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PRESENT STATUS OF PLASTICS INDUSTRY IN TURKEY
"PLASTICS UNDER DEVELOPMENT" AND
"THE REQUIRED TECHNICAL ASSISTANCE"^{1/}

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C O N T E N T S

	Paragraphs
INTRODUCTION	
I - PLASTIC PROCESSING INDUSTRY	1 - 4
Capital Levels	5 - 7
Machine and Equipment	8- 12
Working capacities	13-15
Labour	16-17
Technical Background	18-22
Development of the Sector	23-27
II - PLASTIC RAW-MATERIALS PRODUCING SECTOR	28-29
Capital	30-31
Capacities	32
Employment	33-34
Technical Knowledge	35-38
Expected Development	39-45
III - PLASTIC CONSUMPTION	46
Domestic Product Supply	47-48
Imports	49-50
Consumption During 1963-1972	51-55
Demand Projections During 1973-1987	56-57
IV - REQUIRED TECHNICAL ASSISTANCE	58-59

INTRODUCTION

First entrance of Plastic Industry to Turkey has been realized through the importation and processing of thermoplastic plastic in 1947.

Although the plastic processing sector, exhibiting a slight development after the Declaration of Independence in 1923, up to 1947 could only reach to a production capacity of 120 tons. Due to importation problems created by the commencement of second world war it entered into a stagnant period.

The introduction of thermoplastic materials to Turkey begins from the year 1950 onwards. By the foundation and acknowledgement of new methods in the application of plastics during the year 1952, a considerable increase in the importation of plastic materials like Polyvinylchloride, Polyethylene, Polystyrene, Acetate cellulose, Celluloid and Urea Formaldehyde was realized.

It is only after 1960 when the State Planning Organization took up the subject into consideration and after the foundation of Petrochemical Complex in 1965 that the plastic industry in Turkey gained a new momentum.

This study is an attempt to examine the two major Plastic Industries :

- Plastic Processing Industry
- Raw Materials Producing Industry .

in Turkey covering a period of ten years starting from 1963. Synthetic rubbers are excluded of this study .

I - PLASTIC PROCESSING INDUSTRY :

1. Most of plastic processing plants are concentrated in the neighborhood of the cities that are industrial and commercial centers such as Istanbul, Izmir and Mersin .

2. According to the information supplied by the Chambers of Commerce and Industry in 1972, 884 companies were actively involved in the plastic processing industry .

3. Only 150 firms out of 884, has replied to the questionnaire prepared with the intention to study the present state of the Plastic Industry .

4. The answers received from 150 firms together with the data pertaining to 884 companies , constitute the main source of information of our below summarized study .

Capital Levels

5. Table I gives the capital levels of 884 firms actively involved in plastic processing .

Table - I -

-	The number of companies whose capital is less than	₹ 70,000	is	715
-	" " " " " "	is between	₹ 70,000-₹140,000	is 79
-	" " " " " "	" "	₹140,000-₹210,000	is 34
-	" " " " " "	" "	₹210,000-₹280,000	is 21
-	" " " " " "	" "	₹280,000-₹350,000	is 17
-	" " " " " "	" "	₹350,000-₹700,000	is 11
-	" " " " " "	" "	greater than ₹ 700,000	is 7

6. However, according to the 1970 statistics of chambers of commerce and Industry, constitution of total capital of this sector is shown in Table II.

Table - II -

<u>Land and Building</u>	<u>Machine and Equipment</u>	<u>Other Fixed Assets</u>	<u>Working Capital</u>	<u>Total Capital</u>
₹506.300	₹ 21,632.660	₹ 2,180.670	₹ 15,749.000	₹ 44,068.630

1. By evaluating the Tables I and II, following generalizations can be made so as to show the present status of the plastic processing Industry in Turkey .

- About % 80 of the firms actively involved in Plastic Processing Industry are small scale work - shops .
- These work-shops or factories are either rented or they supply minimal work-place conditions for their labourers .
- This sector, is poned with financial impossibilities from the point of storage of raw-material and processed goods, or this sector produces on order.

Machine and Equipment :

8. Table - III gives the number of plastic processing machines of 884 firms and their types in accordance with the data prepared by the chambers of commerce Industry .

Table - III -

<u>Extruders</u>	<u>Injection Machines</u>	<u>Blow Moulding Machines</u>	<u>Presses</u>	<u>Calenders</u>
1.143	1254	606	1270	41

9. The following facts should be noted as an addendum to Table III.

- About 20 thermoforming machines are considered either in the presses or in blow moulding machinery group .
- In this Table fore preparatory machines as High Speed mixer, two roll mill, planetary mixer, and granulator are not included .
- Since a great number of extruders used for tubular film processing and others in such applications as the production of polyethylene and polyvinylchloride pipes and flexible hoses, wire and cable coating, they are all equipped with necessary head roller and drawer systems . The maximum lay flat width of tubular film which can be processed in the sector is 4 meters .
- The injection machines also includes the machines utilized in injection of PVC shoes. In this group, a large variety of machines such as machinery to

produce plastic bins to baby bath to weight 2.5 kg. with dimensions of 0.80x 0.80 x 0.15 meters are also included.

- The group of machinery considered under "Blow Moulding" includes also machines with a capacity to produce 80 lt (drum).
- Automatic and hand operating heat sealing machinery are not included within the content of Table III.

10. After the evaluation of Table III together with Table II, it is possible to deduce the following results.

- All the machinery used in Plastic Processing Industry in Turkey are rather primitive in their build-up except those owned by large scale establishments.

11. Never the less, a large number of the machines in question are build up from the scraps by the proprietors them selves- Apart from these, there are 5-10 machine and mould manufacturers to meet the needs of plastic processing industrialists.

12. Two firms are quite well organized and specialized in the manufacture of moulds and plastic processing machines in the year 1972, one of them works under the licence of Battendorf.

Working Capacity

13. According to the current laws, the capacity of all the Plastic Processing firms are determined and registered by the Union of Industrial and Commercial Chambers.

The determination of yearly capacities is made by the assumption of a working period of 300 days per year with a length of 8 hours daily work.

14. Table IV gives the registered annual capacities (in tons) of plastic processing industries in the year 1972, calculated in accordance with the above mentioned procedures.

Table - IV -

<u>PVC</u>	<u>PE</u>	<u>PS</u>	<u>PP</u>	<u>Dye stuffs</u>	<u>Bakelite</u>	<u>Galalite</u>	(Ton)
60.500	37.200	12.600	3.100	2.500	3.500	520	

15. We conclude this section by reporting that the machinery utilized in this sector is primitive in nature and of low capacity .

Labour

16. Table V gives the classification of labour as regards to their qualifications in this sector (according to the 1970 statistics). The figures given below are derived from a sample of 150 firms .

Table - V -

No. of Workers	<u>Unqualified workers</u>	<u>Qualified workers</u>	<u>Technicians</u>	<u>High School Graduates</u>
Average annual income	\$ 525	\$ 840	\$ 2,030	\$ 3,361

17. The above figures may be misleading for in General the qualification of the workers and their annual incomes in many of the firms that are not included in the above sample are of a lower rate .

Technical Background

18. The following generalization can be made on the subject of technical knowledge of the plastic processing firms in their own fields :

Firms engaged in processing other industrial products within the frame work of this sector do possess required technical knowledge in their field of activities . However , a great majority of the firms exercising activities on other fields unfortunately do not possess required technical data pertinent to plastic processing technology as well as on the subject of plastic materials .

19. Expressing the above in a broad scale, we may state that, firms engaged in , the pipe and profile extrusion , wire and cable coating , PVC paste applications, foam applications , PVC bottle extrusion, knitted socks are classified as large scale establishments who are equipped with required technical background .

20. Establishments manufacturing heavy - duty sacks, tubular film for greenhouses , thermoformed products, large dimensioned injection products , though are confronted with problems in respect of manufacturing technique , are rein-

forced with sufficient technical knowledge .

21. While on the other hand firms actively involved in the subject of packaging film, small sized injection products, PVC shoes, PE bottles, PE laminations, extrusion coating, rotationally moulded products, PE winter-coating and PE hoses, do generally not possess any of the required technical knowledge.

22. It would be worthwhile to point out that despite the generalization made in the foregoing paragraphs in respect to technical knowledge, this is a matter which is closely related to the fact of dependability as well as the size of the firms engaged in such activities . In fact, a general feel of confidence is dominating on the companies activating on subjects of PE lamination, and extrusion coating that they will in the very near future attempt to remedy their handicaps .

Development of the sector

23. Undoubtedly, Plastics Processing Industry, is to be considered as one of the leading branches of Industry among other industrial branches who exercise greater rate of development compared to the normal rate of development in Turkey .

24. We have endeavored to give a more perspective idea about the development of this branch of industry by pointing out per capita consumption of various kinds of plastics in Turkey during the period of 1967-1972 on Table VI .

Table VI

	<u>1967</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>
PVC	0.47	0.54	0.74	0.82
PE	0.34	0.88	0.98	1.18
PS	0.10	0.18	0.17	0.24
PP	<u>0.01</u>	<u>0.02</u>	<u>0.07</u>	<u>0.20</u>
TOTAL	0.92	1.62	1.96	2.44

25. Factors effecting on the increased rate of development of the sector are enumerated below :

- It is of a cheaper type of a replacement material compared to other materials of natural sources .

- Since this branch of industry is in its early stage of development , demand is in excess of the actual supply (Table VI .)

- No large scale investment is necessary for the building - up of this industry

- By virtue of certain applications, it has been recently adopted in Turkey .

- Possibility of procuring a great variety and quantity of raw-materials from local market .

- Certain facilities have now been granted in respect to foreign currency allocations and relative taxes pertaining to importation of the required raw materials from abroad .

26. It can be forecasted , that this sector is expected to achieve remarkable progress in respect to both capacity and technology as of 1973 . Henceforth, besides the facilities indicated above, the governmental authorities shall put in practice supplementary encouragement measures related to certain taxes etc., to be implemented during the commissioning as well as the investment period of the projects which are found to be feasible .

27. In fact , among the projects which has been granted the privilege of benefiting from the said encouragement measures and/or which are under study for benefiting such encouragement measures are listed below :

- Plant with a total approximate capacity of 29.000 tons for producing valued snaks .

- Two individual powder polyethylene coating plants .

- An extrusion coating plant .

- Two separate PVC profile extrusion plants .

- An injection plant suitable for producing bear bottle - cases -

- An extrusion plant for producing milk bags .

II - PLASTIC - RAW MATERIALS PRODUCING INDUSTRY .

28. Alike the Plastic Processing sectors, the plants and complexes producing Petrochemical raw and intermediary materials in Turkey, are concentrated in the

intensified regions of industry .

29. Comprehensive knowledge could not be acquired from other establishments which are of the nature of polymerization unit , although in fact satisfactory data could be obtained for the Petrochemical Complex .

Capital

30. Petkim - Petrochemical Complex was during the initial phases set-up with a main capital of 250.000.000 TL. which was later augmented to 750.000.000 TL.

This company has realized a total investment of 2.2 billion TL. during 1972 for the plants indicated in Table VII.

31. With a view to meet the increasing demand of plastic raw-materials, Petkim has initiated prompt action to \$ 100 extend PE and PVC plants and as a result thereof succeeded in commissioning the PE extension plant in 1973 .

Capacities

32. Capacities as per type of products of the firms producing plastics are given in Appendix - 1 Table VII . As the subject of capacity will be referred to again in subsequent chapters, it is found sufficient to mention only the capacity values in this chapter .

Employment :

33. If a comparison is to be made on the qualification of employees in plastic processing sector and plastic raw materials producing sector, we can reach to the conclusion that considerable difference can be observed in favour of raw - materials producing sector . As matter of fact , besides the type of works requiring physical activities in the petrochemical industry , for other fields of employment a university degree is stipulated as a must .

34. Field of activation and number of personnel employed by Petrochemical Complex during the term of 1969-1972, are given on Table VIII.

Table - VIII -

<u>Years</u>	<u>Technical</u>	<u>Administrative</u>	<u>Others</u>	<u>Total</u>
1969	659	273	367	1299
1970	828	310	279	1419
1971	1017	345	329	1691
1972	1077	378	338	1713

Technical Knowledge

35. As it is the case for great many other countries , realization of Petrochemical Industry in Turkey has come into being by concluding licence and know-how agreements with other specialized firms . TABLE IX below contains list of licence agreements by which various types of plastic are produced .

Table IX

<u>UNIT</u>	<u>LICENCE</u>	<u>ENGINEERING</u>
PE	ICI	JIMON CARVES
PVC	ICI SOLVIC SOLVAY	C.T.I.P.
PS	CODREN	LITVIN
CBR	POLYSAR	HEARTLEY
SBR	SHELL	"

36. Within the frame work of licence agreements concluded , personnel of works-plant as well as those of the related units are subjected to special training with the licensor companies .

37. On the other hand, with a view to secure recent development possibilities in respect to both production and exploitation , a new research department has been set - up in the complex and the required machinery and equipment had been procured for this purpose .

38. With a view to take proper advantage of various types of seminars specialized courses and the like both in Turkey and abroad , a radical programme has set up which will enable the personnel to reinforce their qualifications within their own frame of activities .

Expected Development

39. We have already pointed out in paragraph 23-27 great scale of developments in plastic industry in Turkey . Nevertheless the capacity of the Petrochemical industry aimed to meet the plastic product requirements of the country , has failed to meet the increased demand and despite the fact that 100 % extension of the related units have been realized, it would still not be possible to meet the countries requirements domestically .

40. In addition to the above, new types of plastic have replaced certain specific types of plastic previously used in Turkey .

41. In the foregoing paragraphs, detailed information will be presented on the subject of consumption values of plastic materials and their projections in future .

42. In Table X contained in Appendix - 2 , consumption percentages as per various fields of applications of the plastic types broadly used in Turkey and consumption percentage estimations in terms of 1970 are given .

43. Considering the substitution of various types of plastic with each other , we must indicate that cost of raw materials plays a vital role rather than the quality average factor of the finished product . It is self explanatory that development in Turkey as regards to various industrial branches display an important factor in the consumption percentages .

44. In parallel to the development summarised above, intensified efforts are being spent for the continuation of feasibility and investment studies on the subject of producing the required plastic materials locally in Turkey .

45. Furthermore a particular importance by the Turkish government has been attributed to the erection of the second Petrochemical Complex aimed in the Third five year Development Plan , and realization of this complex during this period is foreseen .

III . PLASTIC CONSUMPTION

46. Plastic processing capacity of the sector was taken up in paragraphs 13-15 and expected development of the same sector was discussed in paragraph 23. and consumption percentages as per various types finished products of the Low Density PE, PVC, PP, High density PE were in detail studied in paragraphs 39-45. In this section , consumption values during the period 1963-1971 as well as projection of demand until 1987 has been studied .

Domestic Product Supply

47. The capacities of firms producing plastic raw or intermediary materials are shown on Appendix - 1 Table-VIII , and actual quantities produced during the period of 1963-1972 are given on Appendix 3 Table - XI .

48. It is worth while to make the following clarifications in respect to the above mentioned Tables .

- The production capacity of the polyethylene unit has reached to 27.000 tons/year by the start - up of the 25.000 tons/year polyethylene expansion in the beginning of 1973 . For this reason, the capacity utility in 1972 is actually 100 % .

- No veritable knowledge could yet be acquired about the domestic production level of polyester resins, phenolics and urea formaldehyde resins .

Imports :

49. The quantity of plastic materials imported to Turkey during the period 1963-1972 according to types is given in Appendix 4 Table XII .

The intermediary raw-materials of the plastic industry are included within the frame work of import tables .

50. However, bearing in mind that the figures representing both domestic productions and imported goods were based on Turkish Lira values as per our previous studies carried out in this respect , to avoid a probable error which may be influenced by the variation of the different foreign currency rates, it is deemed it proper to base this values on \$.

Consumption during 1963 - 1972

51. Consumption values of plastic materials calculated by the summation of import and domestic production values are given in Appendix 5, Table XIII.

The comparison of Table IV with Table XIII reveals the fact that, the consumption values of plastics excluding polyvinylchloride, reach to such levels as to exceed the working - capacities. We deem it important to make the following explanation on this subject :

- The capacities are registered on the basis of 8 hours daily work.
- Since sufficient knowledge could not be acquired, recently registered capacities could not be shown in Table IV.

- Although the capacity reports indicate the quantity of plastic materials consumed according to types, during processing phase, one type of plastic material can be substituted by the other.

- Despite the fact that approximately 50 % of the plastics processing sector in Turkey can be described as unutilized capacity, this may presumably be the result of neglecting to disregard the technologically work-out machinery from the capacity reports.

52. High density polyethylene used in the injection blow moulding - and knitted socks production, is rapidly substituting the low density polyethylene and polypropylene recently.

Furthermore consumption of polyethylene and Polyvinylchloride plastic materials, has considerably increased especially after the start-up of Petrochemical Complex and they remain to be one of the most desirable consumed plastic types.

53. Although a gradual rate of increase in the consumption of plastic materials in Turkey is noticeable from 1967, it can easily be seen that the figures representing per capita consumption on Table -VI, are notably below the level of world standards. This represents a typical characteristic of the developing countries.

54. Influence of increase in gross national income and progress in industrial and agricultural development, is quite remarkable in the rise of per capita plastic consumption .

55. On the other hand rate average 2 : 5 % population growth in Turkey , effects the consumption positively .

Demand Forecasts

56. Plastic material demand forecasts has been studied in the section dealing with expected developments in the Turkish plastic industry , and the related figures has been given on appendix 6 Table XIV .

57. Linear , semi-logarithmic, parabolic and Gompertz type time series have been utilised in the calculation of these demand forecasts and for each type of demand forecasts the most suitable method conforming to the consumption, time curve of the related product in the past has been selected . However, in the demand forecasts pertaining to the products solely imported due to the unproductibility in Turkey , we have tried to estimate the real demand besides the import figures since it would be impractical to establish actual market potentials effected by certain restrictions .

IV - REQUIRED TECHNICAL ASSISTANCE

58. In general all sorts of difficulties arising out of the implementation of technique , organization , Technology as well as new applications confronted with during the settlement and build-up of a new industry in the developing countries stand also true for the plastic industrial branch in Turkey .

59. In conclusion , we may say that required technical assistance to new inventions , to be applied in the new field of applications as well as knowledge of process accompanied by instrumentation , technology and organization can be secured for contributing to the plastic industry of the developing countries by timely arranging seminars , conferences, and if necessary expediting experts to the countries in question .

APPENDIX I

TABLE VII

PLASTICS RAW MATERIAL PRODUCERS

RAW MATERIAL TYPE	CAPACITIES	START-UP DATE	PRODUCERS AND LOCATION PLACE
POLYETHYLENE	12 000	1970	PETKIM-İZMİT
POLYETHYLENE EXPANSION	15 000	1973	" "
POLYVINYLCHLORIDE	20.000	1970	" "
" EXPANSION	26 000	1974	" "
POLYSTYRENE	15 000	1974	" "
CAPROLACTAM	25 000	1975	" "
SBR	32 150	1974	PETKIM-KAUÇUK-İZMİT
CBR	13 150	1974	" " "
PLASTICISERS (Based on PA)	11 050	In Operation	PLASTIFAY-İSTANBUL
		"	MARSHAL - "
		"	PLASTEL - "
		"	DERBY - "
		"	VINYL-PLAST "
POLYVINYL ACETATE	10 630	"	HOECHST "
		"	MARSHAL - "
		"	POLISAN - "
		"	POLINPEX - "
UREA FORMALDEHYDE RESINS 11.135		"	BASF-SÜMERBANK
		"	POLISAN SÜMERBANK
ALKYD RESINS	8 291	"	BAYRAKLI-İZMİR
			DYO - "
			DEVILUX - "
			ÇAVUŞOĞLU-İSTANBUL
			MARSHALL "
			EVA "
			MERBOLIN "

POLYESTHER RESINS	4 448	In operation	DEWILUX - İZMİR
			MAZOKAL - İSTANBUL
ACRYLICS	200	"	SVA - "
ACRYLICS			FAROLAS - "
			ŞAŞP-ŞÜMERBANK İSTANBUL
PHENOLIC	2 450	In operation	ÖZTANIK KINYA "
			DERBY "
			POLYSAN "
			POLINDEA "
MELAMIN	2 000		PESKIN "
			ŞAŞP-ŞÜMERBANK "
SYNTHETIC FIBERS			DERBY "
			SASA - ADANA
			ŞİPAŞ- BURSA
			AKBA - İSTANBUL

APPENDIX - 2

TABLE - 1

CONSUMPTION PERCENTAGE OF VARIOUS PLASTICS AGAINST APPLICATION FIELDS

APPLICATION FIELD	PVC			PE (L.D.)			PE (H.D.)			PP	
	1972	1973	1973	1972	1973	1973	1972	1973	1972	1973	
RIGID EXTRUSION (Pipe Profile)	54.00	51.86					6.00	4.30	0.84	1.26	
WIRE AND CABLE COVERING	13.00	16.00		1.12	1.00						
INJECTION	1.85	1.74		23.53	15.60		2.02	1.34	10.16	15.41	
SHOES	5.00	9.00									
PASTE	18.55	14.00									
ACCUMULATOR SEPARATORS	0.30	1.00									
RECORDS	0.41	0.50									
PACKAGING FILM AND SACKS				33.90	37.40						
HEAVY DUTY FILM AND SACKS				40.26	42.00						
FLOOR COVERING	2.32	3.50									
BLOW MOULDING	1.19	1.00		0.00	1.80		61.70	42.25			
COATING					0.20						
FLEXIBLE EXTRUSION	2.37	2.40		1.17	2.00						
NOVEN SACK, ROPE AND FISHING NETS							30.28	52.11	39.00	83.33	

APPENDIX - 3 TABLE XI
THE LEVEL AND VALUE OF PRODUCTION OF PETROCHEMICALS TO TURKEY

Current Capacity Ton/Year	Unit	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
27.000	Ton								5.638	10.246	12.413
26.000	TL.								42.782	66.035	81.677
10.630	Ton		35	1.575	3.432	4.415	5.617	6.450	7.000	7.595	10.300
4.448	TL.		164	7.371	21.278	28.256	40.442	38.700	50.050	62.100	81.400
2.450	Ton				75	533	588	1.162	1.600		
	TL.				675	4.613	5.128	10.951	19.200		
	Ton						252	1.207	1.355		
	TL.						815	5.092	6.910		
11.135	Ton						568	2.966	3.511		
	TL.						1.444	7.507	10.340		
10.050	Ton					2.202	3.167	5.078	5.114	7.180	11.400 (x)
	TL.					18.662	26.850	43.051	49.749	58.300	93.500
	Ton		35	1.575	3.507	7.190	10.192	16.563	26.760	34.877	51.436
	TL.		164	7.371	21.933	31.679	74.672	125.331	187.897	241.352	376.956

(x) Estimated

This table has been prepared by the help of the (March 1972) report prepared by the Private Commission of State Planning Organisation on the subject of artificial and synthetic fibres and by the help of 1973 Programme of State Planning Organisation (Page 154)

APPENDIX 4
TABLE XII
 QUANTITY AND VALUE OF PETROCHEMICALS ANNUALLY IMPORTED
 TO TURKEY

	Unit	1963	1964	1965	1966	1967
	Ton/ TL.					
POLYETHYLENE (PE)	Qty.	3.334	4.550	4.357	7.259	9.333
	Value	9.829	14.298	14.171	29.097	25.166
POLYVINYLCHLORIDE (PVC)	Qty.	5.510	5.678	6.550	15.059	15.242
	Val.	19.172	16.466	19.285	43.611	42.729
POLYVINYLACETATE	Qty.	-	-	-	-	42
	Val.	-	-	-	-	293
POLYESTER RESIN	Qty.	-	-	-	-	47
	Val.	-	-	-	-	202
PHENOLS	Qty.	-	-	-	-	403
	Val.	-	-	-	-	1.022
UREA FORMALDEHYDE RESINS	Qty.	-	-	-	-	99
	Val.	-	-	-	-	270
PLASTICIZERS	Qty.	-	-	-	-	462
	Val.	-	-	-	-	1.560
CAPROLACTAM	Qty.	-	-	8	10	10
	Val.	-	-	337	642	770
DIMETHYL TEREPHTHA- LATE	Qty.	-	-	-	-	94
	Val.	-	-	-	-	314
POLYSTYRENE	Qty.	1.650	2.980	3.569	4.742	3.263
	Val.	4.721	8.496	10.175	13.512	9.305
POLYPROPYLENE	Qty.	-	-	69	245	304
	Val.	-	-	372	722	838
ACRYLONITRILE	Qty.	-	-	-	-	5
	Val.	-	-	-	-	527
ACRILICS	Qty.	-	-	-	-	50
	Val.	-	-	-	-	223
ALKYD RESINS	Qty.	-	-	-	-	207
	Val.	-	-	-	-	936
CBR	Qty.	-	-	-	-	14
	Val.	-	-	-	-	61
SBR	Qty.	-	-	6.280	8.528	13.124
	Val.	-	-	24.406	32.894	49.877
TOTAL ...	Qty.	10.500	13.508	21.362	38.483	42.669
	Val.	39.329	37.260	68.802	120.545	134.093

APPENDIX - 4
TABLE XII
QUANTITY AND VALUE OF PETROCHEMICALS ANNUALLY IMPORTED
TO TURKEY

	Unit Ton/ Tl.	1968	1969	1970	1971	1972
POLYETHYLENE (PE)	Qty.	19.000	18.302	20.285	20.670	24.810
	Val.	33.086	27.188	35.322	60.131	85.303
POLYVINYLCHLORIDE (PVC)	Qty.	16.751	14.766	17.738	18.147	15.931
	Val.	44.976	37.720	48.116	70.816	62.164
POLYVINYLACETATE	Qty.	34	52	50	78	92
	Val.	268	137	234	367	420
POLIESTER RESIN	Qty.	12	-	3	0.1	1
	Val.	51	-	52	1	27
PHENOLS	Qty.	1.213	1.386	1.964	2.108	2.042
	Val.	2.738	3.106	7.619	12.820	12.245
UREA FORMALDEHYDE RESINS	Qty.	176	910	2.382	2.435	2.360
	Val.	281	1.804	5.706	5.844	5.650
PLASTICIZERS	Qty.	433	6.304	8.318	9.429	9.628
	Val.	1.284	17.988	35.815	40.560	42.320
CAPROLACTAM	Qty.	2.410	4.000	6.104	10.399	10.635
	Val.	12.403	17.566	36.732	77.479	72.439
DIMETHYLTERTHPHTALATE	Qty.	143	6.294	8.311	9.429	10.845
	Val.	519	17.956	44.087	57.346	68.360
POLYSTYRENE	Qty.	5.045	4.725	7.002	6.203	13.325
	Val.	13.135	11.219	18.728	21.718	49.410
POLYPROPYLENE	Qty.	492	285	630	2.555	7.286
	Val.	1.078	449	2.078	8.405	25.822
ACRYLONITRILE	Qty.	7	9	10	42	5.108
	Val.	1.041	801	1.108	3.655	17.008
ACRILICS	Qty.	11	19	8	219	392
	Val.	85	253	743	2.405	5.199
ALKYD RESINS	Qty.	247	27	31	75	11
	Val.	678	167	360	674	133
OBR	Qty.	845	523	253	226	291
	Val.	2.397	1.850	865	1.439	1.736
SBR	Qty.	13.750	11.237	8.768	10.732	13.751
	Val.	49.205	37.622	37.304	59.415	73.487
TOTAL	Qty.	60.569	68.799	81.857	92.747,1	116.208
	Val.	163.175	175.776	274.869	423.075	522.423

APPENDIX - 5 TABLE - XIII
THE CONSUMPTION OF PETROCHEMICALS IN TURKEY
(Ton)

	1963	1964	1965	1966	1967	1966	1969	1970	1971	1972
POLYETHYLENE (PE)	3.134	4.870	4.986	9.899	3.133	19.000	18.302	26.923	30.916	36.923
POLYVINYLCHLORIDE	5.510	5.678	6.550	15.059	15.212	16.751	14.726	19.280	27.703	33.256
POLYVINYLACRYLATE	-	35	1.575	3.432	4.457	5.651	6.502	7.050	7.973	10.392(X)
PHENOLS	-	-	-	-	43	1.455	2.593	3.319	2.108	2.042
POLYESTER RESINS	-	-	-	75	580	600	1.162	1.603	-	1
UREA FORMALDEHYDE RESINS	-	-	-	-	99	744	3.876	5.893	2.435	2.360
PLASTICISERS	-	-	-	-	2.664	3.600	11.382	13.432	16.609	21.028
CAPROLACTAM	-	-	8	10	10	2.410	4.000	6.104	10.399	10.635
DIOCTYL SEBACATE	-	-	-	-	94	143	6.294	8.311	9.429	10.845
POLYSTYRENE	1.656	2.980	3.569	4.742	3.263	5.045	4.725	7.002	6.203	13.325
POLYPROPYLENE	-	-	69	245	304	492	285	630	2.555	7.256
ACRYLONITRILE	-	-	-	-	5	7	9	10	42	5.108
ACRYLICS	-	-	-	-	50	11	19	8	219	392
ALKYD RESINS	-	-	-	-	207	247	27	31	75	11
CBR	-	-	-	-	14	845	523	253	226	291
SDR	-	-	6.260	8.528	13.124	13.750	11.237	8.769	10.732	13.751
TOTAL	10.500	13.543	22.937	41.990	49.819	70.761	95.662	108.617	127.624	167.646

APPENDIX - 6

TABLE-AIV

DEMAND FORECASTS FOR PETROCHEMICALS IN TURKEY

(Ton)

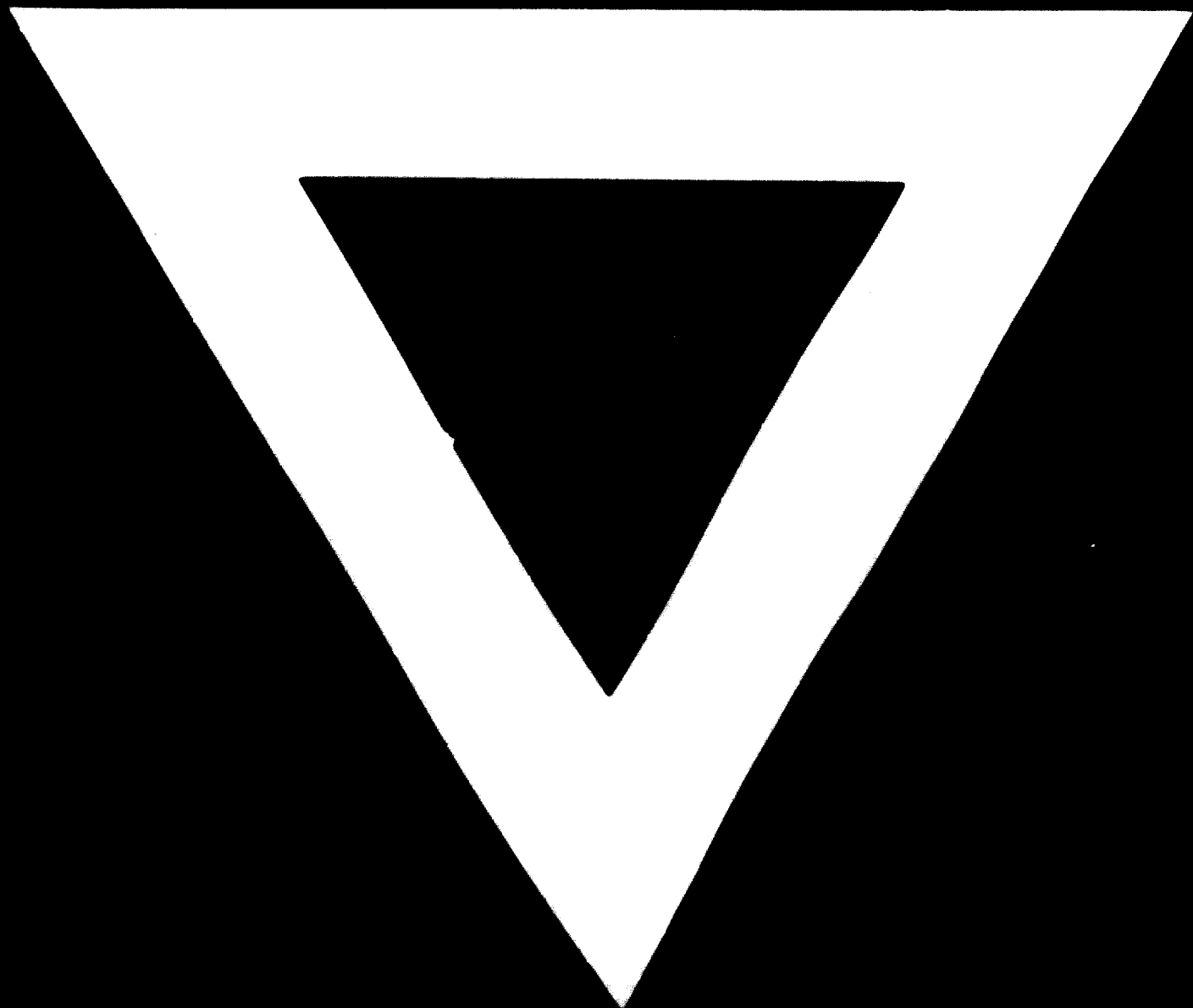
YEARS	1973	1974	1975	1976	1977	1978	1979
MELAMIN	943	1.258	1.619	2.025	2.477	2.974	3.517
POLYPROPYLENE (PP)	11.500	14.000	17.500	21.500	26.500	32.000	38.000
HIGH DENSITY POLYETHYLENE (HD.PE)	7.964	10.255	12.930	15.990	18.990	23.224	27.376
LOW DENSITY POLYETHYLENE (L.D. PE)	51.350	60.810	71.010	81.890	93.340	105.150	117.260
POLYSTYRENE	10.300	11.800	13.600	15.700	18.200	21.000	24.400
POLYVINYLAETATE (PVA)	7.804	9.202	10.800	12.314	14.050	15.106	17.220
POLYVINYLCHLORIDE (PVC)	35.200	41.000	47.900	55.900	65.200	76.000	88.700
POLYESTHER (PET)	20.530	25.440	30.590	36.040	41.580	47.130	52.600
CAPROLACTAM	11.253	12.378	13.615	14.975	16.473	17.323	18.169
STYRENE BUTADIENE RUBBER (SBR)	17.426	18.861	20.486	23.748	26.883	29.990	31.313
CIS-POLYBUTADIENE RUBBER (CBR)	7.468	8.064	8.780	10.178	11.522	12.425	13.420
ACRYLONITRIL BUTADIENE STYRENE RUBBER (ABS)	1.425	1.800	2.325	2.950	3.850	5.000	6.578

APPENDIX - 6

TABLE - XIV

DEMAND FORECASTS FOR PEROXYCHEMICALS IN GUMMI (Ton)

YEARS	1980	1981	1982	1983	1984	1985	1986	1987
TELAMIS	4.104	4.722	5.416	6.141	6.910	7.725	8.582	9.500
POLYPROPYLENE (PP)	45.000	52.500	61.000	70.500	80.500	91.500	104.000	117.000
HIGH DENSITY POLYETHYLENE	31.805	36.805	41.374	46.460	51.795	57.050	62.350	67.620
LOW DENSITY POLYETHYLENE	129.500	142.000	154.500	167.000	179.100	191.200	201.900	212.000
POLYSTYRENE	26.200	32.900	37.800	43.700	50.500	58.400	67.600	77.500
POLYVINYLACRYLATE (PVA)	19.788	22.192	23.634	24.542	26.100	26.344	28.100	29.220
POLYVINYLCHLORIDE (PVC)	103.500	120.800	140.900	162.000	181.000	199.000	216.000	235.000
POLYESTER (PET)	57.910	63.000	67.830	72.360	76.630	80.049	84.000	87.300
CAPROLACTAM	19.099	20.059	21.062	22.115	23.220	24.381	25.600	26.800
STYRENE BUTADIEN RUBBER (SBR)	33.867	37.071	40403	43.020	45.600	48.400	51.000	53.500
CIS-POLYBUTADIEN RUBBER (CBR)	14.514	15.888	17.316	18.200	19.500	20.450	21.500	22.500
ACRYLONITRIL BUTADIEN STYRENE RUBBER (ABS)	7.565	8.700	10.000	11.500	12.225	14.058	16.000	17.800



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