: Annual demand for the appliances, assumed to be equivalent to the annual production amount

X: Per capita GDP

K: Signifies the annual demand (substitution demand) at the time when the new demand for the appliances attained its maximum. The applicable value here has been calculated on the basis of the situation prevailing in Japan and the U.S.A. (Table AI-2-3)

A, B: Coefficients

Table AI-2-1 Actual Production and Production Forecast of Electric Appliances and Rolling Stocks in Iran

(1,000 unit)

	1973	1974	1975	1976	1977	1980	1985
(1) Electric Appliances							
Refrigerator	257	309	437	513	600	740	1,000
Electric Fan	181	-	215	215	610	640	1,150
TV	242	326	356	370	400	490	660
Radio	281	351	345	390	390	450	560
Cooler	134	144	227	260	300	410	730
Washing Machine	25	-	35	35	40	50	70
(2) Telephone Receivers	80	114	115	120	210	250	405
(3) Motor Vehicles							
Passenger Car	51	73	90	102			
Mini Bus and Ambulance	1.5	4.4	5.4	8.2			
Bus	1.6	2.0	2.4	2.5			
Truck	5.9	8.4	10.9	13.5			
Van	17.4	21.3	32.2	41.8			
Sub-total	77.4	109.1	140.9	168.0	200	290	550

Sources: 1973-1976; NPC Data, Iran Almanac 1975, 1976, 1977, Bank Markazi IRAN Annual Report 1976

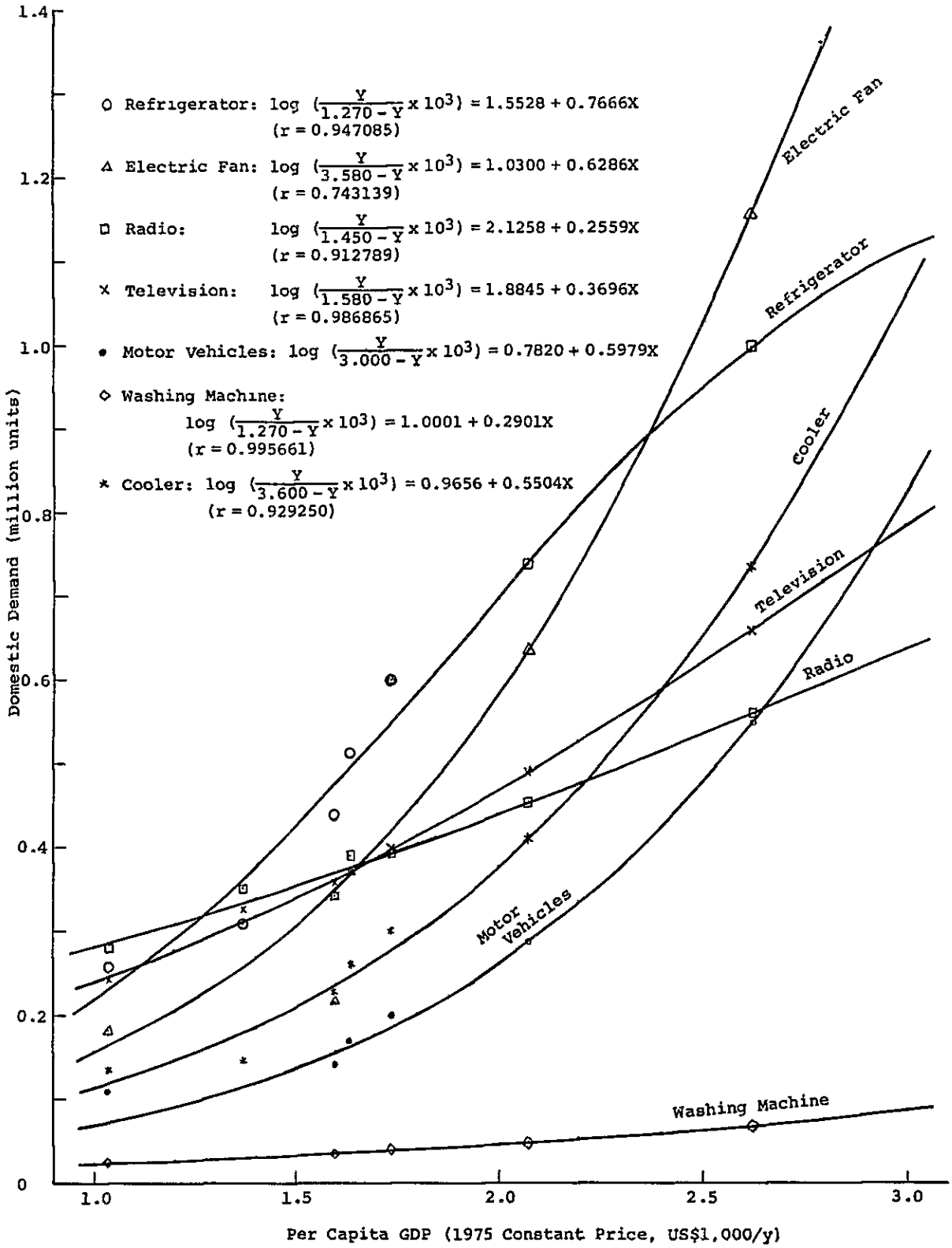


Fig. AI-2-1 Relation between Per Capita GDP and Domestic Demand for Electric Appliances and Motor Vehicles

Table AI-2-2 Average Unit Consumption of ABS Resin for Electric Appliances, Telephone and Motor Vehicles in Iran and Japan (1)

		Iran		Japan
		1974	1977	1974 ~ 1976
Refrigerator				
Production	(10^3 unit)	309	600	
ABS Consumption	(ton)	1,500	3,200	
Unit Consumption	(kg/unit)	4.9	5.3	1.80
Electric Fan				
Production	(10^3 unit)	195	610	
ABS Consumption	(ton)	150[1)]	480	
Unit Consumption	(kg/unit)	0.79	0.79	0.61
TV				
Production	(10^3 unit)	326	-	
ABS Consumption	(ton)	124	-	
Unit Consumption	(kg/unit)	0.38[2)]	-	0.35
Radio				
Production	(10^3 unit)	351	-	
ABS Consumption	(ton)	66	-	
Unit Consumption	(kg/unit)	0.19[2)]	-	0.18[3)]
Telephone				
Production	(10^3 unit)	80	-	
ABS Consumption	(ton)	60	-	
Unit Consumption	(kg/unit)	0.75	-	0.83[4)]
Motor Vehicles				
Production	(10^3 unit)	109	-	
ABS Consumption	(ton)	0	-	
Unit Consumption	(kg/unit)	0	-	5.27

Notes: 1) ABS resin consumption for electric fans in 1974 is estimated by the unit consumption in 1977.
2) The unit consumption of ABS resin for TV and radio is estimated by the unit consumption of them in Japan and ABS resin consumption for TV and other electric appliances in Iran in 1974.
3) The unit consumption of ABS resin for radios in Japan includes that for tape recorders.
4) The unit consumption of ABS resin for telephones in Japan is the data in 1976.

Table AI-2-2 (Continued)

Average Unit Consumption of ABS Resin for Some Electric Appliances, Telephone and Motor Vehicles in Iran and Japan (2)

(kg/unit)

	Iran	Japan 1974 - 1976
Washing Machine	-	0:45
Sweeping Machine	-	2.11
Air Conditioner	-	0.80
Sewing Machine	-	0.72
Office Machine[1)]	-	2.00
Calculating Machine	-	0.14
Typewriter	-	1.32
Optical Instrument[2)]	-	0.08
Musical Instrument[3)]	-	1.77
Clock	-	0.05
Knitting Machine	-	0.98
Spinning Machine	-	432.1
Motorcycles	-	0.42

Notes: 1) Copying machines including electro-static machines, office printing machines, cash registers, office micro cameras, time recorders, and check writer

2) Cameras, projectors, telescopes, micro-scopes

3) Pianos, organs, electronic organs

Table AI-2-3 Estimation of K-value (the extent of annual demand when the market has reached saturation)

	Unit	Refrigerator	Electric Fan	TV	Radio	Motor Vehicles
(1) Estimation of Durability in Years						
a) Country Surveyed		Japan	Japan	Japan	Japan	U.S.A.
b) Year of the Survey		1975	1973	1975	1973	1975
c) Number of Persons per Household	persons	3.4	3.4	3.4	3.4	3.2
d) Population	persons	110.6	108.7	110.6	108.7	236.4
e) Domestic Demand	1,000 units	4,000	11,250	16,500	11,000	-
f) Number of Each Product possessed by one Household	units	1	3	2.5	2.5	1.75
g) Service Life	years	8	8.5	5	7	6
(2) Estimation of K-Value in Iran						
a) Year of the Survey		1,990	1,990	1,990	1,990	1,990
b) Number of Persons per Household	persons	5.0	5.0	5.0	5.0	5.0
c) Population	persons	50.7	50.7	50.7	50.7	50.7
d) Number of Each Product possessed by one Household	units	1	3	2	1	1.75
e) Service Life (in years)	years	8	8.5	5	7	6
f) K-Value (Annual Replacement Demand, After Market Saturation)	1,000 units	1,270	3,580	1,580	1,450	3,000

Telephone equipment

First, the correlation between the number of telephone subscription and per capita GDP has been clarified by covering several countries of the world (Fig. AI-2-2). In the correlation chart, the positions of the U.S.A., Canada, Sweden, and Australia (all of which show a high position in terms of the telephone subscription per hundred population) and the present position of Iran has been connected by straight lines. It was then assumed that the telephone subscription number in Iran will grow along with these lines in pace with the increase in the Iranian per capita GDP. The extent of demand for ABS resin for telephone equipment production has been calculated by multiplying the Japanese average unit consumption of ABS for telephones (Table AI-2-2) with the annual difference of the number of telephone subscription.

Other electric/electronic appliances and machinery

The extent of potential demand for ABS resin for manufacturing these products has been estimated by first clarifying the correlation between the ABS consumption in the production of the electric/electronic appliances and machinery and per capita GDP in the case of Japan (Fig. AI-2-3). Then, the total extent of demand for ABS resin for the production of these item in Iran was calculated on the basis of the Iranian per capita GDP data. When formulating Fig. AI-2-3, it was necessary to clarify the correlation between the ABS resin demand for the Japanese domestic consumption of these products and the total extent of the ABS resin demand for the Japanese production of these products. Therefore, the rate between the production in value and exportation in value of these products as shown in Table AI-2-4 has been employed to clarify the correlation.

Then, the potential demand for ABS resin already calculated in the above "electric appliances and telephone equipment" was subtracted. Further, an assumption was made on the basis of Table AI-2-5 that the rate of domestic production of these items in Iran will be 35% in 1977, 40% in 1980, and 60% in 1985. On the basis of these data, the potential demand for ABS resin in Iran in the production of the "other electric/electronic appliances and machinery".

Motor vehicles

The potential demand for ABS resin in this field has also been estimated in the same manner as employed for "electric appliances"

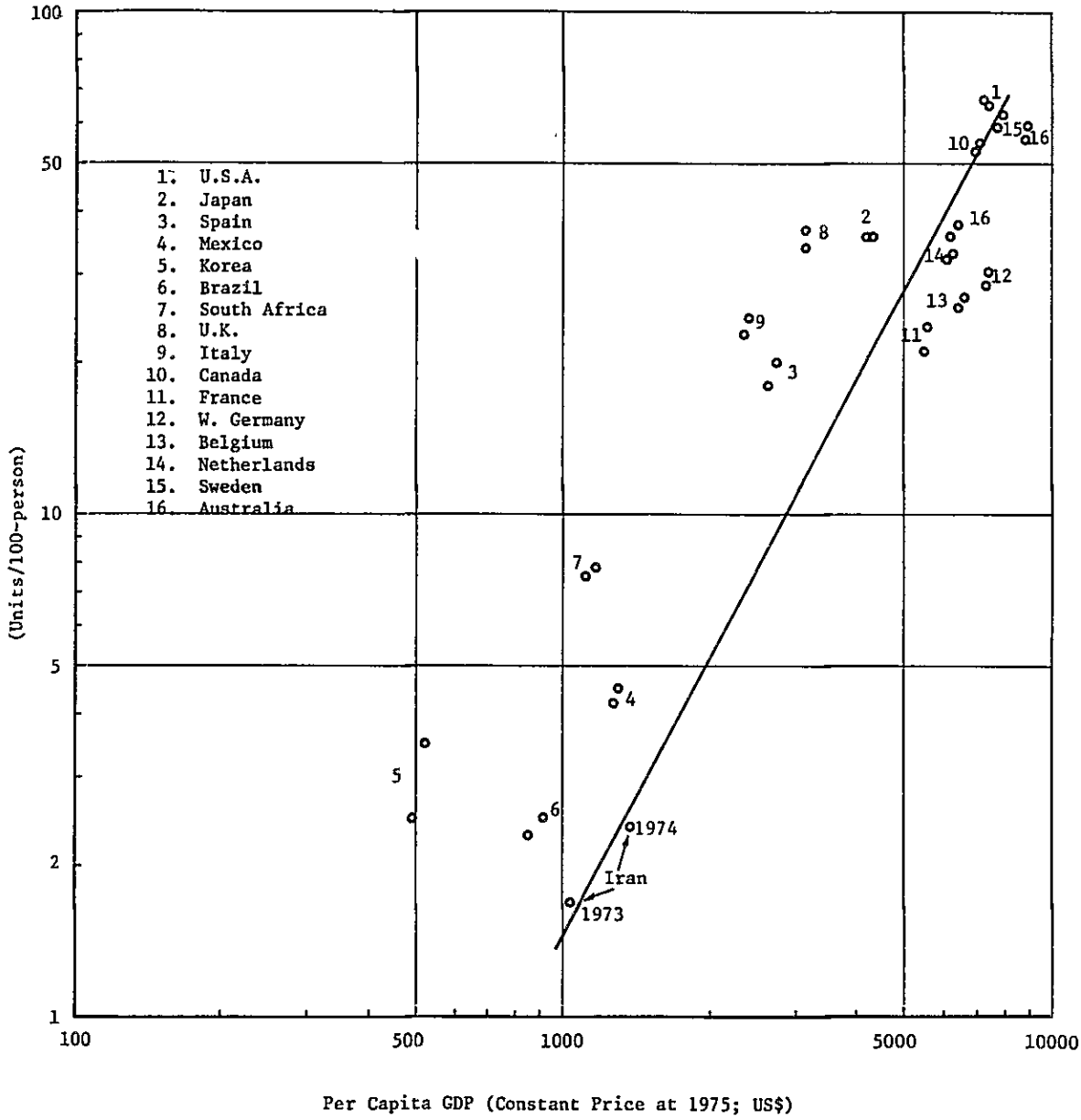


Fig. AI-2-2 Relationship between Per Capita GDP and Number of Ownership of Telephone Sets

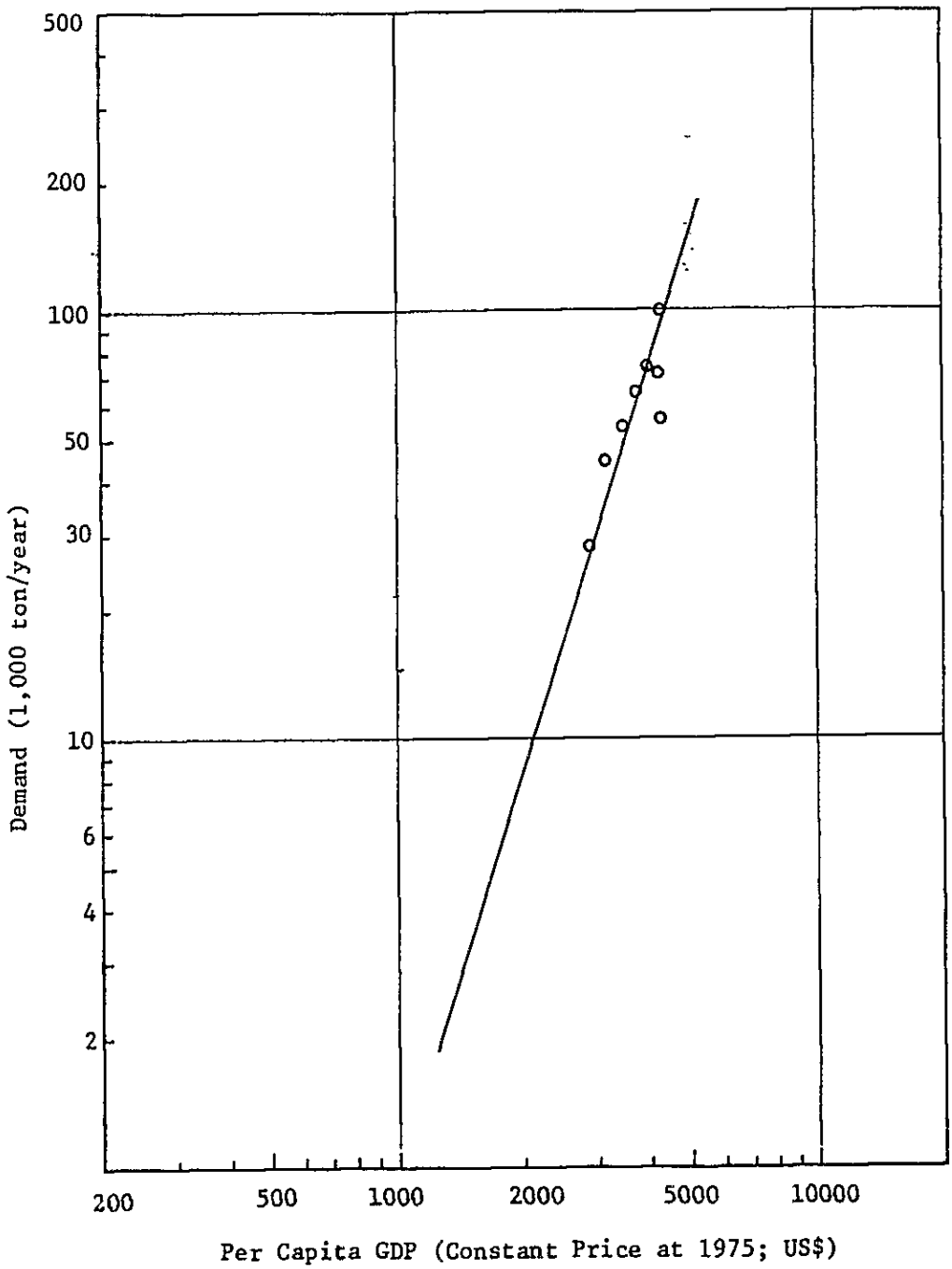


Fig. AI-2-3 Relationship between Per Capita GDP and ABS Resin Demand for Electric/Electronic Appliances and Machinery in Japan (1968 ~ 1977)

Table AI-2-4 Total Production and Export Values of Electric, Electronic Appliances in Japan

(million US$)

	Production (A)	Export (B)	B/A (%)
1965	5,995	332	5.5
1970	19,798	2,350	11.9
1971	22,000	2,860	13.0
1972	26,419	3,726	14.1
1973	35,508	4,670	13.2
1974	37,163	5,796	15.6
1975	32,390	6,089	18.8

Source: Keizai Tokei Nenkan 1976 and 1977 Tokyo-Keizai Shinpoo-Sha

Table AI-2-5 Electric Machinery, Tools & Appliances Production and Import in Iran

(million US$)

	Domestic Production (A)	Import	Total (B)	A/B (%)
1971	167	256	423	39.5
1972	208	263	471	44.2
1973	302	311	613	49.3
1974	378	409	787	48.0
1975	444	801	1,245	35.7

Source: Iran Almanac 1977

Other rolling sotcks

The potential demand for ABS resin in manufacturing motor cycles, bicycles, etc. has been estimated on an assumption that the Japanese rate of ABS consumption in the automobile industry and the other rolling stocks industry can be also applied to the case of Iran.

Sundry goods and others

The correlation between the ABS consumption in producing sundry goods and others in Japan and the U.S.A. and per capita GDP of these two countries was first obtained (Table AI-2-6 through Table AI-2-10 and Figs. AI-2-4). Then, the Iranian per capita GDP figure has been applied to this correlation in order to estimate the Iranian potential demand.

It should be noted here, however, that an assumption was made concerning the domestic production rate of sundry goods and others as being 40% in 1977, 50% in 1980 and 70% in 1985. This assumption was made due to the fact that finished products such as beds, showcases, sporting goods, toys, etc. are and will be imported into Iran, thereby involving certain amount of ABS which is not directly geared to the potential demand for ABS resin in Iran.

Table AI-2-6 ABS Resin Demand in Japan

	1971		1972		1973		1974		1975		1976		1977[7]	
	(ton)	(%)[1]	(ton)	(%)[1]	(ton)	(%)[1]	(ton)	(%)[1]	(ton)	(%)[1]	(ton)	(%)[1]	(ton)	(%)[1]
For Electric, Electronic Appliances[2]	53,700	22	61,400	14	82,200	34	59,600	Δ27	49,100	Δ18	63,300	29	66,800	6
Machinery[3]	20,300	23	24,400	20	31,400	29	24,200	Δ23	19,600	Δ19	25,200	29	27,000	7
Rolling Stocks[4]	29,800	22	39,300	32	52,500	34	36,500	Δ30	41,400	13	46,900	13	49,600	6
Sundry Goods[5]	29,300	13	33,200	13	42,800	29	27,100	Δ37	30,300	12	40,200	33	42,100	5
Others[6]	9,900	7	12,200	23	16,600	36	11,000	Δ34	6,600	Δ40	8,600	30	9,800	14
Domestic Demand	143,000	NA	170,500	19	225,500	32	158,400	Δ30	147,000	Δ7	184,200	25	195,300	6
Exports	14,700	39	40,500	176	24,500	Δ39	29,300	20	26,600	Δ9	36,900	39	37,300	1
Total	157,700	19	211,000	34	250,000	19	187,700	Δ25	173,600	Δ8	221,100	27	232,600	5

Source: Japan ABS Resin Ind. Association

Notes: 1) Growth Rate over Previous Year

2) Television, Radio, Tape Recorder, Washing Machine, Sweeping Machine, Refrigerator, Air Conditioner, etc.

3) Copying Machine, Typewriter, Sewing Machine, Knitting Machine, Spinning Machine, Calculating Machine, etc.

4) Front Grille, Instrument Panel, Center Panel, Ventilation, Lid, Air Intake, Fender Mirror Body, etc.

5) Wall Cabinets, Trip Bags, Lady's High Heels, Sporting Goods, Toys, Stationery, etc.

6) Bed, Chair, Desk, Drawers, Cupboard, Showcase, Pipes, Joints, Blending Use, Containers, Display, Vessels for Toilet Set, Vessels for Medical Supplies, etc.

7) Estimated by Japan ABS Resin Ind. Association

Table AI-2-7 ABS Resin Consumption for Electric and Electronic Appliances in Japan

	1975		1976		1977	
	Quantity (tons)	Growth Rate (%)	Quantity (tons)	Growth Rate (%)	Quantity (tons)	Growth Rate (%)
For Electric, Electronic Appliances						
TV	3,680	Δ18.0	5,590	51.9	5,300	Δ5.2
Radio, Tape Recorder	7,900	Δ9.3	10,520	33.2	12,600	19.8
Washing Machine	1,240	Δ48.3	1,540	24.2	1,600	3.9
Sweeping Machine	8,090	Δ1.3	9,430	16.6	9,400	Δ0.3
Refrigerator	6,100	Δ21.3	7,120	16.7	8,200	15.2
Electric Fan	4,960	Δ27.4	5,900	19.0	6,100	3.4
Window Fan	230	Δ94.3	60	Δ73.9	0	-
Air Conditioner	2,490	Δ33.4	3,070	23.3	3,400	10.7
Illuminator	770	Δ23.0	930	20.8	1,000	7.5
Communication Appliances	1,640	15.5	2,850	73.8	2,100	Δ26.3
Others[1)]	12,000	9.2	16,290	35.8	17,100	5.0
Total	49,100	Δ17.6	63,300	28.9	66,800	5.5

Source: Japan ABS Resin Ind. Association

Note: 1) Electronic Ranges, Irons for Press, Electric Kettles, and Others

Table AI-2-8 ABS Resin Consumption for Machinery in Japan

	1975		1976		1977	
	Quantity (tons)	Growth Rate (%)	Quantity (tons)	Growth Rate (%)	Quantity (tons)	Growth Rate (%)
For Machinery						
Sewing Machine	2,450	Δ24.4	2,640	7.3	2,700	2.3
Knitting Machine	790	Δ24.8	1,030	30.4	1,050	1.9
Office Machine	1,990	Δ39.1	2,040	2.5	2,500	22.5
Calculating Machine	2,970		4,700	58.2	4,700	0
Typewriter	1,320	Δ11.4	2,150	62.9	2,200	2.3
Optical Instrument	770	18.4	1,280	66.2	1,400	9.4
Musical Instrument	1,400	Δ3.4	1,650	17.9	1,900	15.2
Spinning Machine	2,180	Δ42.6	2,480	13.8	2,600	4.8
Clock	1,330	Δ39.5	1,860	39.8	2,000	7.5
Others	4,400	18.9	5,370	22.0	5,950	10.8
Total	19,600	Δ19.0	25,200	13.7	27,000	7.1

Source: Japan ABS Resin Ind. Association

Table AI-2-9 ABS Resin Consumption for Rolling Stocks in Japan

	1975		1976		1977	
	Quantity (ton)	Growth Rate (%)	Quantity (ton)	Growth Rate (%)	Quantity (ton)	Growth Rate (%)
For Rolling Stocks						
Motor Vehicles[1)]	37,210	14.2	42,980	15.5	45,400	5.6
Motorcycles[2)]	1,360	Δ25.3	2,120	55.5	2,300	8.7
Other Rolling Stocks[3)]	2,830	35.3	1,800	Δ36.4	1,900	5.6
Total	41,400	13.4	46,900	13.3	49,600	5.8

Source: Japan ABS Resin Ind. Association

Notes: 1) Motor vehicles with four wheels such as passenger cars, busses, and trucks.

2) Motorcycles with two wheels including motor scooters.

3) Bicycles; Rolling stocks of railway, airplanes, helicopters, motorboats, ships, tankers; Rolling stocks for industry such as forklifts and electric vehicles; Rolling stocks for farming such as combines, tractors, and others

Table AI-2-10 ABS Resin Consumption for Sundry Goods in Japan

	1975		1976		1977	
	Quantity (ton)	Growth Rate (%)	Quantity (ton)	Growth Rate (%)	Quantity (ton)	Growth Rate (%)
For Sundry Goods						
High Heels	2,050	Δ0.3	2,340	14.1	2,400	2.6
Bags	1,220	3.8	1,300	6.6	1,300	0
Toys[1)]	2,070	3.3	4,790	131.4	5,100	6.5
Sporting Goods[2)]	2,440	Δ3.6	3,360	37.7	3,400	1.2
Stationery[3)]	1,300	Δ20.7	1,680	29.2	1,800	7.1
Vessels for Food	2,840	28.6	3,210	13.0	3,400	5.9
Household Articles[4)]	2,890	Δ17.7	4,260	47.4	4,500	5.6
Vacuum Bottles	2,540	Δ22.8	3,490	37.4	3,500	0.3
House Equipment[5)]	4,010	30.6	5,380	34.2	5,700	5.9
Others[6)]	8,940	60.6	10,390	16.2	11,000	5.9
Total	30,300	11.8	40,200	32.7	42,100	4.7

Source: Japan ABS Resin Ind. Association

Notes: 1) Plastic Toys
2) Including goods for recreation
3) Examples: Fountain Pen, Ball Point Pen, Ever-sharp Pencil
4) Examples: Tool for pressing, washing; Shaving of vegetables, fruits and other foods
5) Examples: Equipment of bath, toilet, lavatory
6) Examples: Handcart for baby, tool for potted plants, articles for interior decoration

Table AI-2-11 ABS Resin Demand in the U.S.A.

	1971	1972		1973		1974		1975		1976	
	(ton)	(ton)	(%)[1]	(ton)	(%)[1]	(ton)	(%)[1]	(ton)	(%)[1]	(ton)	(%)[1]
For Electric, Electronic Appliances	5,000	7,000	40	9,000	29	7,000	Δ22	7,000	0	7,000	0
Machinery	25,000	38,000	52	48,000	26	60,000	25	39,000	Δ35	48,000	23
Rolling Stocks	53,000	65,000	23	70,000	8	60,000	Δ14	55,000	Δ8	77,000	40
Pipes, Joints	72,000	100,000	39	116,000	16	107,000	Δ8	91,000	Δ15	114,000	25
Sundries, etc.	131,000	135,000	3	164,000	21	122,000	Δ26	96,000	Δ21	166,000	73
Domestic Demand	286,000	345,000	21	407,000	18	356,000	Δ13	287,000	Δ19	412,000	43
Export	14,000	12,000	Δ14	15,000	25	15,000	0	5,000	Δ67	10,000	100
Total	300,000	357,000	19	422,000	18	371,000	Δ12	292,000	Δ21	422,000	45

Source: Modern Plastics International

Note: 1) Growth Rate over Previous Year

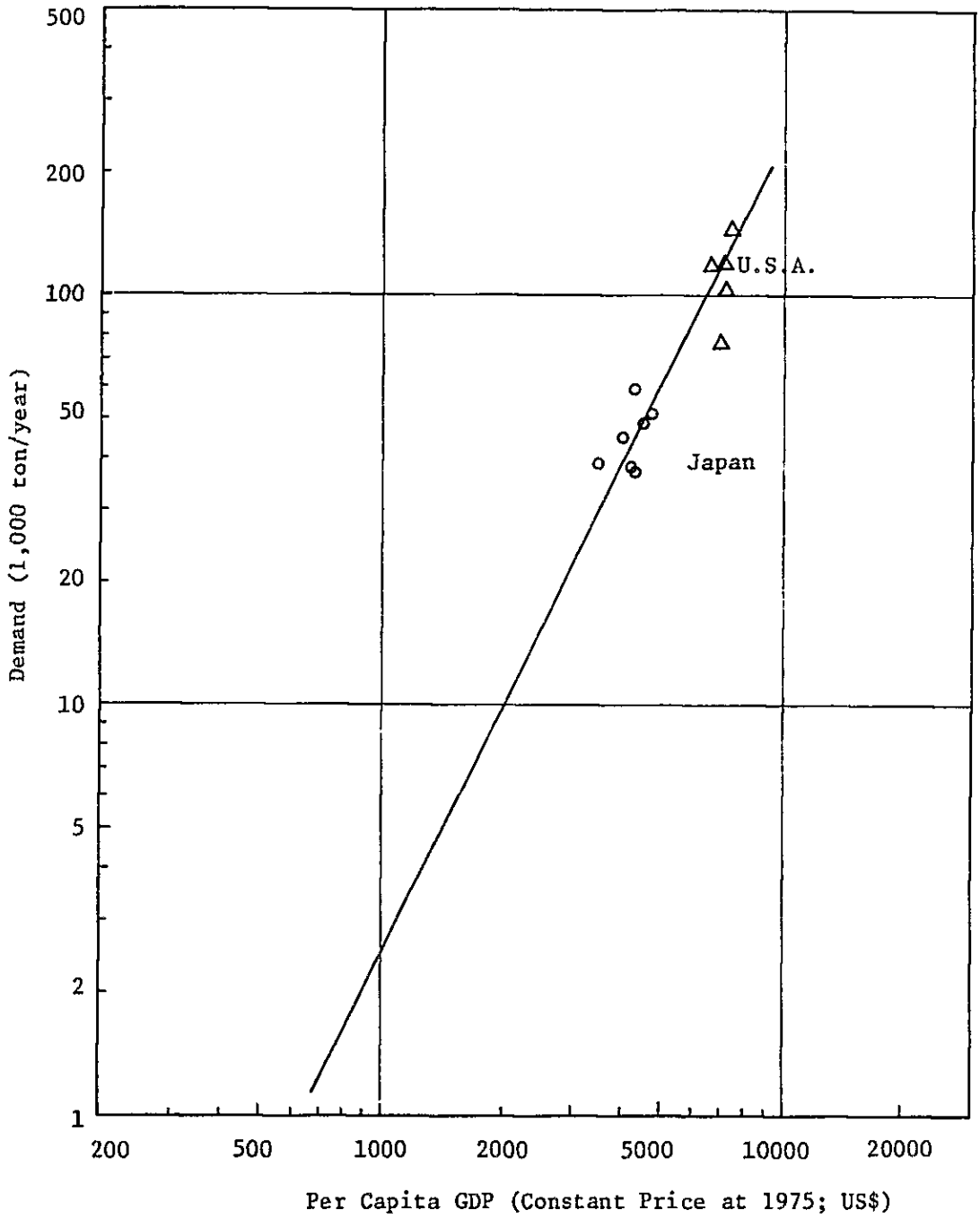


Fig. AI-2-4 Relationship between Per Capita GDP and ABS Resin Demand for Sundry Goods and Others in Japan and US. (1971 ~ 1977)

3. Synthetic Fiber Raw Materials

3-1 General

Fig. AII-3-1 shows the general diagram of the methodology employed for forecasting the demand for synthetic fiber raw materials in Iran. First, assessment was made concerning the material-wise textile consumption figures in 1976 in Iran. Then, the synthetic fiber demand extent was forecast. The 1980 and 1985 production forecasts of synthetic fiber were formulated on the basis of the results of the above assessment and forecasts, together with a forecast on the textile processing capacity in the future, as well as the synthetic fiber manufacturing projects currently formulated in Iran. Thereafter, the demand for synthetic fiber raw material monomer corresponding to this production amount has been calculated. Next, the demand forecast on the synthetic fiber raw materials and the minimum economic scale of operation for monomer production were taken into consideration in order to carry out a preliminary selection of synthetic fiber raw material production projects which should be the subjects of scrutinization with an ultimate objective of implementation in Iran.

3-2 Forecast on Synthetic Fiber Demand

Fig. AII-3-2 shows the method of forecasting the synthetic fiber demand in Iran. In this survey, the cross section method was mainly employed in order to assess a macroscopic picture of the demand for synthetic fibers.

Concerning the future economic growth (growth of GDP) and forecast of population increase in Iran to be employed for this forecast were based on the forecast data compiled by the United Nations.

There are two methods available for formulating the forecasts on the material-wise textile demand. The first method involves a forecast on the total textile demand which will then be classified into material-wise categories on the basis of the past records of material-wise textile consumption rate in Iran and other countries. The second method is to forecast the application-wise consumption amount, and then to obtain the material-wise textile consumption in each of the application fields. Since it was difficult to quantitatively forecast the application-wise demand extent during the present survey, the total textile demand was first forecast, and then the obtained result was classified into the material-wise categories.

The following paragraphs will explain the outline of the employed forecast methodology. First, the correlation between per capita GDP and per capita textile consumption was checked on major 55 countries of the world. On the basis of this

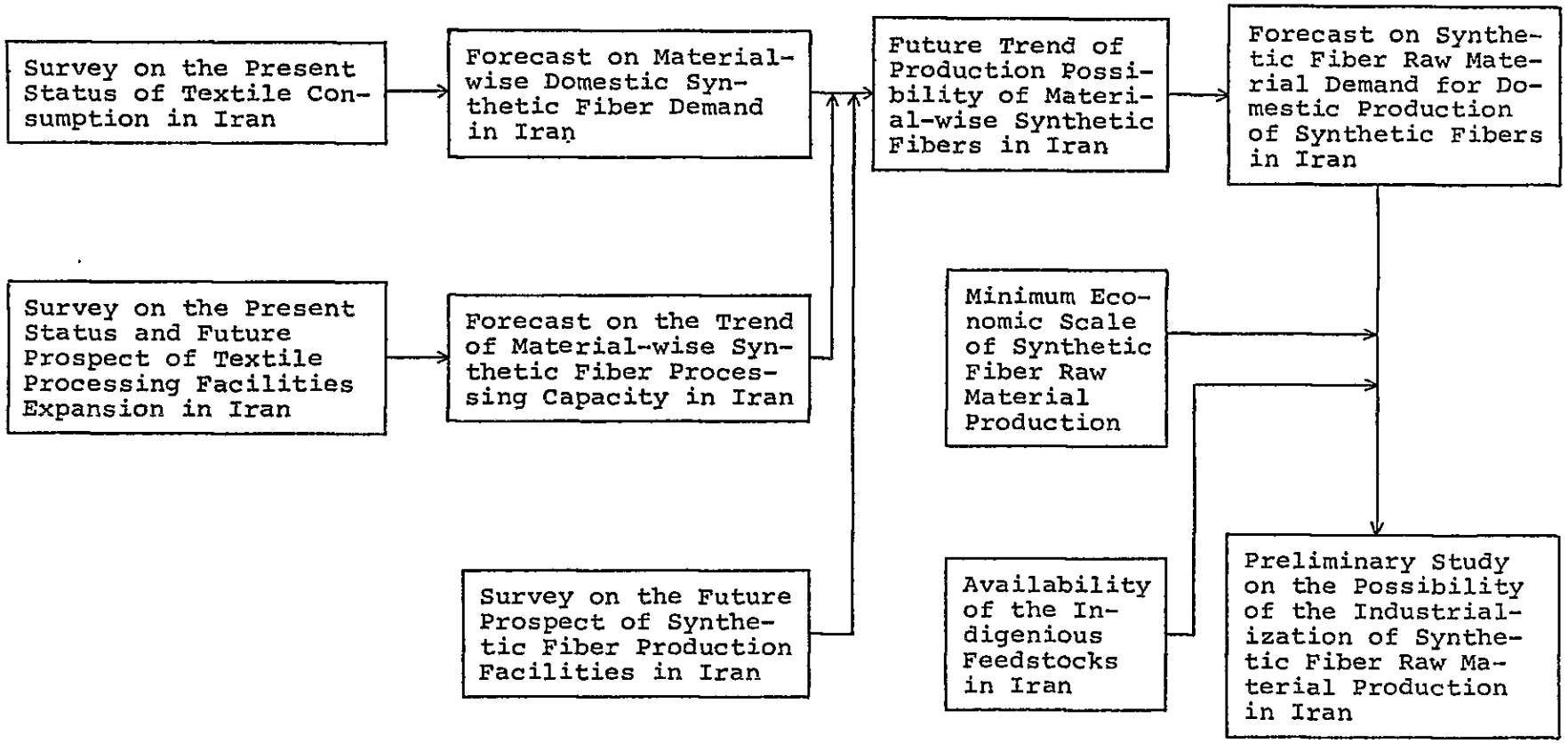


Fig. AI-3-1 Method of Forecasting Synthetic Fiber Raw Material Demand

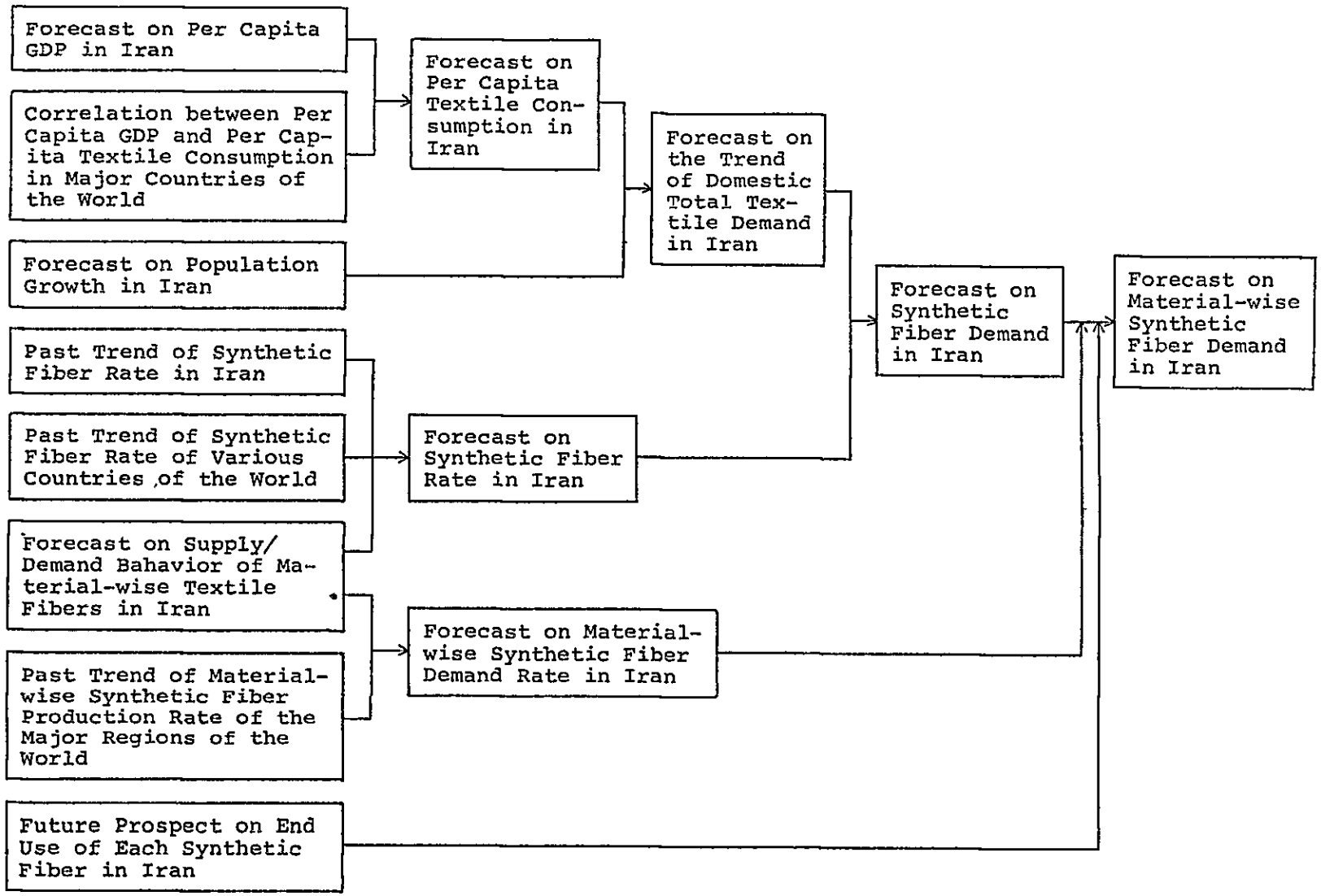


Fig. AI-3-2 Method of Forecasting Synthetic Fiber Demand in Iran

correlation, together with the GDP forecast for Iran, the per capita textile consumption in Iran was estimated. Then, on the basis of this figure together with the forecast population of the country, the likely trend of Iranian domestic total textile demand was estimated.

At the same time, another forecast was formulated concerning the possible future trend of synthetic fiber rate in Iran again on the basis of the trends of the synthetic fiber rate of various countries of the world. Thus obtained Iranian synthetic fiber rate was placed under a comparative study with the forecasts on production of natural fibers, regenerated fibers, and the supply/demand balance thereof.

Further, on the basis of the past trend of material-wise synthetic fiber production rate of the major regions of the world, the future Iranian material-wise synthetic fiber demand rate was estimated by incorporating the findings obtained through the field survey conducted within the framework of this study. On the basis of the obtained Iranian domestic total textile demand, the Iranian synthetic fiber rate, and the forecast material-wise synthetic fiber demand rate, the Iranian material-wise synthetic fiber demand extent was calculated.

Next, on the basis of the present status of the Iranian textile processing facilities as well as the facility expansion projects together with the knowledge obtained through the field survey, the future trend of textile processing capacity of Iran was studied. On the basis of the results of this study, the staple fiber (SF) and filament yarn (FY) ratio in Iran in the above-mentioned synthetic fiber demand extent was forecast for each of the material-wise categorization, thereby obtaining a basis for forecasting the future trend of the amounts of processing of SF and FY in each of the material-wise categories. In the forecasts on the demand extent and processing extent, the exportation of processed synthetic fiber products was also included. The reason for including the export portion is explained as follows:
At present, Iran is exporting nylon tricot and acrylic fiber knitted products nearly entirely destined to the U.S.S.R. and East European countries for barter transactions. A small amount of these products are also exported to neighbouring countries. Even if these exports should increase in the future, the rate occupied in the total production will still be negligibly small. Further, the items will be also limited to specific products such as knitted garments. Therefore, it has been assumed that the above-mentioned forecasts on demand extent and processing extent include the exportation of these processed products.

Also, the synthetic FY and SF production amounts in Iran have been forecast on the basis of the material-wise synthetic SF and FY production projects (including the already constructed facilities) in Iran and by comparing the project figures with the already estimated Iranian material-wise synthetic SF/FY

processing amount. When carrying out this comparison study, a scrutinization was also made concerning the export possibility of synthetic SF/FY from Iran.

3-3 Forecasts on synthetic fiber and synthetic fiber raw materials

(1) It is forecast that Iranian total textile demand in 1985 will be about 490,000 ton/year, and per capita consumption 11 kg/year. The total textile consumption in 1976 is estimated to have been 246,000 ton/year and per capita consumption 7 kg/year. Therefore, the above forecast signifies an annual growth rate of 8%.

(2) By 1985, the synthetic fiber rate in Iran will attain a level of approximately 45%, so that the synthetic fiber demand estimation is 220,000 ton/year (per capita consumption 5.0 kg/year).

(3) The Iranian 1985 synthetic fiber production amounts are forecast as follows on the basis of the synthetic fiber production expansion projects formulated by various Iranian enterprises and also on the basis of the estimation of the Iranian domestic synthetic fiber processing capacity.