PAGEV

TURKISH PLASTICS PROCESSING MACHINERY INDUSTRY
FOLLOW-UP REPORTS
2017

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PREFACE

The plastic industry is one of the most important actors of the Turkish economy. Today, the contribution of the plastics industry to the country's economy is gradually increasing with the total production exceeding 9 million tons, and 35 billion dollars worth of turnover, the approaching direct exports of 5 billion dollars and the annual growth of 12% for the last 10 years.

Our industry, with its production capacity, has reached the second place in Europe and the sixth place in the world. As PAGEV, we continue to lead the industry successfully in the framework of the "Connecting Power" mission of the Turkish Plastics Industry.

We also know that having the right and reliable data and information is the most important part of the solution when we sign the indispensability of Plastics in our lives and sign our work to tackle our industrial problems with concrete steps based on scientific evidence. In this direction we constantly investigate, collect new data, compile and report them. We present our reports that we believe are important for the development of our industry and our booklets containing important information to the plastics industry representatives, stakeholders and public institutions.

As PAGEV, we prepared a report set that will contribute to the industry in a serious way in the face of our long and dedicated researches. With our reports, we made booklets with the comments of our expert reporters about the point where the Turkish Plastics Industry is in the right and reliable light, common problems and what should be the search for concrete solutions. We believe that our reports and information set will benefit all of our stakeholders, especially our members, and will guide the plastics world. At the same time, we are pleased that our public institutions have reached the most up-to-date and accurate information about the plastics industry.

On the other hand, with our sector reports in English, we think that our colleagues will be able to share the potential of our country's plastics industry with the most up-to-date business partners in the global marketplace.

Hereby, presenting our current reports and information files relating with our industry, we would like to thank all of our colleagues who have contributed to this day's achievement of our industry, who has taken a position as a locomotive mission in the development of our country.

Best regards,
Yavuz EROĞLU
PAGEV President

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- EXECUTIVE SUMMARY -

Turkey is a country which imports about 60-80% of plastic processing machines and parts and accessories and is a net importer in these products and can not provide sufficient added value with low export prices compared to developed western societies. As the plastics industry is growing rapidly, the production of plastic processing machines does not develop parallel to this pace, and the sector can not develop against imports made from cheap machine-maker countries, especially from China. The lack of a state strategy for the plastic processing machinery industry and the inadequate protection of the domestic producers cause the production of plastic processing machines in Turkey not to improve sufficiently.

Annual machinery investment of Turkish plastics industry realized as USD 821 million for the last 5 years between 2012-2016 period. In this period, investments of presses and other machines constituted 37% of total investments while injection machines 23%, extrusion machines 19%, thermoforms 5%, blow molding 2% and parts and components 15%.

By the end of September 2017, 359 million dollars of production, 415 million dollars of imports, 116 million dollars of exports and 657 million dollars of domestic sales (machinery investment of the plastics industry) has been realized. In this period, industry gave 299 million dollars of foreign trade deficit and 63% of the investment has been met by imports and export covarage of ımports realised as 28%.

In the January – September period of 2017 comparing with the peer period of 2016; production increased as 5%, imports decreased as 2%, exports inreased as 4%, domestic sales inreased as 1%, foreign trade deficit declined as 4%.

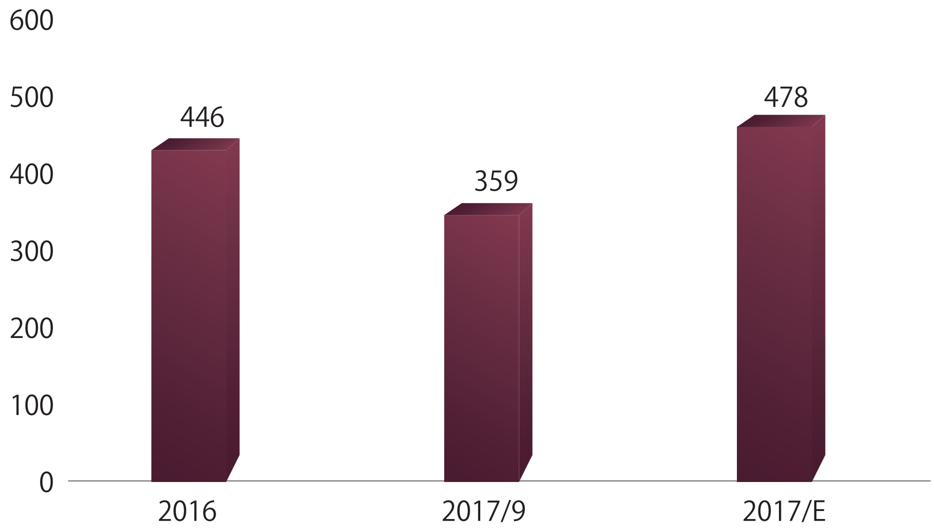
While the share of imports in domestic sales declined from 65% to 63% exports covarage to imports incresed from 26% to 28% in this period.

In 2017, plastic processing machinery production is expected to increase by 7%, domestic sales will remain at the same levels, imports decrease by 5% and exports by 6%, compared to 2016.

In order for the Turkish plastic processing machinery sector to produce and export more value-added machines, the main strategies are as described in the Machinery Sector Export Strategy Document; General Purpose; "Improvement of Machinery Industry and Ensure the Manufacture of High-Tech Products".

1. PRODUCTION

Production of plastic processing machines has increased by an average rate of 9.4% a year between 2012 and 2016. Production realized as 359 million dollars in January – September period of 2017 and expected to be 478 million dollars by the end of the year, increasing by 7% with respect to 2016.



Graphic 1: Plastics Processing Machines Production (USD Million)
Source: TurkStat & ITC Trade Statistics

Taking the January – September period of the year realization into account, production of all machines other than injection and extrusion are expected to increase comparing with 2016.

Machinery Group	2016	2017/9	2017/E	% Increase 2017/2016 (E)
Injection Machines	23	16	21	-5
Extrusion Machines	71	48	64	-10
Blow Molding Machines	1,0	3,4	4,5	334
Thermoform Machines	47	40	53	13
Presses and Other Machines	154	130	173	13
Parts and Components	151	122	162	8
Total	446	359	478	7

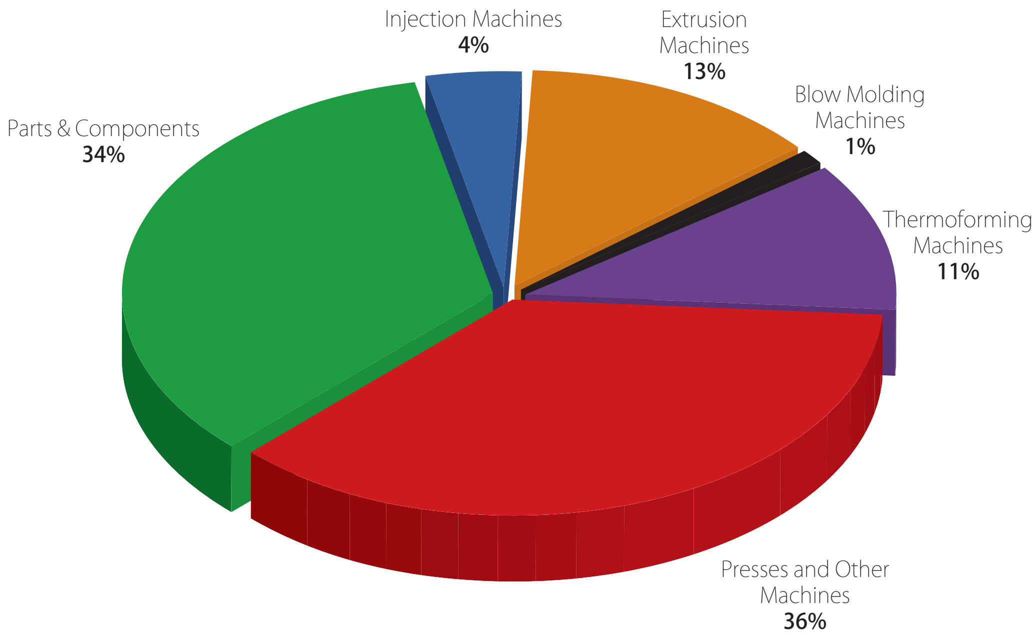
Table 1: Plastics Processing Machines Production (USD Million)
Source: TurkStat & ITC Trade Statistics

1. PRODUCTION

In this period, injection machines accounted for 4% extrusion machines 13%, blow molding machines 1%, thermoforming machines 11%, presses and other machines 36% and parts and components 34% of total plastic processing machines production.

Machinery Group	2016	2017/9
Injection Machines	5	4
Extrusion Machines	16	13
Blow Molding Machines	-	1
Thermoform Machines	11	11
Presses and Other Machines	34	36
Parts and Components	34	34
Total	100	100

Table 2: Share of Machines in Total Production (%)
Source: TurkStat & ITC Trade Statistics

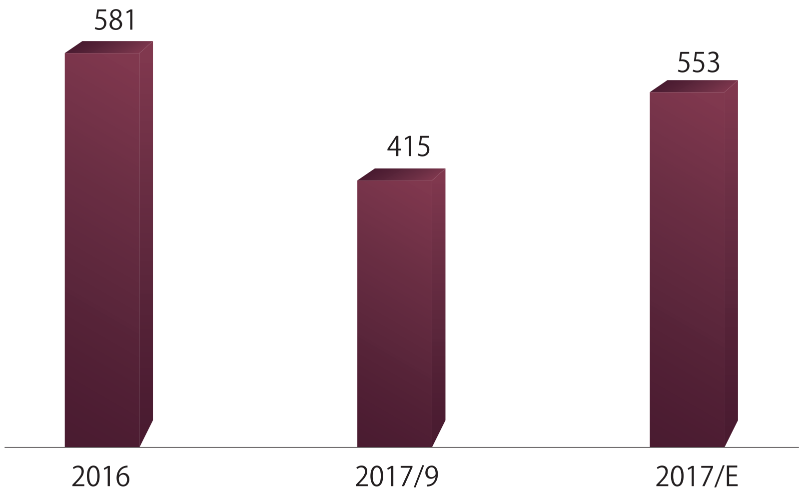


Graphic 2: Share of Machines in Total Production (2017/9)
Source: TurkStat & ITC Trade Statistics

2. FOREIGN TRADE

2.1. IMPORTS

Imports of plastic processing machines has decreased by an average rate of 0.7% a year between 2012 and 2016. In the January – September period of 2017, total plastics processing machines and components imports realized as 415 million dollars and expected to increase to 553 million dollars by the end of the year, decreasing by 5% with respect to 2016.



Graphic 3: Plastics Processing Machines Imports (USD Million)
Source: TurkStat & ITC Trade Statistics

It is expected that imports of all machines other than blow molding, thermoform machines and parts and components to decrease in 2017 with respect to 2016.

Makine Grubu	2015	2016/11	2016/T	%Artış
Injection Machines	172	124	165	-4
Extrusion Machines	115	74	99	-14
Blow Molding Machines	23	20	26	14
Thermoform Machines	15	16	21	42
Presses and Other Machines	216	150	200	-7
Parts and Components	40	32	43	6
Total	581	415	553	-5

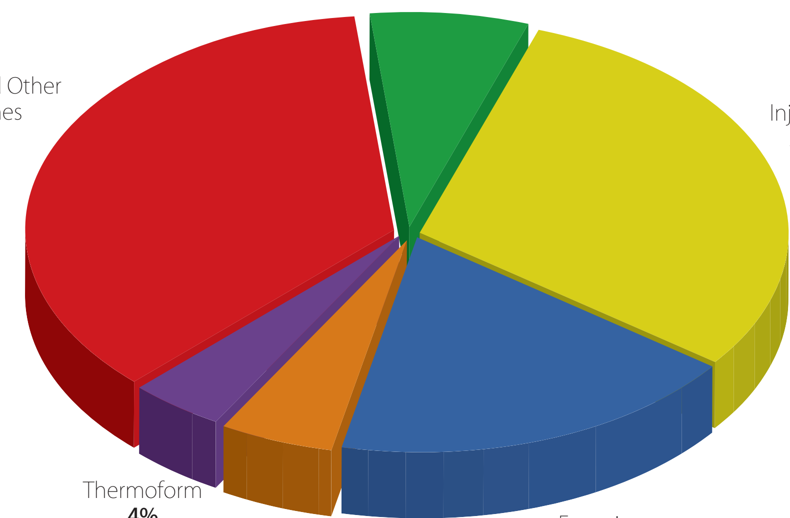
Table3: Plastics Processing Machines Imports (USD Million)
Source: TurkStat & ITC Trade Statistics

In the January – September period of 2017, injection machines shared 30%, extruders 18%, blow molding 5%, thermoform 4%, presses and other machines 36% and parts and components 8% in total imports.

2. FOREIGN TRADE

Machinery Group	2016	2017/9
Injection Machines	30	30
Extrusion Machines	20	18
Blow Molding Machines	4	5
Thermoform Machines	3	4
Presses and Other Machines	37	36
Parts and Components	7	8
Total	100	100

Table 4: Breakdown of Imports by Machine Types (USD -%)
Source: TurkStat & ITC Trade Statistics

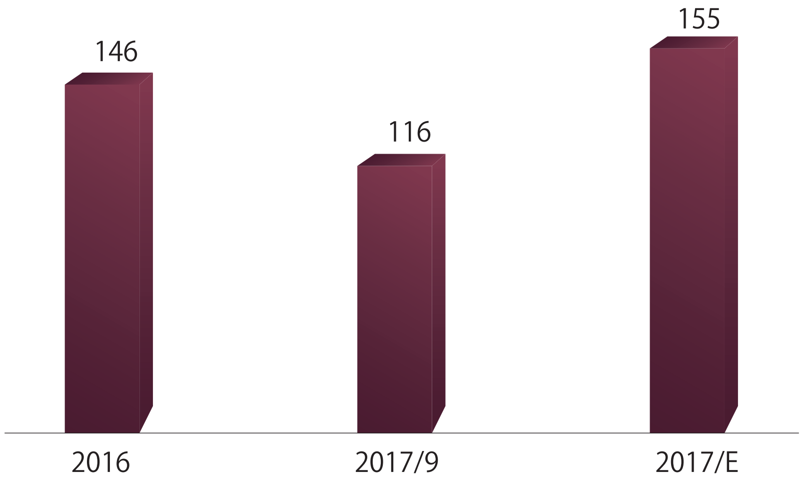


Graphic 4: Breakdown of Imports by Machine Types (USD -%) (2017/9)
Source: TurkStat & ITC Trade Statistics

2. FOREIGN TRADE

2.2. EXPORTS

Exports of plastic processing machines has increased by an average rate of 4.5% a year between 2012 and 2016. Plastics processing machines exports realized as 116 million dollars in the 9 monts of 2017 and are expected to increase to 155 million dollars by the end of the year, increasing by 6% with respect to 2016.



Graphic 5: Plastics Processing Machines Exports (USD Million)
Source: TurkStat & ITC Trade Statistics

Taking the realization of January – September period of 2017, exports of all machines other than blow molding and thermoform machines and parts and components, are expected to decrease.

Makine Grubu	2015	2016/11	2016/T	%Artış
Injection Machines	11.3	8.0	10.7	-5
Extrusion Machines	35.3	23.9	31.9	-10
Blow Molding Machines	0.4	1.3	1.8	334
Thermoform Machines	18.7	15.9	21.3	13
Presses and Other Machines	57.4	50.7	67.6	18
Parts and Components	22.8	16.4	21.9	-4
Total	146.1	116.3	155.1	6

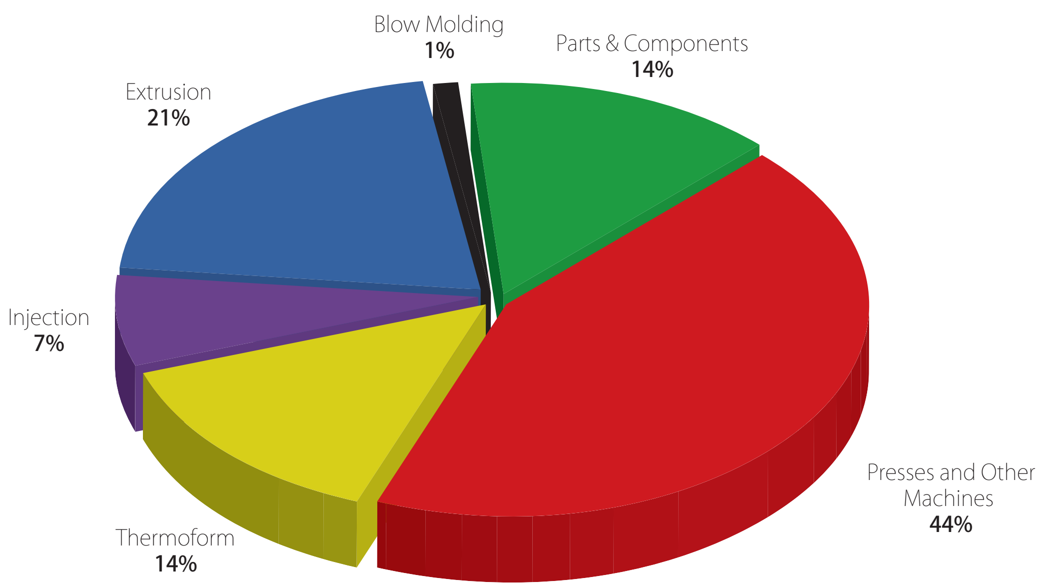
Table 5: Plastics Processing Machines Exports (USD Million)
Source: TurkStat & ITC Trade Statistics

2. FOREIGN TRADE

In the January – September period of 2017, injections shared 7%, extrusions 21%, blow molding 1%, thermoforms 14%, presses and other machines 44% and parts and components 14% in total exports.

Machinery Group	2016	2017/9
Injection Machines	8	7
Extrusion Machines	24	21
Blow Molding Machines	-	1
Thermoform Machines	13	14
Presses and Other Machines	39	44
Parts and Components	16	14
Total	100	100

Table 6: Share of Machines in Total Machine Exports (USD - %)
Source: TurkStat & ITC Trade Statistics



Graphic 6: Share of Machines in Total Machine Exports (USD - %) (2017/9)
Source: TurkStat & ITC Trade Statistics

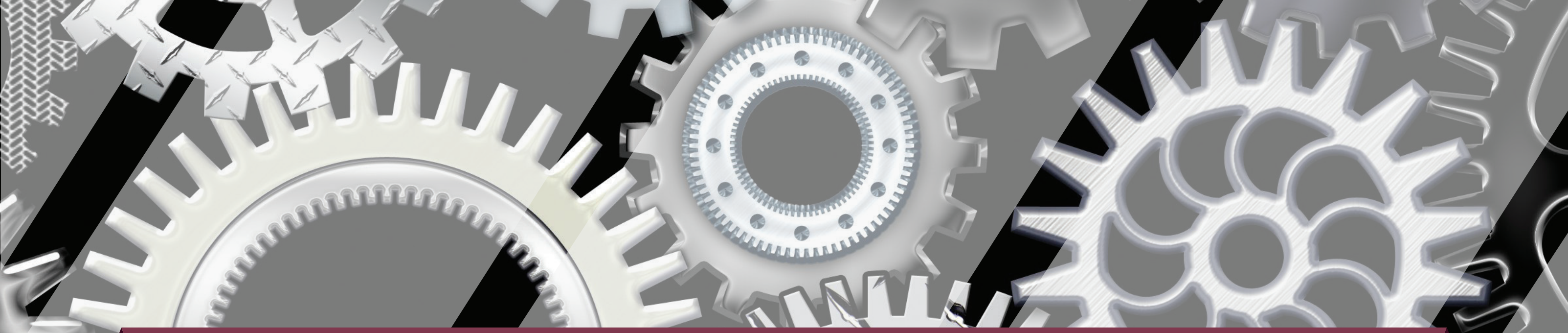
2.3. FOREIGN TRADE BY COUNTRIES

By the end September 2017, plastics processing machines and parts and components imported from 64 countries. Imports from the 10 main countries in the first half of 2017 constituted the 91% of the total imports. China, Germany, Italy, Austria and Japan are the first 5 countries from which Turkey imports plastics processing machines. These countries shared 79.2% of imports on value base.

On the other hand, by the end of September 2017 exports of plastics processing machines destined to 137 countries. The 10 main countries received a share of 45% on value base in January – September period of 2017. The first 3 countries to which Turkey has conducted plastics processing machines exports in this period are Algeria, Germany and Romania. These countries shared 28.2% of exports on value base.

Imports			Exports		
	Million $	% -Share	Countries	Million $	% -Share
China	108.0	26.0	Russsian Fed.	8.5	7.3
Germany	85.4	20.6	Iran	7.1	6.1
Italy	68.3	16.5	Algeria	6.8	5.8
Austria	35.6	8.6	Germany	5.5	4.8
Japan	31.2	7.5	Romania	4.9	4.2
Taiwan	18.7	4.5	Bulgaria	4.3	3.7
Sweetzerland	11.6	2.8	Uzbekhistan	4.0	3.5
France	6.7	1.6	Çorlu Free Zone	3.7	3.2
Canada	6.3	1.5	Iraq	3.6	3.1
UK	5.8	1.4	S.Afriaka Rep.	3.3	2.8
10 Countries	**377.6**	**91.0**	**10 Countries**	**51.9**	**44.6**
Others	**37.5**	**9.0**	**Others**	**64.4**	**55.4**
Total	**415.1**	**100.0**	**Total**	**116.3**	**100.0**

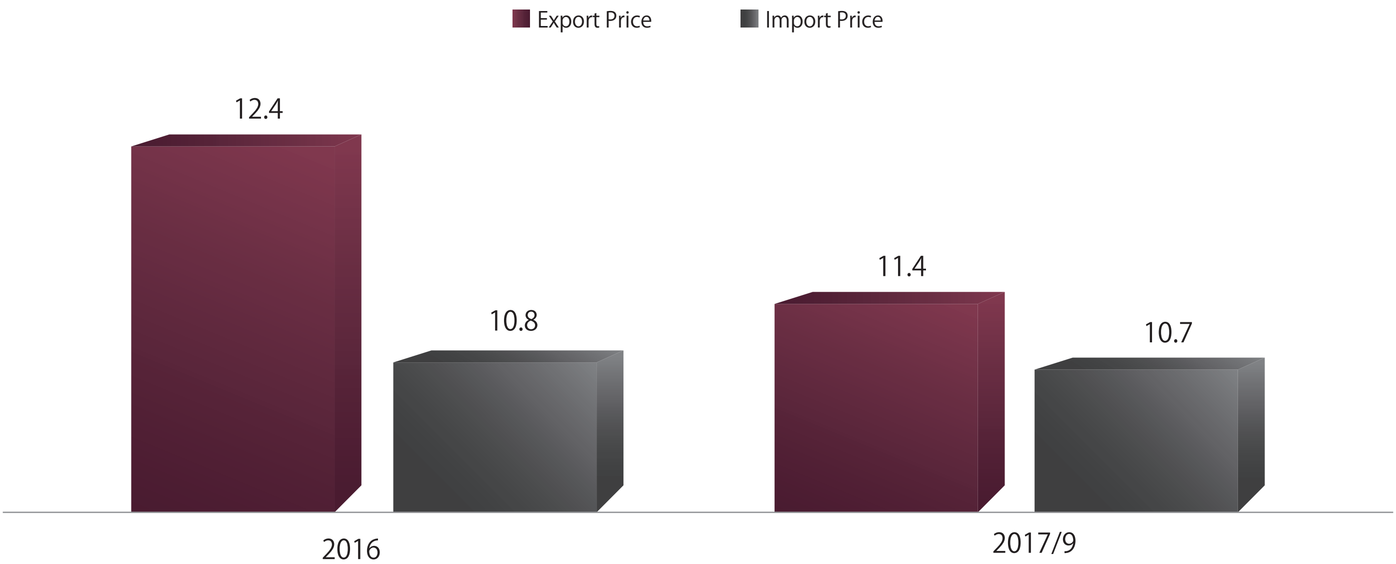
Table 7: Plastics Processing Machines Foreign Trade by Countries (2017/9)
Source: TurkStat & ITC Trade Statistics



2. FOREIGN TRADE

2.4. IMPORT AND EXPORT PRICES

In January – September period of 2017, average unit import prices of plastics processing machines and parts and components realized as USD 11.4/kg, decreasing by 8% with respect to 2016.



Graphic 7: Average Import and Export Prices Of Plastics Processing Machines (USD/Kg)
Source: TurkStat & ITC Trade Statistics

In this period, average import prices for all machines other than injection, presses and other machines and parts and components decreased.

Machinery Group	2016	2017/9	% Increase
Injection Machines	6.6	6.2	-7
Extrusion Machines	20.2	21.2	5
Blow Molding Machines	21.0	22.8	9
Thermoform Machines	15.7	25.6	63
Presses and Other Machines	17.7	14.5	-18
Parts and Components	38.6	32.3	-16
Total	12.4	11.4	-8

Table 8: Average Import Prices By Plastics Processing Machines (USD/kg)
Source: TurkStat & ITC Trade Statistics

Average unit export prices for plastics processing machines and parts and components realized as USD 10.7/kg in the January – September perod of 2017, decreasing by 0.2% compared with 2016. In this period, the average export prices for all machines other than blow molding and presses declined.

2. FOREIGN TRADE

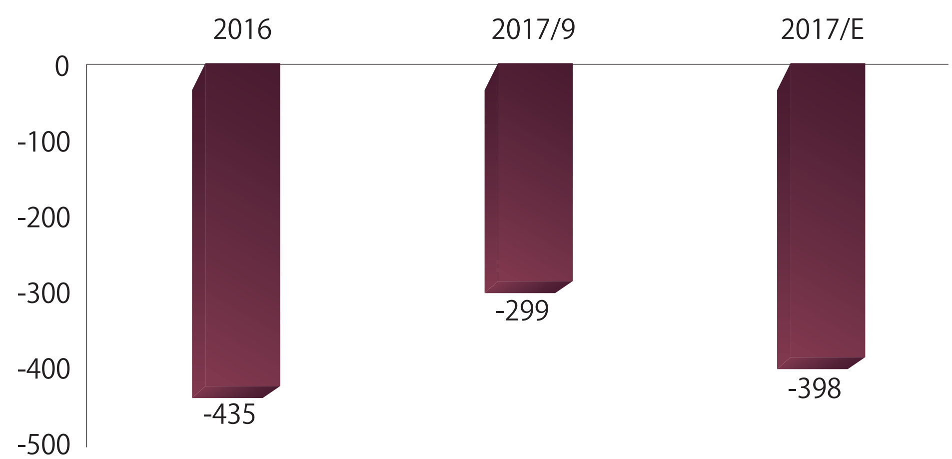
Machinery Group	2016	2017/9	% Increase
Injection Machines	4.6	4.4	-2.8
Extrusion Machines	14.0	12.3	-12.5
Blow Molding Machines	4.0	7.0	74.2
Thermoform Machines	19.0	18.6	-2.4
Presses and Other Machines	8.9	10.2	13.8
Parts and Components	22.2	16.1	-27.3
Total	10.8	10.7	-0.2

Table 9: Average Export Prices By Plastics Processing Machines (USD/kg)
Source: TurkStat & ITC Trade Statistics

In this period, the average unit export prices for plastics processing machines realized 6% less than the average unit import prices.

2.5. FOREIGN TRADE DEFICIT

Turkey has always had foreign trade deficit in plastics processing machines. Its foreign trade deficit, which was 589 million dollars in 2011, decreased to 299 million dollars in the January – September period of 2017. Foreign trade deficit is expected to be 398 million dollars by the end of 2017, decreasing by 8% compare to 2016.



Graphic 8:Foreign Trade Deficit in Plastics Processing Machines (USD Million)
Source: TurkStat & ITC Trade Statistics

Taking the realization in the January – September period of 2017, foreign trade deficit for all machines other than blow molding machines and parts and components are expected to decrease by 2017 with respect to 2016.

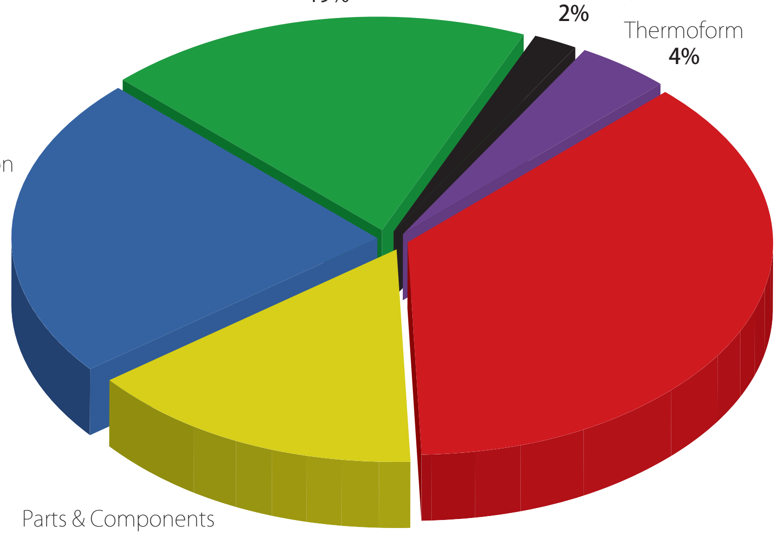
2. FOREIGN TRADE

Makine Grubu	2016	2017/9	2017/E	% Increase (E) (2017/2016)
Injection Machines	-161	-116	-154	-4
Extrusion Machines	-79	-50	-67	-16
Blow Molding Machines	-22	-18	-24	8
Thermoform Machines	4	0	0	-97
Presses and Other Machines	-158	-99	-133	-16
Parts and Components	-17	-15	-21	19
Total	-435	-299	-398	-8

Table 10: Foreign Trade Deficit in Plastics Processing Machines (USD Million)
Source: TurkStat & ITC Trade Statistics

3. DOMESTIC SALES (MACHINERY INVESTMENTS OF PLASTICS INDUSTRY)

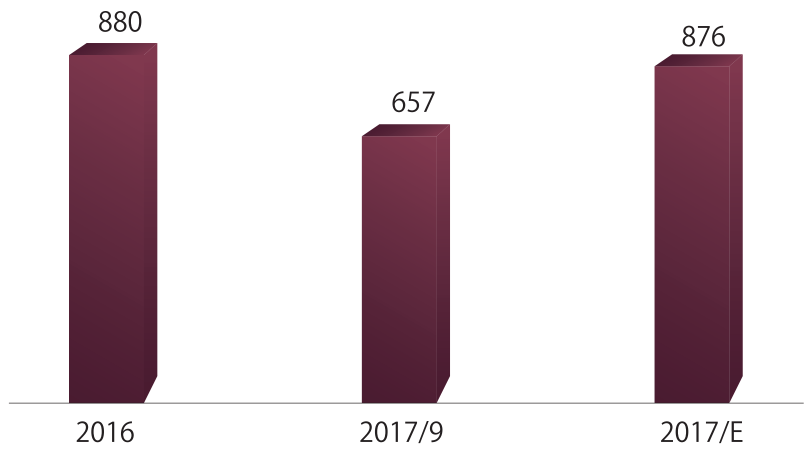
The plastics industry, in parallel with the increase in its processing capacity, makes investment in machine and equipment with an increasing trend every year. The annual average machinery and equipment investment of the plastics industry realized as 821 million dollars during 2012 – 2016 period, 37% of the total investment in this period constituted as presses and other machines while injection shared 23%, exytusion 19%, components 15% in total investments.



Graphic 9: Breakdown of Machinery Investments of Plastics Industry for the Last 5 Years
Source: TurkStat & ITC Trade Statistics

The machine and equipment investment of the industry, which reached to its maximum level in 2011 with 885 million dollars, realized as 441 million dollars by the end of 9 months of 2017. Machinery investments of plastics industry is expected to reach to 876 million dollars by the end of 2017, remaining about at the same amount with respect to 2016.

3. DOMESTIC SALES (MACHINERY INVESTMENTS OF PLASTICS INDUSTRY)



Graphic 10: Domestic Sales of Plastics Processing Machines (USD Million)
Source: TurkStat & ITC Trade Statistics

Taking the realisation of 9 months, İt is expected that all machineries investments of plastics industry other than blow molding, thermoforming machines and parts and components, to decrease by the end of 2017 compare to 2016.

Makine Grubu	2016	2017/9	2017/E	Increase (E) (2017/2016)
Injection Machines	184	132	176	-4
Extrusion Machines	150	98	131	-13
Blow Molding Machines	23	22	29	23
Thermoform Machines	43	40	53	23
Presses and Other Machines	312	229	305	-2
Parts and Components	168	137	183	9
Total	880	657	876	0

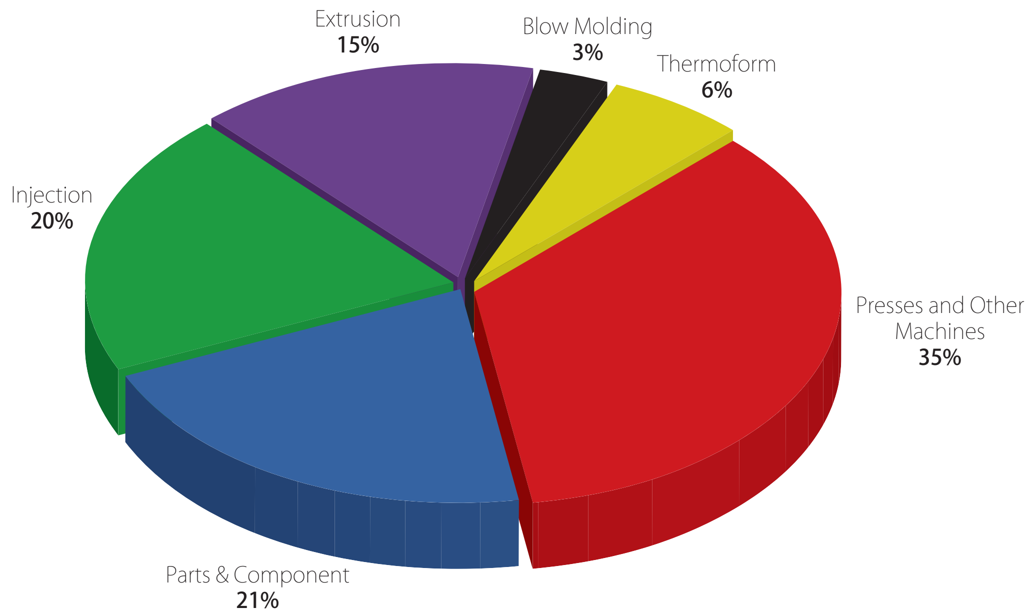
Table 11: Domestic Sales of Plastics Processing Machines (USD Million)
Source: TurkStat & ITC Trade Statistics

By the end of September of 2017, the share of injection realized as 20%, extruders 15%, blow molding 3%, thermoform 6%, presses and other machines 35% and parts and components 21% in the total machinery investment of the plastics industry.

Machinery Group	2016	2017/9
Injection Machines	21	20
Extrusion Machines	17	15
Blow Molding Machines	3	3
Thermoform Machines	5	6
Presses and Other Machines	35	35
Parts and Components	19	21
Total	100	100

Table 12: Breakdown of Machinery Investments by Machine Types
Source: TurkStat & ITC Trade Statistics

3. DOMESTIC SALES (MACHINERY INVESTMENTS OF PLASTICS INDUSTRY)



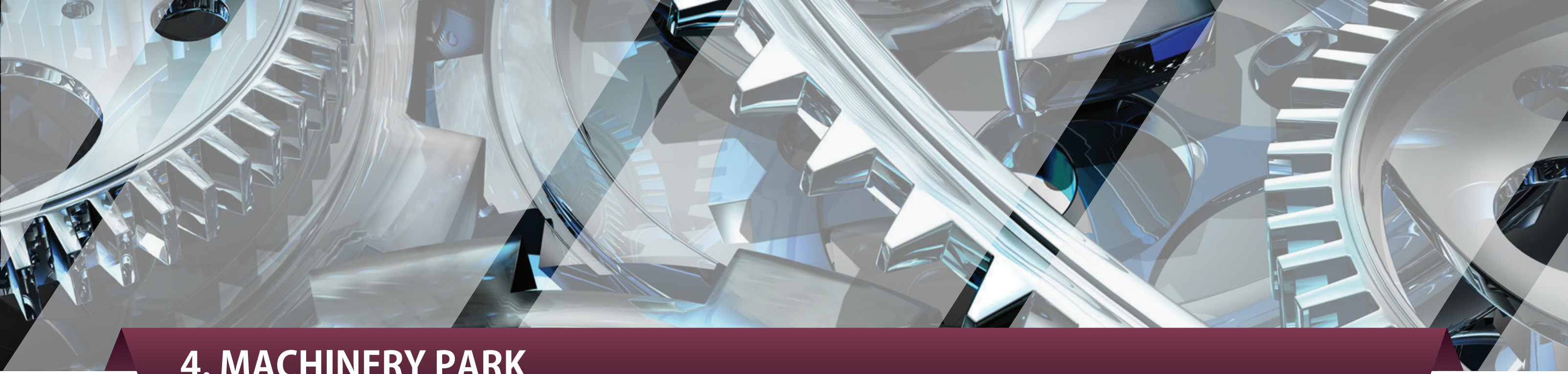
Graphic 11: Breakdown of Machinery Investments by Machine Types (2017/9)
Source: TurkStat & ITC Trade Statistics

4. MACHINERY PARK

Turkish plastics industry, which had 2.5 million tons of processing capacity and 5.688 machine parks in 2001, is expected to exceed 9.5 million tons of processing capacity by the end of 2017. The machinery park of the industry increased to 337 thousand units by the end of 9 months of 2017.

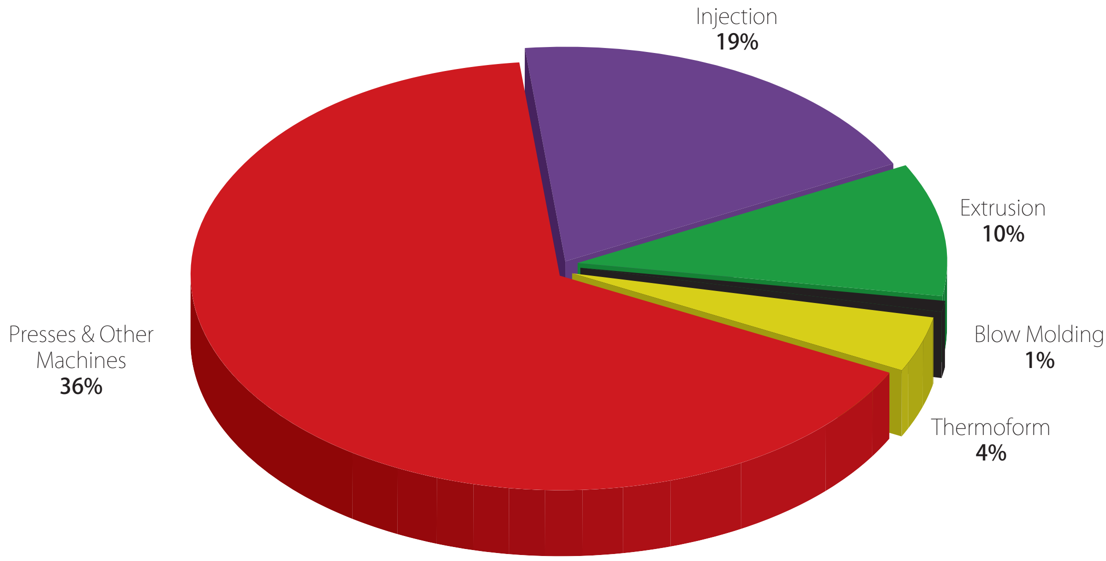
Between 2001 and 2017, the plastics industry's processing capacity increased by an average of 8.5% as the machinery park invcreased 29% annualy.

Graphic 12: Plastics Industry Process Capacity and Mahcinery Park



4. MACHINERY PARK

As of the 9th month of 2017, 19% of the Turkish plastics processing machinery park consists of injection, 10% extrusion, 1% blow molding, 4% thermoform and 66% presses and other machines.



Graphic: 13: Machinery Park of Plastics Industry by Machine Types
Source : TurkStat

As of the 9th month of 2017, 30% of the total processing machinery park of the Turkish plastics industry is sold by domestic producers while 70% of it has been imported.

	Units			% Share	
	Domestic Production	Imports	Total	Domestic Production	Imports
Injection Machines	4,441	60,281	64,722	7	93
Extrusion Machines	4,382	30,206	34,588	13	87
Blow Molding Machines	386	3,326	3,712	10	90
Thermoform Machines	5,085	8,864	13,949	36	64
Presses and Other Machines	86,414	133,605	220,019	39	61
Total	100,707	236,282	336,989	30	70

Table 13: Machinery Park of Plastics Industry
Source: TurkStat & ITC Trade Statistics

4. MACHINERY PARK

Share of imported machines in total machine park realised as; 93% in injection machines, 87% in extrusion machines, 90% in blowing machines, 64% in thermoforming machines and 61% in others.

In other words, the share of domestic produced machineries within the total park is; 7% in injection machines, 13% in extrusion machines, 10% in blow molding machines, 36% in thermoforming machines and 39% in presses and other machines.

10 countries share 96.5% of total imported machines park. China shared 43.7% of injection, 63.3% of extrusion, Italy shared 30.5% of blow molding and Germany shared 21% in the imported machines park.

Injection		Extrusion		Blow Molding		Thermoform	
Countries	% Share	Countries	% Share	Countries	% Share	Countries	% Share
China	43.7	China	63.3	Italy	30.5	Germany	21.0
Germany	18.1	Germany	13.8	Germany	21.5	China	18.8
Italy	9.6	Italy	7.3	China	9.4	Italy	14.9
Taiwan	8.9	Taiwan	4.3	France	8.4	Taiwan	10.0
Austria	6.2	Austria	3.9	Japan	7.2	France	5.7
Switzerland	2.8	S. Korea	1.6	Taiwan	4.5	Israel	5.1
France	2.7	India	1.1	UK	4.0	Switzerland	4.5
Japan	2.4	Japan	0.8	Switzerland	3.5	USA	4.2
S. Korea	1.2	USA	0.8	Austria	3.0	S. Korea	3.4
India	0.9	UK	0.7	Belgium	2.8	Austria	2.8
10 Countries	96.5	10 Countries	97.5	10 Countries	94.9	10 Countries	90.4
Others	**3.5**	**Others**	**2.5**	**Others**	**5.1**	**Others**	**9.6**

Table 14: Machinery Park of Plastics Industry
Source: TurkStat & ITC Trade Statistics

10 countries shared 97.5% in imported extrusion machinery park while 63.3% of the park is made up of China, 13.8% of Germany, 7.3% of Italy, 4.3% of Taiwan and 3.9% of Austrian machinery.

10 countries shared 94.9% in imported blow molding machinery park while 30.5% of the park is made up of Italy, 21.5% of Germany, 9.4% of China, 8.4% of Italy and 7.2% of Japanian machinery.

10 countries shared 90.4% in imported thermoform machinery park while 21% of the park is made up of Germany, 18.8% of Chaina, 14.9% of Italy, 10% of Taiwan and 5.7% of France machinery.

5. SUPPLY AND DEMAND

5.1. PEER PERIOD COMPARISON

In the January – September period of 2017 comparing with the peer period of 2016 ;

- Production increased as 5%,
- Imports decreased as 2%,
- Exports inreased as 4%,
- Domestic sales inreased as 1%,
- Foreign trade deficit declined as 4%.

While the share of imports in domestic sales declined from 65% to 63% exports covarage to imports incresed from 26% to 28% in this period.

	2016/9	2017/9	% Increase (2017/2016)
Production	340	359	5
Imports	422	415	-2
Exports	112	116	4
Domestic Sales	651	657	1
Foreign Trade Deficit	-311	-299	-4
Imports/Domestic Sales (%)	65	63	
Exports/Imports (%)	26	28	

Table 15: Plastics Processing Machines Supply&Demand (USD Million)(9 Months Comparison)
Source: TurkStat & ITC Trade Statistics

5.2. EXPECTATIONS FOR 2017

By the end of September 2017, 359 million dollars of production, 415 million dollars of imports, 116 million dollars of exports and 657million dollars of domestic sales (machinery investment of the plastics industry) has been realized.

	2016	2017/9	2017/E	% Increase (E) (2017/2016)
Production	446	359	478	7
Imports	581	415	553	-5
Exports	146	116	155	6
Domestic Sales	880	657	876	0
Foreign Trade Deficit	-435	-299	-398	-8
Imports/Domestic Sales (%)	66	63	63	
Exports/Imports (%)	25	28	28	

Table 16: Plastics Processing Machines Supply&Demand Balance (USD Million)
Source: TurkStat & ITC Trade Statistics

5. SUPPLY AND DEMAND

In this period, industry gave 299 million dollars of foreign trade deficit and 63% of the investment has been met by imports and export covarage of ımports realised as 28%.

In 2017, plastic processing machinery production is expected to increase by 7%, domestic sales will remain at the same levels, imports decrease by 5% and exports by 6%, compared to 2016.

6. PLASTICS INJECTION MACHINES

By the end of September 2017, 16 million dollars of production, 124 million dollars of imports, 8 million dollars of exports and 132 million dollars of domestic market sales (injection machines investment of plastics industry) realized. In this period foreign trade deficit of plastics injection machines realised as 116 million dollars.

It can be observed that 94% of the domestic sales (injection machines investment of the industry) was provided by imports and export covarage of imports realized as 6% in this period.

	2016	2017/9	2017/E	% Increase (E) (2017/2016)
Production	23	16	21	-5
Imports	172	124	165	-4
Exports	11	8	11	-5
Domestic Sales	184	132	176	-4
Foreign Trade Deficit	-161	-116	-154	-4
Imports/Domestic Sales (%)	94	94	94	
Exports/Imports (%)	7	6	6	

Table 17: Injection Machines Supply&Demand Balance (USD Million)
Source: TurkStat & ITC Trade Statistics

As of the end of September 2017, injection machines imported from 18 countries. China received a share of 51.2% in total imports. Apart from China, Germany, Austria, Japan and Taiwan are the countries from which Turkey imports the most.

In the same period, 57% of the exports of plastics injection machines was realized to 10 countries. Algeria, Turkmenistan, Saudi Arabia, Poland and Iraq with a total of 36% share, have been the biggest markets to which Turkey has exported plastics injection machines.

6. PLASTICS INJECTION MACHINES

	Imports		Exports		
	USD 1000	% - Share	Countries	USD 1000	% Share
China	63,348.4	51.2	Algeria	894.9	11.1
Germany	15,259.2	12.3	Türkmenistan	590.4	7.3
Austria	10,883.6	8.8	S.Arabistan	579.2	7.2
Japan	10,151.5	8.2	Polonya	419.5	5.2
Taiwan	6,210.5	5.0	Iraq	411.5	5.1
Italy	5,741.7	4.6	Bulgaristan	374.6	4.7
Güney Kore	3,426.7	2.8	Russian Fed. Fed.	366.5	4.6
Kanada	3,408.6	2.8	Pakistan	352.5	4.4
France	1,910.0	1.5	Sweeden	307.9	3.8
Sweetzerland	1,737.7	1.4	Romain	290.2	3.6
Total 10	**122,077.9**	**98.7**	**Total 10**	**4,587.2**	**57.1**
Others	**1,626.3**	**1.3**	**Others**	**3,452.2**	**42.9**
Total	**123,704.2**	**100.0**	**Total**	**8,039.4**	**100.0**

Table 18: Plastics Injection Machines Imports&Exports by Countries (2017/9)
Source: TurkStat & ITC Trade Statistics

7. PLASTICS EXTRUSION MACHINES

By the end of September 2017, 48 million dollars of production, 74 million dollars of imports, 24 million dollars of exports and 98 million dollars of domestic sales (injection machines investment of plastics industry) were realized in the plastics extrusion machines. In the same period, foreign trade deficit of extrusion machines realized as 50 million dollars.

It can be observed that the 76% of the domestic sales (injection machines investment of the industry) was met by imports and export covarage ratio of imports has been realized as 32% in the same period.

	2016	2017/9	2017/E	% Increase (E) (2017/2016)
Production	71	48	64	-10
Imports	115	74	99	-14
Exports	35	24	32	-10
Domestic Sales	150	98	131	-13
Foreign Trade Deficit	-79	-50	-67	-16
Imports/Domestic Sales (%)	76	76	76	
Exports/Imports (%)	31	32	32	

Table 19: Supply&Demand Balance in Extrusion Machines (USD Million)
Source: TurkStat & ITC Trade Statistics

7. PLASTICS EXTRUSION MACHINES

By the end of 9 months of 2017 the extrusion machines imported from 15 countries. The countries from which Turkey imports most are Germany, Italy, China, Austria and Japan with a total share of 86.5%.

In the same period Turkey exported extrusion machines to 56 countries. The 61.9% of the total exports of plastics extrusion machines destined to 10 countries. Uzbekhistan, Algeria, Russian Federation, Çorlu Free Trade Zone and Germany shared 42% of total exports of extrusian machines.

Imports			Exports		
	USD 1000	% - Share	Countries	USD 1000	% Share
Germany	18,721.7	25.3	Uzbekhistan	2,470.2	10.3
Italy	18,683.9	25.2	Algeria	2,186.0	9.1
China	13,283.5	17.9	Russian Fed. Fed.	1,929.1	8.1
Austria	8,644.0	11.7	Çor.Eu.Free Zone	1,690.6	7.1
Japan	4,741.6	6.4	Germany	1,623.4	6.8
Swetzerland	4,107.6	5.5	Ukrain	1,303.2	5.5
Taiwan	4,048.1	5.5	China	1,033.2	4.3
Netherland	900.5	1.2	Romain	943.5	3.9
UK	293.0	0.4	Iraq	894.8	3.7
India	243.7	0.3	Serbia	719.6	3.0
Total 10	**73,667.5**	**99.5**	**Total 10**	**14,793.5**	**61.9**
Others	**344.1**	**0.5**	**Others**	**9,098.3**	**38.1**
Total	**74,011.6**	**100.0**	**Total**	**23,891.8**	**100.0**

Table 20: Plastics Extrusion Machines Imports&Exports by Countries (2017/9)
Source: TurkStat & ITC Trade Statistics

8. BLOW MOLDING MACHINES

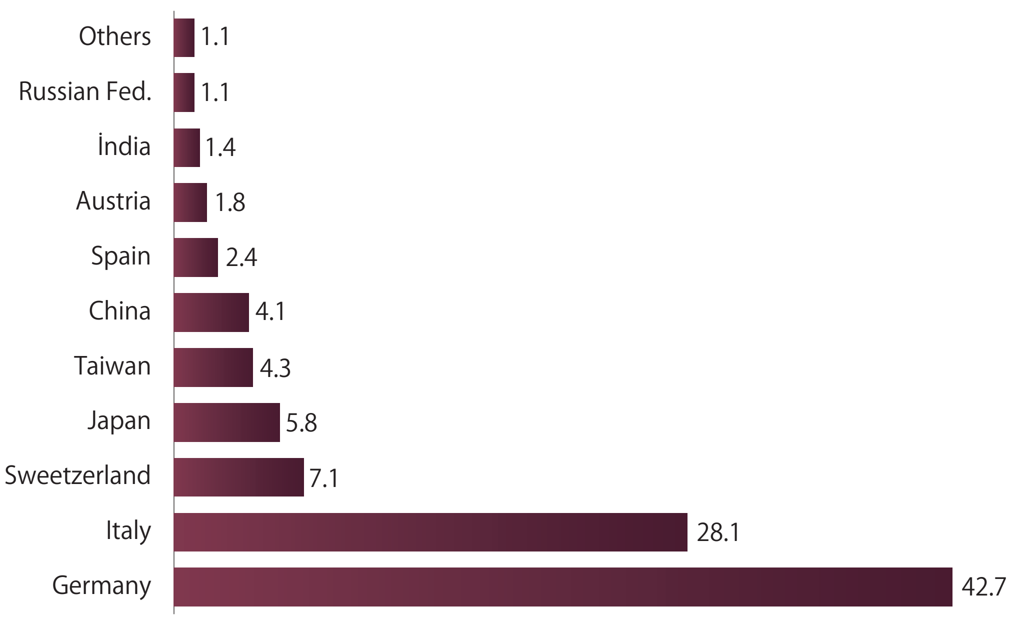
By the end of 9 months of 2017, 3million dollars of production, 20 million dollars of imports, about 1 million dollars of exports and 22 million dollars of domestic market sales (blow molding machines investment of plastics industry) were realized. The industry gave 18 million dollars of of foreign trade deficit in this period.

It can be observed that the 91% of the domestic sales (blow molding machines investment of the industry) was provided by imports in the same period and exports covarage ratio of imports realized as 7% in the same period.

	2016	2017/9	2017/E	% Increase (E) (2017/2016)
Production	1	3	4	-
Imports	23	20	26	14
Exports	0	1	2	-
Domestic Sales	23	22	29	23
Foreign Trade Deficit	-22	-18	-24	8
Imports/Domestic Sales (%)	97	91	91	
Exports/Imports (%)	2	7	7	

Table 21: Supply&Demand Balance in Blow Molding Machines (USD Million)
Source: TurkStat & ITC Trade Statistics

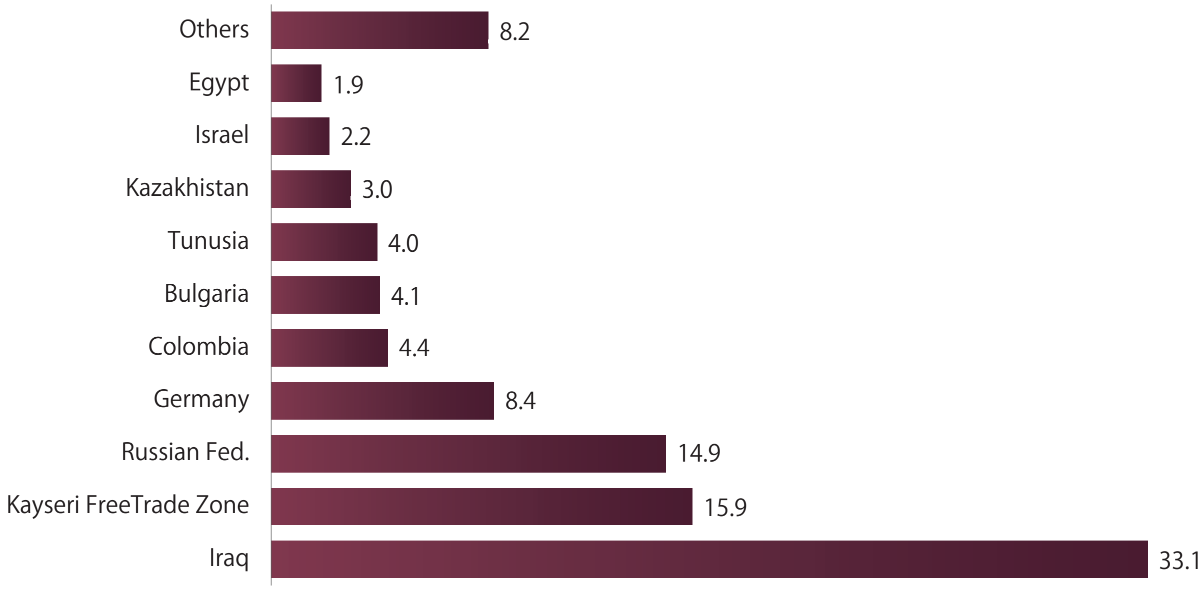
By the end of September 2017, Turkey imported blow molding machines from 14 countries. Germany shared 43% and Italy shared 28% of total imports.



Graphic 14: Plastic Blow Molding Machines Imports by Countries (2017/9)
Source: TurkStat & ITC Trade Statistics

8. BLOW MOLDING MACHINES

In this period, Turkey exported blow molding machines to 18 countries and 33% of total exports destined to Iraq and 15% to Russian Federation.



Graphic 15: Plastic Blow Molding Machines Exports by Countries (2017/9)
Source: TurkStat & ITC Trade Statistics

9. THERMOFORM MACHINES

By the end of September 2017, 40 million dollars of production, 16 million dollars of imports, 16 million dollars of exports and 40 million dollars of domestic market sales (thermoform machines investment of plastics industry) realized. On the other hand, foreign trade deficit of thermoform machines realized as 1 million dollars in this period.

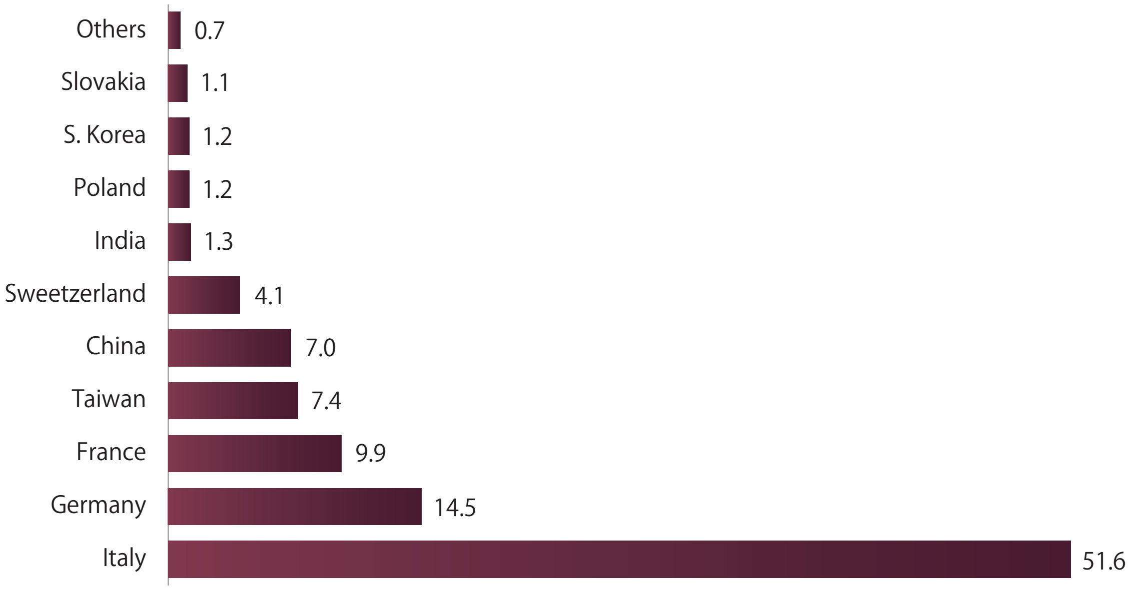
It can be observed that the 40% of the domestic sales (thermoform machines investment of the industry) was provided by imports and export covarage of imports ratio has been realized as about 100% in the same period.

	2016	2017/9	2017/E	% Increase (E) (2017/2016)
Production	47	40	53	13
Imports	15	16	21	42
Exports	19	16	21	13
Domestic Sales	43	40	53	23
Foreign Trade Deficit	4	0	0	-97
Imports/Domestic Sales (%)	35	40	40	
Exports/Imports (%)	126	101	101	

Table 22: Supply&Demand Balance in Thermoform Machines (USD Million)
Source: TurkStat & ITC Trade Statistics

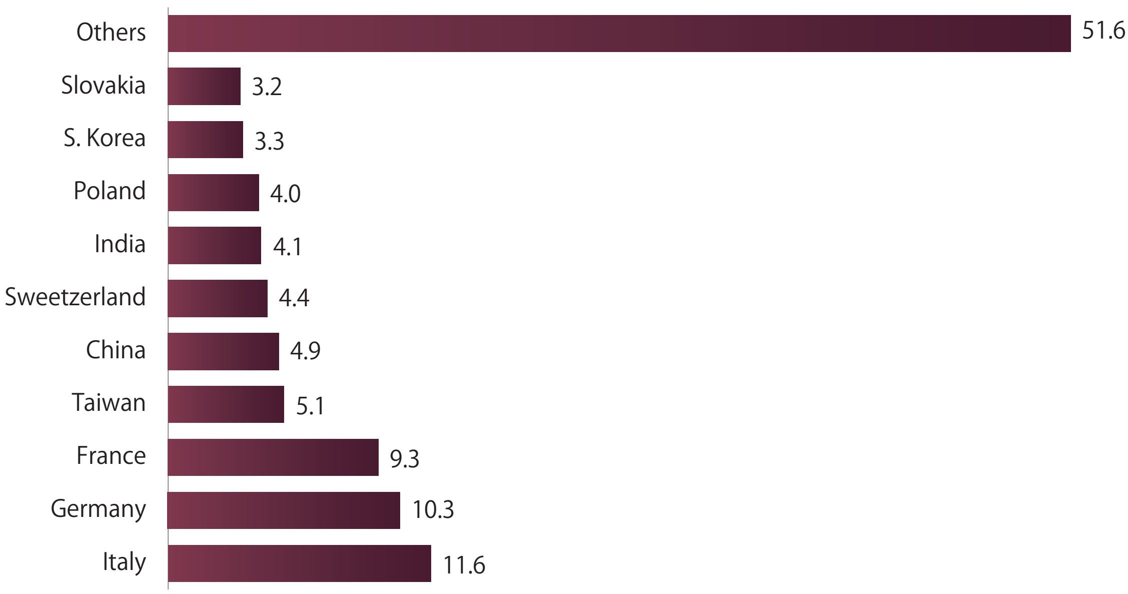
9. THERMOFORM MACHINES

By the end of 9 months of 2017, Turkey imported thermoform machines from 16 countries. Italy shared 52% of total imports.



Graphic 16: Thermoform Machines Imports by Countries (2017/9)
Source: TurkStat & ITC Trade Statistics

In this period, Turkey exported thermoform machines to 50 countries. Indonesia, Russian Federation, Nigeria, Ukarain, and Algeria shared 40% of total exports.



Graphic 17: Thermoform Machines Exports By Countries (2017/9)
Source: TurkStat & ITC Trade Statistics

10. PRESSES AND OTHER MACHINES

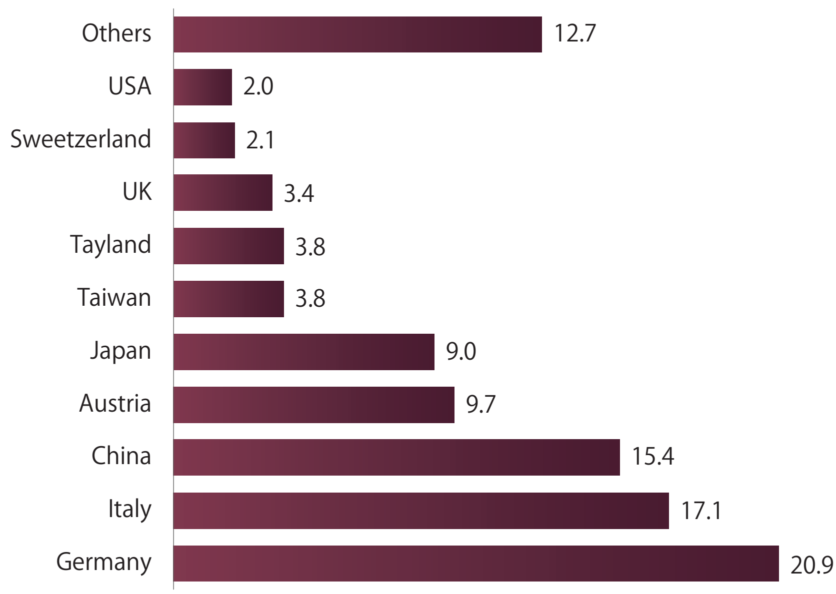
By the end of 9 months of 2017, 130 million dollars of production, 150 million dollars of imports, 51 million dollars of exports and 229 million dollars of domestic market sales (presses and other machines investment of plastics industry) realized in presses and other machines industry. In this period foreign trade deficit realised as 99 million dollars.

It can be observed that the 66% of the domestic sales (thermoform machines investment of the industry) was provided by imports and export covarage of imports ratio realized as 34% in this period.

	2016	2017/9	2017/E	% Increase (E) (2017/2016)
Production	154	130	173	13
Imports	216	150	200	-7
Exports	57	51	68	18
Domestic Sales	312	229	305	-2
Foreign Trade Deficit	-158	-99	-133	-16
Imports/Domestic Sales (%)	69	66	66	
Exports/Imports (%)	27	34	34	

Table 23: Supply&Demand Balance in Presses and Other Machines (USD Million)
Source: TurkStat & ITC Trade Statistics

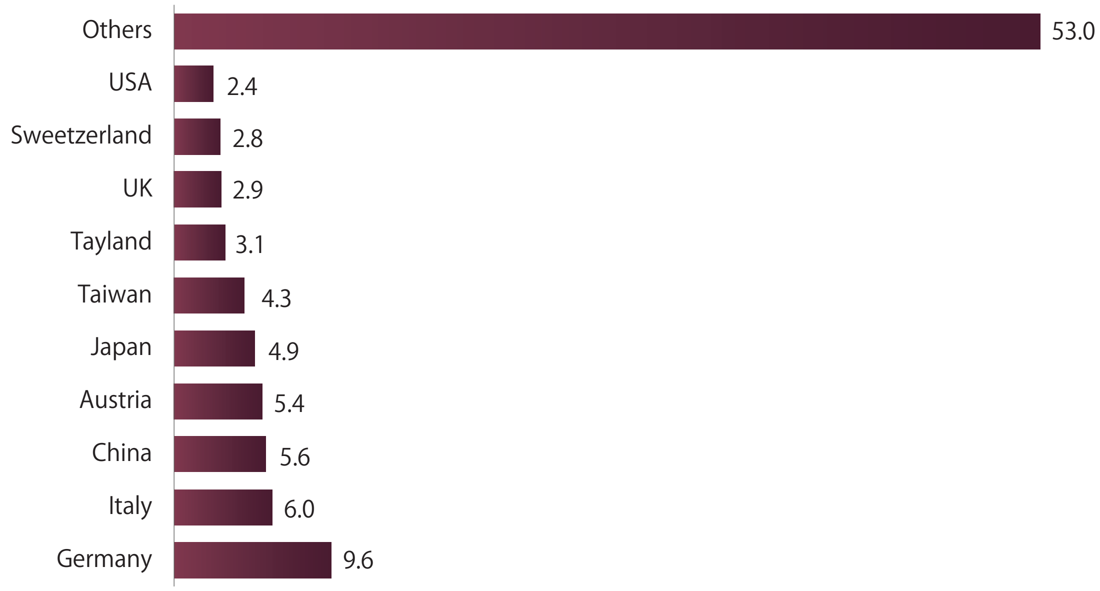
As the end of 9 months of 2017, presses and other machines have been imported from 45 countries and Germany, Italy, China, Austria shared 72% of total imports.



Graphic 18: Presses and Other Machines Imports by Countries (2017/9)
Source: TurkStat & ITC Trade Statistics

10. PRESSES AND OTHER MACHINES

In this period, presses and other machines were exported to 120 countries and Iran, S. Africa Republic, Russian Federation, Algeria and Romania shared 32% of total exports.



Graphic 19: Preses and Other Machines Exports by Countries (2017/9)
Source: TurkStat & ITC Trade Statistics

11. PARTS & COMPONENTS

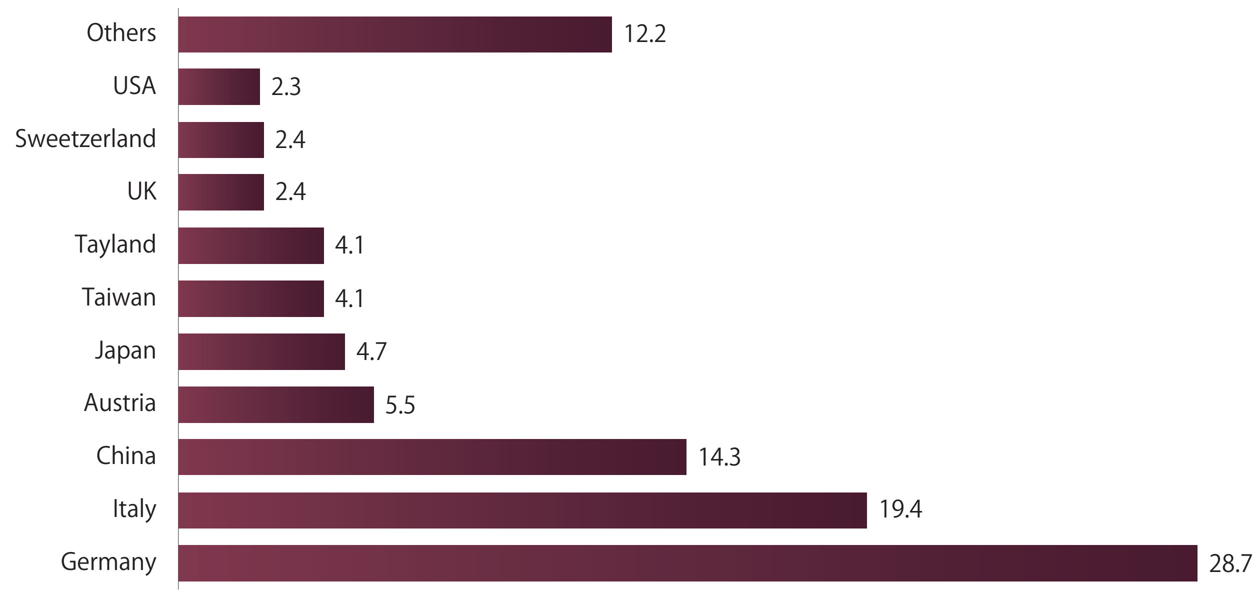
As of the 9 months of 2017, 122 million dollars of production, 32 million dollars of imports, 16 million dollars of exports and 137 million dollars of domestic market sales (accessories investment of plastics industry) were realized in the parts and componets industry. On the other hand, foreign trade deficit realized as 15 million dollars in the same period.

It can be observed that the 23% of the domestic sales (accessories investment of the industry) was provided by imports in the same period and export covarage of ımports ratio realized as 51% in the same period.

	2016	2017/9	2017/E	% Increase (E) (2017/2016)
Production	151	122	162	8
Imports	40	32	43	6
Exports	23	16	22	-4
Domestic Sales	168	137	183	9
Foreign Trade Deficit	-17	-15	-21	19
Imports/Domestic Sales (%)	24	23	23	
Exports/Imports (%)	57	51	51	

Table 24: Supply&Demand Balance in Parts and Components (USD Million)
Source: TurkStat & ITC Trade Statistics

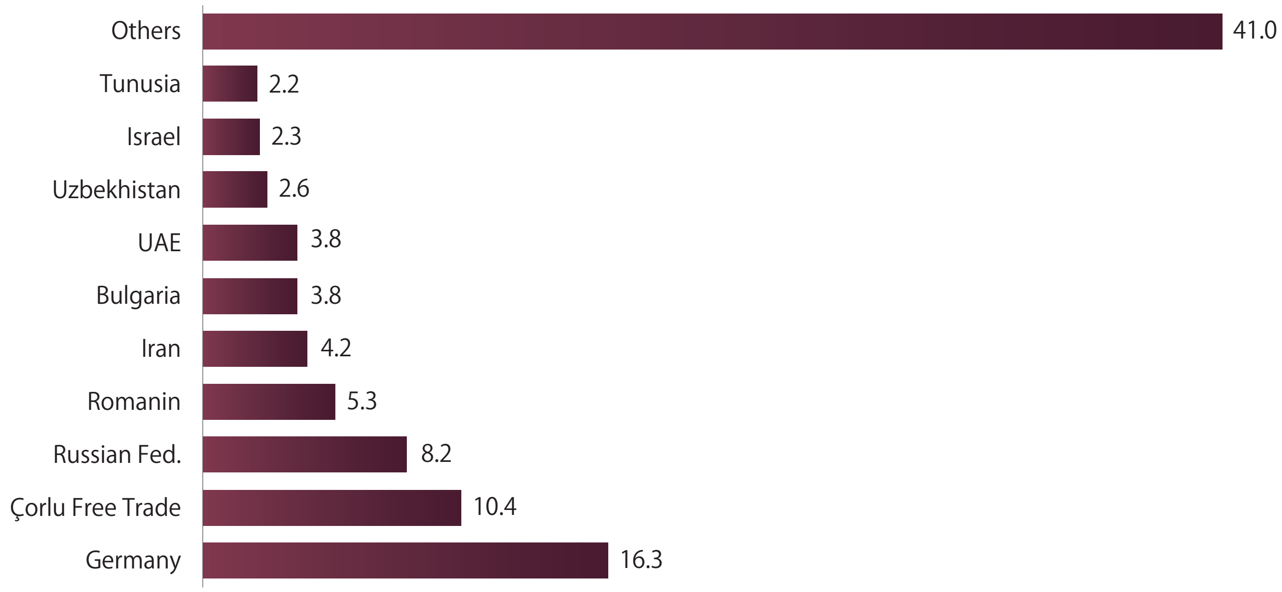
As of the end of September 2017 parts and components have been imported from 56 countries and Germany, China, Italy, Japan ve France shared% 73 of total imports.



Graphic 20: Parts and Components Imports by Countries (2017/9)
Source: TurkStat & ITC Trade Statistics

11. PARTS & COMPONENTS

In this period, parts and components were exported to 102 countries and Germany, China, Corlu Free Trade Zone, Russian Federation, Romania and Iran shared 44% of total imports.



Graphic 21: Parts and Components Exports by Countries (2017/9)
Source: TurkStat & ITC Trade Statistics

12. CONCLUSION

12.1. MAIN PROBLEMS OF THE INDUSTRY

General problems in the machinery manufacturing industry can also be applied to the plastic processing machines industry. In addition to these general problems, the absence of any national strategy and enough protection for domestic manufacturers of machine industry are the major problems faced in the plastics processing machines.

Turkey, as for plastic processing machinery has a very serious investing plastics industry. Thus, Turkey is one of the world's most important market in this area. But 80% of the market is dominated by imported machines.

Turkey is a net importer in the plastics processing machines trade and machines exported are far from providing high added value when compared their unit prices.

The developments in the plastics processing machines and their accessories and parts industry, despite significantly developing the plastics industry and the propensity to invest following the similar pattern, is under constant pressure of the cheap imports conducted in China. Imports receives a higher margin in sharing the increasing demand.

The lack of a state strategy for the plastic processing machinery sector, adequate protection of domestic producers and provide competitive advantages of plastic products manufacturer, they choose the second-hand imports of machinery.

The most important problems encountered in Turkey include plastic processing machinery sector;

- There is not a certain vision of the sector.
- Horizontal and vertical cooperation before competition between firms is not available.
- R&D, P&D, industrial design and product develoment efforts are insufficient in the industry.
- Patents and trademark investments are not enough in the industry.
- Industry’s international technical compliance is insuficient.
- Equity capital and working capital of the companies are inadequate.
- Energy costs are high.
- The industry needs for the marketing customer relationship management.

12. CONCLUSION

12.2. PROPOSED STRATEGIES

Machinery, including plastics processing machinery, is the basic sector that produces investment goods and has a special and important place in the manufacturing industry. It covers the entire sub-sectors called "engineering industries" where machine and spare parts are manufactured. It is an industry that is given priority in all developed countries and is defined as the priority sector. The locomotive role of machinery industry in which engineering and research are intensive and indispensable, can be summarised as

- The manufacturing industry has entered into and supplying inputs for almost all sectors,
- Driving force of the industry,
- Mobilization of the engineering discipline and
- Determination of development speed and produ-tion compositions according to new needs and demands.

Vision of Machine Manufacturing Industry in Strategy Document prepared for Machine Manufacturing Industry; it is described as "Turkey's being the technology production base in the machinery sector". The main objective in achieving this vision is to develop the machinery industry and to ensure that high-tech products are manufactured ".

The principle strategies for Turkish plastics processing machines industry to produce and export machines with higher added value could be as listed below:

It is seen that the export markets of the top ten plastics processing machinery exports of Turkey are countries with a share of 15% in total imports of plastic processing machines in the world. In order for Turkey to increase exports of plastic processing machinery, it is necessary to increase its promotional activities to other countries that have an 85% share of the world plastic processing machinery imports.

Turkey can establish the necessary incentive infrastructure to invest in global machinery producers in Turkey by using the experience of cheap and grown manpower and machinery production, and incentives can be provided for the investment of plastic processing machines in Turkey by global players.

Despite the fact that the number of plastic processing machines operating in all European countries is around 3000-3500, the presence of 600 machine manufacturers in Turkey causes the turnover and profitability per company to be at a low level. Today 's production of value-added machines requires very large R&D spending. A large number of domestic machinery producers, all at the SME level, have difficulties in accessing technological level at the level of the machinery of the westeren companies by making R&D expenditures on these scales individually as the reason for the inadequacy of existing financial power.

For this reason, instead of production machines in Turkey, parts and components of these machines should be produced at the desired quality level, so that the global players of the sector enter the parts procurement system of Turkey. Turkey should be regarded as one of the important production and export center for the parts and accessories of plastic processing machines.

In order for the Turkish plastic processing machinery sector to produce and export more value-added machines, the main strategies are as described in the Machinery Sector Export Strategy Document; General Purpose; "Improvement of Machinery Industry and Ensure the Manufacture of High-Tech Products". The main objectives that should be adopted in the industry and in the industry are:

- To increase competitive production opportunities in the global markets by enhancing the technological level of the industry.
- To turn the traditional machine product structure of the industry into a structure in which machines with higher added value are manufactured and to increase the manufacture and added value of the industry by pulling away the foreign capital investments.
- To establish large scaled injection and extrusion machines producers in the industry which will create a brand in the global markets and to organize the other companies as subsidiary industry companies which manufacture accessories and parts for the said companies and global machine manufacturers.
- To increase the productivity of the industry and to develop and to spread the aggregation activities in order to establish synergy.
- To establish the training infrastructure of the industry in order to meet the need for trained intermediate staff.

12. CONCLUSION

- To increase the support provided for industry oriented R&D, product development and innovation. Informal production and unfair competition must be prevented.
- Apart from the growth rate of the plastics industry, the positive/negative developments in the foreign markets will also have a direct effect on the plastics processing machines industry.
- On the aforementioned matter, it should assign tasks to industrial unions outside of government agencies on matters such as searching for potential foreign markets and expansion of companies to such markets. Branches should be established and road show and bilateral meetings should be organized in potential foreign markets by industrial unions with the intention of advertisement and marketing.
- While companies which make sizable factory investments can purchase machines of 5 year term with various and advantageous credits, our country is left with single machine orders with low prices. As there are no discounts made due to the size of the order, these orders are lost to countries such as China–Taiwan. A credit system similar to Hermes in Germany must be established in Turkey and Exim Bank credits must be turned into resources to which machine manufacturing SMEs can easily access in order to develop the exports of machines. Credit must be provided to small and medium sized enterprises abroad by Exim bank and these enterprises should be encouraged to import from Turkey.
- Rate and term guarantees should be provided to exporters in long term export sales.
- The plastics processing machines industry must produce machines with higher added value and competition level in global markets. However, there are a great number of plastics processing machine and accessories and parts manufacturers in Turkey and the production capacity and capacity output per company are very low, below the economic scales. For that reason, inter-enterprise mergers or strategical cooperation concerning R&D (common R&D centers) must be established in order for the small companies to achieve the power to conduct R&D.
- Turkey can set up the necessary incentive substructure for global machine manufacturers to invest in Turkey by using its cheap and qualified manpower and experience in machine manufacturing and special incentives can be provided to the global players for their investments on plastics processing machines in Turkey. Turkey could be turned into a production and exports base for at least some of the plastics processing machines with the incentive substructure which is to be applied in the said manner.
- In this day and age the manufacturing of machines which provide added value requires great R&D expenditures. It is difficult for the domestic machine manufacturers, all of which are at SME level, to make such R&D expenditures and reach the technological level used by the Western countries in manufacturing due to their financial in capabilities. For that reason, rather than main machine production in Turkey, the manufacture of accessory and parts of these machines at the required quality level and entering into supply system of the global players of our industry and Turkey becoming the manufacture and exports base for plastics processing machine accessories and parts could be the second strategy to pursue.
- Passing on the legal regulations and structural measures to provide a transformation to high "Added Value" and "Trademark Value machine industry.
- To provide sustainable financial solutions for the sector in order to achieve sustainable growth at home and abroad and to take advantage of economies of scale.
- Provide sustainable, competent, high-performance, technology-focused, human resources at all levels of learning and change.
- To make an effective promotion both in Turkey and abroad and in order to increase exports, giving priority to the quality, trust and technology elements of the Turkish Machine Industry.
- To give emphises on R&D and innovation in order to be able to produce high value-added products that can compete globally.
- Prevention of unregistered production and unfair competition,
- Opening offices in potential foreign markets for promotion and marketing, organizing road shows and bilateral meetings.
- The introduction of exporter and maturity guarantee in long term export sales,
- Preventing the penetration of the machinery which does not meet the EU standards in Turkey,

13. PAGEV PROJECTS

PAGEV which is the "Unifying Power" of the Turkish Plastics Industry develops different projects aiming to solve the problems outlined above. These are in summary: "PAGEV Plastics Center of Excellence" and "International Regional Plastics Production Center".

13.1. PAGEV PLASTICS CENTER OF EXCELLENCE

Plastic materials, used in all areas of life, are rapidly taking place of other alternative products, because of their superior properties, in Turkey as well as in all over the world. Plastics, which useage in all sectors Increasing is becoming an indispensable material for the 21st century.

Turkish Plastics Industry which is one of the growing sectors in our country despite being young, is the 6th in the world and the 2nd in Europe. Growing with the goal of leadership in Europe, the Turkish Plastics Sector aims to increase the certification and added value of its products.

PAGEV, "Unifying Power" of the Turkish Plastics Industry, is leading the industry with the "PAGEV Plastic Excellence Center" for realizing this purpose. The mission of the PAGEV Center for Plastic Excellence will include the following activities.

- Research and Development
- Test and Laboratory Services
- Certification
- Training
- Competent Consulting

With the Center of Excellence, the test and laboratory support that the plastic industry needs will be provided to the industry. So, many problems that lead to loss of time and energy such as high test costs, overseas shipping, customs clearance, long test times will be removed.

The platforms that will provide information to and knowledge sharing in the industry will be developed by the Center and detailed training programs will be prepared and presented for the benefit of the industry. While working on the newest technologies, the Center of Excellence will work together with industry organizations, universities, research institutes, professional associations and non-governmental organizations to work for the Turkish Plastics Industry to be the world leader with R&D and innovation based work.

Established with the support of the Ministry of Science, Industry and Technology, PAGEV Plastics Center of Excellence will provide to the plastics industry and Turkish economy, especially the development of industrial skills and capabilities that will form the basis of Turkey's national projects.

Upon completion, the Center of Excellence, which will have an area of over 30 thousand m2, rises right beside PAGEV Vocational and Technical Anatolian High School in Küçükçekmece, Istanbul. PAGEV Plastic Center of Excellence, which will make Turkey the center of plastic production in the world, will carry out innovative projects.

In addition to this, the Center will create a control mechanism for the products exported abroad. The Center will also contribute to the preservation of the reliability and reputation of the plastic products produced in Turkey. On the other hand, the introduction of poor quality and non-standard goods into the country will be prevented by determining the technical suitability of the plastic products imported from abroad without any definite importation in the laboratories.

With its superior information infrastructure, the Center of Excellence will present the important documents required by the players of the sector more economically and quickly.

By accelerating the development, we will focus on the development of products and production technologies that will increase the competitive power of our firms.

The Center of Excellence, which will develop innovative ideas by following the developments in the world plastic sector, will increase the competitive power of our firms by providing many field consultancy services from the determination of appropriate input materials to the optimization of production process.

13. PAGEV PROJECTS

13.2. INTERNATIONAL REGIONAL PLASTIC MANUFACTURING CENTER

Altough the Turkish Plastics Sector, with its process capacity reaching 9 million tons, has the 6th largest plastics production capacity in the world and 2nd in Europe, imports more than 85% of the plastic raw material it needs.

One of the most important advantages of the plastics industry in Turkey is that it is located between the Middle East countries which are the main petroleum and plastic raw material producer and the European market wich is the main plastic consumer.

PAGEV aims to unify the plastic raw materials potential of Middle East countries with the Turkish Plastics Industry's competent production capability and experience at the international regional plastic production center, which Turkey aims to establish in South East Anatolia Region.

In the center, to be established with the win-win principle, the plastics raw materials producer countries will be supplying cheap and reliable raw materials having a large volume and reliable market while Turkish Plastics Industry will have greater competition possibilities in the global markets with its growing production capacity and falling costs.