Challenges for the Future of Turkish Agricultural Machinery Sector Towards European Union Membership

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[Keywords] agricultural machinery, European Union, Turkey

Abstract

European Council, after the Helsinki Meeting on 10 and 11 December 1999, declared the acceptance of Turkey's candidacy for full membership and required Turkey's progress towards fulfilling the Copenhagen economic and political criteria. Turkey will certainly intensify the legislation and practice harmonisation with the EU. And there seems to be so many fundamental decisions to be taken for the development of the agricultural sector and harmonisation with the Common Agricultural Policy of the EU.

This paper presents the possible effects of the Turkey's EU membership to the agricultural sector, with particular reference to the agricultural tractors and machinery and the competitiveness of Turkey within the European market.

For the sake of industralization, the agriculture sector has been, maybe unintentionally but nonetheless, neglected for many years, even decades, in Turkey. There has not been any sound policy for the production and foreign trade of agricultural goods and new technologies. The sector has serious problems such as decrease in both crop and animal production, low yields, high input prices and high production costs, weakness in competition within the foreign markets, and consequently very low level of productivity. As a result, agriculture in Turkey is nowadays facing a real challenge of survival and integration into Common Agricultural Policy of the European Union (EU).

According to the Food and Agricultural Organization of the United Nations (FAO) statistics, Turkey is one of the major agricultural producers and has an important production potential. Approximately 40% of vegetables and 27.5 % of fruits of EU are being produced only in Turkey and the total agricultural land and total agricultural active population of Turkey is about 26.86% and 86.2%, respectively, of EU.

Until now, foreign trade of agricultural machinery between Turkey and the EU has been very low. There are mainly three major reasons explaining this. These are;

i. average farm size in Turkey is very low, approx. 5 ha, which makes it infeasible to use bigger tractors and machinery which are very common in European farms,

ii. the production capacity of the agricultural machinery sector is quite sufficient for the majority of machines, except combine harvesters, cotton harvesters and some special type of machines. There is even a considerable amount of exportation to mainly Middle Eastern, North African and Central Asian countries,

iii. the national manufacturers have been protected by certain regulations such as customs taxation, restriction or prohibition for imports,

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Abstract
This paper presents the current situation of Turkish agricultural production and mechanization and discusses the possible effects of the Turkey's EU membership to the agricultural sector, with particular reference to the agricultural tractors and machinery and the competitiveness of Turkey within the European market.

1. Introduction

For the sake of industrialization, the agriculture sector has been, undeniably though unintentionally, neglected for many years, even decades, in Turkey. There has not been any sound policy for the production and foreign trade of agricultural goods and new technologies. The sector has serious problems such as decrease in both crop and animal production, low yields, high input prices and high production costs, loosing competitive power in foreign markets, and consequently very low level of productivity. As a result, agriculture and all interrelated sectors including Agricultural Machinery Manufacturing (AMM) in Turkey is facing a real challenge of survival and integration into Common Agricultural Policy of the European Union (EU).

2. Relations Between the EU and Turkey

Prior to discussing the issues on Turkey's agricultural and agricultural machinery manufacturing sectors it seems to be necessary to give a broad background information on Turkey-EU relations.
Relations between Turkey and the European Union are based on the Agreement establishing an Association between the EEC and Turkey, the so-called Ankara Agreement, which was signed on **12 September 1963** and came into force on **1 December 1964**. The cornerstone of this agreement is the establishment of a customs union in three stages.
The Customs Union (CU) came into force on 1 January 1996 as foreseen in the 1963 Ankara Agreement, which established the EU-Turkey Association. Legally, it is the result of an Association Council Decision of 6 March 1995. It leaves out Agriculture and Services, even though a commitment between the parties exists to include the former through ongoing negotiations on mutual concessions. Coal and Steel Community products are dealt with separately through a free trade agreement that came into force on 1 August 1996. At the time of the inception of the CU, the Turkish Government had both harmonized and put into place most legislation needed for its proper functioning. Since then the Turkish Government has gone a long way towards adopting EU's trade policy.
As requested by the Luxembourg European Council, the Commission adopted on **4 March 1998** the initial operational proposals of the "**European Strategy for Turkey**" to prepare Turkey for membership.
The European Council, met in Helsinki on 10 and 11 December 1999, welcomes recent positive developments in Turkey as noted in the Commission's progress report, as well as its intention to continue its reforms towards complying with the Copenhagen criteria. The Council stated that "Turkey is a candidate State destined to join the Union on the basis of the same criteria as applied to the other candidate States".

3. Present Structure and Production of Agriculture in Comparison

According to the Food and Agricultural Organization of the United Nations (FAO) statistics, in comparison with the developed countries and despite its lower level of productivity and technological structure, Turkey is one of the major agricultural producers and has an important production potential. Table 1 shows the amount and area of some agricultural products of Turkey and EU. As can be seen from the table, approximately 40% of vegetables and 27.5 % of fruits of the EU are being produced in Turkey.
Total population and land of the country is approximately 64 millions capita and 78 million ha, equivalent to 17% and 25% of the EU, respectively. The agricultural shares in total and economically active population of Turkey are about 32% and 47.6% respectively. Economically active population of Turkey amounts to 176.8% of EU total.

Table 1. Summary of Agricultural Production and Structure Statistics of Turkey in comparison with the European Union (FAO, 2000 and Grethe,1999).

	Turkey	European Union	Turkey as of EU (%)
Population Statistics (thousands, 1998, FAO estimates)			
Total Population	64,479	374,520	17.2
Agricultural Population	20,610	17,724	116.3
Agricultural Population (%)	32.0 %	4.7 %	
Total Economically Active Population	30,336	175,618	17.3
Economically Active Pop.in Agriculture	14,457	8,176	176.8
Econ.Active Pop.in Agriculture (%)	47.6 %	4.7 %	
Area (million ha)	78	313	24.90
Agricultural Land (1000 ha)	39,677	147,690	26.86
Basic Economic Indicators			
GNP (1997) (billion ECU)	176	7,050	2.5
GNP per capita (1997) (ECU)	2,760	18,952	14.6
Agriculture/GNP (1997) (%)	13.4	3.9	
Agriculture/GNP (1998) (%)	16.5		
1998 Production (tons)			
Cereals	33,182,350	213,253,864	15.6
Fruits	15,987,545	58,095,906	27.5
Vegetables	21,742,712	54,148,580	40.2
Cotton	2,093,370	1,512,182	138.4
Olives	1,550,000	8,882,323	17.5
Tractors/1000 ha, 1997	33.0	91.0	36.3
Agricultural Trade	**millions ECU**		**%**
Exports of Turkey (Total)	4,399		100
Exports of Turkey (with the EU)	1,985		48
Exports of EU (Total)	52,138		100
Exports of EU (with Turkey)	977		2
Imports of Turkey (Total)	3,569		100
Imports of Turkey (with the EU)	977		30
Imports of EU (Total)	63,123		100
Imports of EU (with Turkey)	1,985		3

Compared to 1997, the sector's total contribution to GNP rose by 3.1 percentage points to 16.5% in 1998, which is the highest value reached in this decade. The agricultural share in employment is about 47.6%.

The agricultural production value per capita of Turkey was $971 in 1997, while it was $31,500 in Denmark, $20,435 in Holland, $16,835 in USA, $10,119 in Germany, $7,608 in Italy, $4,925 in Spain and $4,586 in Greece (SPO, 2000). The main reason of this considerable difference is because the agricultural population of Turkey accounts for approximately 32% of the total, while it is about 4.7% in the EU. In Turkey, number of tractors in use per thousand ha of agricultural land was 33, which is almost one third of EU's 91 tractors. This means that there is a great market potential for agricultural machinery to reach the EU level.

In terms of foreign trade of agricultural products, the EU seems to be an important partner of Turkey. In 1997, Turkey accomplished about 48% (ECU 1,985 millions) of its exports and 30% (ECU 977 millions) of its imports of agricultural products to/from the EU countries. Stable Turkish exports and decreasing imports from the EU resulted in Turkey's positive agricultural and food trade balance with the EU of ECU 1,008 millions.

With regard to agricultural policy, Turkey continued its path of relatively high support and protection for agriculture. Provisional OECD data on percentage PSE (producer support estimate) amounts to 39. This compares to 31 in 1997 and is the highest value ever calculated for Turkey. The most important increases in PSE were observed for cereals, sugar and beef.

As part of its European strategy for Turkey the Commission has proposed a programme along the lines of the approach followed for the candidate countries from Central and Eastern Europe to help Turkey to bring its farm policy in line with the CAP. The Commission's services and the Turkish authorities have already started a process of policy comparison in the area of arable crops.

The "European Size Unit (ESU)" is used to compare agricultural holdings within the EU countries. ESU is calculated by dividing the Standard Gross Margin of a farm by a constant amount of ECU (e.g. 1200 for 1995) and aims at eliminating the type and size differences of farms in comparison. The agricultural holdings within the EU are divided into 9 different economic classes defined by ESUs. Table 2 provides the classification of agricultural holdings of Turkey compared with EU, in accordance with the above-mentioned methodology.
Table 2 confirms that 90.69% of holdings are very small farms (below 4 ESU) compared to EU's average of 57.52% (Arslan, 1998). In other words, Turkish farmers are poorer and their productivity is lower than the EU farmers. Also, according to the Turkish State Institute of Statistics, 73% of farmers owns land below 5 ha.

Table 2. Distribution of Agricultural Holdings by Economic Criteria (ESU) - Turkey vs EU. (Arslan, 1998)

Holding Group	Size	ESU Range	Turkey		European Union (12 countries)
			Number of farms	% of total	% of total
I	Very small	< 2	2,956,389	72.82	41.32
II		2 – <4	725,534	17.87	16.20
III	Small	4 – <6	198,310	4.88	8.52
IV		6 – <8	71,084	1.75	5.42
V	Below medium	8 – <12	44,899	1.11	6.68
VI		12 – <16	14,037	0.35	4.09
VII	Above medium	16 – <40	13,274	0.33	10.91
VIII	Big	40 – <100	2,220	0.05	5.49
IX	Very big	> 100	33,839	0.83	1.37

4. Current Situation of the AMM Sector

In Turkey almost all of the machinery and tractors used in agriculture are produced domestically and apart from those well-known and marketed brands, most of them are manufactured locally in order to meet the local market needs.
Tractor, as the major power source of agricultural operations, helps increase the productivity, decrease the costs and also enables the use of modern technologies in agricultural production. There are 5 agricultural tractor manufacturing establishments in Turkey with an existing capacity of 123,000 tractors per year. (Table 3). However, there seems to be a 50% of unused capacity, which can be oriented towards EU needs for small tractors in particular. The ownership of the 3 of these companies are private and the other two are public. The privately owned companies have approximately 90% share in the domestic market and only one of them uses foreign capital with 37.5% of share. The percentage of domestic input in production ranges between 70% and 90% and varies according to each company's production range and technology.

Table 3. Basic Characteristics of the Turkish Tractor Manufacturing Sector in 1998 (SPO, 2000).

Production Capacity	Total Production	Capacity Usage (%)	Domestic Input of Production (%)	Employment
123,000	60,500	49.2	70 - 90	3,918

Table 4 shows the foreign trade of agricultural tractors between Turkey and the European Union, as a comparison before and after the Turkey's entrance to the Customs Union. As can be seen from the table, despite the Customs Union, only about 3% of domestic supply of Turkey in 1998 was imported from the EU. Similarly, approximately 3% of the domestic production was sold to the EU countries in 1998. There has not been any significant change in foreign trade between with and without the Customs Union and this implies that the sector of agricultural tractors is domestic-market oriented and self-sufficient.
The agricultural machinery manufacturing technology, except tractors, conforms to the technology levels 2 and mainly 3, as classified by UNIDO (1979). According to UNIDO, in technology level 2, which comprises the small-scale industries, manufacture of agricultural equipment is carried out mechanically on a commercial basis and products manufactured are selected agricultural equipment, mainly pumps, crop protection equipment, etc., and they are situated in urban and semi-urban areas. In technology level 3, which comprises the medium and large-scale industries, manufacture is carried out by conventional, semi-automatic and special purpose machine tools on a high volume, high precision and high investment basis.

Table 4. Turkey's Foreign Trade of Agricultural Tractors* with the EU Countries for the years before and after the Turkey's Entrance to Customs Union (CU) in 1996 (Evcim, 2000; SPO, 2000).

	Before CU (1995)			After CU (1998)		
	Number of Tractors	% of Domestic Supply	% of Domestic Production	Number of Tractors	% of Domestic Supply	% of Domestic Production
Imports	457	1.04	---	1,729	3.08	---
Exports	1,258	---	2.77	1,789	---	2.96

1,023 manufacturers produced 111 different types of agricultural machines in 1998 and only 45.49% of their total production capacity could be used up (Table 5). Majority of the establishments are small scale without any Research and Development facilities and lacking the required qualified personnel.

Table 5. Basic Characteristics of the Turkish Agricultural Machinery Manufacturing Sector in 1998 (SPO, 2000).

Number of Establishments	Production Capacity	Total Production	Capacity Usage (%)	Employment
1,023	1,139,790	518,585	45.49	16,838

5. Effects of Customs Union Agreement on the Turkish AMM Sector

Turkey has signed an agreement with the EU in 1996 concerning the permission of free trade of industrial products between the parties. Although the agreement has had no significant effect on prices, employment, quality and variety of the machinery within the Turkish AMM sector, following a steady increase in foreign trade volume of Turkey with the EU until 1995 and after the Customs Union agreement, both import and export volumes were boosted up (Table 6). In terms of productivity in manufacturing, Turkey is behind the EU countries and requires the renewal of production technologies. Despite the lower level of productivity compared to EU, lower machine prices in Turkey can be explained by lower labor costs in production. It seems inevitable in the future as Turkey proceeds for full membership that labor costs will rise and level up with the EU partner countries and lose its competitive power. The unused capacity also causes an increase in total production costs. It is therefore necessary for the sector to invest on modernization projects and to increase the capacity usage.

Table 6. Turkey's Foreign Trade of Agricultural Machinery (excluding tractors) with the EU Countries between 1993 and 1998 (UFT, 1999).

Year	Exports To		Imports From	
	EU (USD)	EU's Share in Total (%)	EU (USD)	EU's Share in Total (%)
1993	784,428	12.75	39,067,865	94.36
1994	378,837	5.52	13,653,450	94.10
1995	816,240	14.61	22,601,638	91.78
1996	1,004,381	10.16	44,485,444	91.49
1997	1,485,057	13.85	50,820,564	83.60
1998	1,166,941	12.51	56,351,051	89.31

6. Competitive Power of the Sector

Table 7 provides indicators of competition for tractor and agricultural machinery manufacturing sectors, separately. As can be seen in Table 7, Import Penetration Rate, the ratio between imports and domestic demand, in 1998 was 3.6% for tractors and 44.96% for other agricultural machinery. On the other hand, the Specialization Rate, the ratio between domestic production and demand, was 1.0 for tractors and 0.7 for other agricultural machinery. These two indicators show that the tractor manufacturing is specialized, oriented for and totally

* : includes all CBU (completely Built Unit), CKD (complete knock-down) and SKD (semi-knock-down) forms of tractors.

supplies the internal market needs. However, there seems to be a significant share of imports in the agricultural machinery market.
The export/import ratio explains the foreign trade balance and the specialization degree of the sector. This ratio was 1.00 for tractor market, which means that there was a perfect balance of foreign trade of tractors in 1998, but the trade of other agricultural machinery was in favor of foreign competitors with a ratio of 0.15.

Table 7. Basic Indicators of Competition Power of Turkey's Agricultural Machinery Sector (Evcim,2000; SPO, 2000)

	Tractor Market	Agricultural Machinery Market
Import Penetration Rate	3.60	44.96
Specialization Rate	1.00	0.70
Export/Import Ratio	1.00	0.15

7. Challenges for the Future
Turkey's candidacy for membership to EU has added a new dimension for the changes in agricultural policies. Even without the WTO agreement and candidacy to EU, Turkey would have been forced to change the ongoing policies anyhow because the implemented agricultural policies were no longer effective and impossible to sustain. It has to be admitted that, the international dimension has gained more weight in the determination of national agricultural policies (Kasnakoglu et al, 2000).
The agricultural sector is not able to achieve the performance level of production that can be obtained with the existing resources. In other words, the productivity level of agriculture is very low, which is due to small and scattered agricultural enterprises and rather high input costs. The agricultural machinery manufacturing (AMM) sector has also certain problems at present. The major problems (SPO, 2000) of the sector and challenges towards the integration to EU and harmonization with the CAP can be listed as follows;

i. There is a considerable shortage of machinery and tractors usage in Turkish agriculture, which in effect avoids the use of modern technologies. Tractor power use per ha and total weight of machines per tractor are approximately 1.3 kW/ha and 4.2 tonnes, respectively, compared to 5–7 kW/ha and 12 tonnes in the EU. Low level of farm incomes, the instability of the agricultural sector because of wrong and inconsistent policies, high inflation rates, effects of the global crisis have all prevented the AMM sector from development.
ii. There is a significant amount of unused capacity in the sector and therefore the government should not support any investment on new capacities for homemade machines. Instead, it would be more rational to support the modernization and R&D investments in order to be strong enough in competition with its foreign counterparts.
iii. It becomes difficult for small-scale manufacturers to invest on Research and Development activities. Regional R&D Institutions, probably supported by the government could answer the needs of the manufacturers within the region.
iv. Despite the low labor costs, the production costs of agricultural machinery (except tractors) are considerably high due to low productivity.
v. Lean Production seems to be a solution to reduce the negative effects of demand fluctuations. In this respect, new policies towards structural changes of main and secondary industrial establishments will be required.
vi. The sector is capable of investing within the developing and even developed countries especially on tractor, tillage machinery, fertilizer spreaders and sprayer production.
vii. The Turkish Standards Institute (TSE) is the only authority preparing standards and granting quality certificates in Turkey. According to their reports, 80% of Turkish standards conform with the European Norms (EN). Most of the Council directives are being applied in practice even if the equivalent Turkish legislation has not yet been enacted. In Turkey, by the end of 1998, 526 'ISO-9000' certificates had been granted, both by TSE and foreign approved bodies. There has been a wide promotion of the CE Marking by both Government, and professional and sectorial, associations. Many private firms already have started providing consultancy services on its implementation given the complex nature of the procedure involved. The government finances in part quality studies done by small and medium sized enterprises, and CE marking applications. In this respect, all manufacturers within the agricultural machinery manufacturing sector must be encouraged to comply with the ISO9000 quality standards and CE marking, and the government must speed up the harmonization process.
viii. ISO9000 quality standard must be required for agricultural machines to be imported. Importation of second-hand tractors and machinery and those with no CE marking should be banned in order to protect the domestic production.

ix. The export/import ratio for agricultural machinery, except tractors, is very low and majority of the agricultural machines imported are harvesting equipment, such as combine harvesters, cotton-pickers, forage harvesters, silage machinery and balers all of which are very expensive machines. There is therefore a need for government support and incentives for investments on the production of this type of machines.

x. Companies willing to export their products to European market are required to have the CE marking. However, there is no accredited institution in Turkey that can provide manufacturers with CE marking and this brings an additional cost of testing abroad and weakens the competitive power of Turkish manufacturers.

xi. Exports to EU would be accelerated by joint-venture initiatives of Turkish companies with the European counterparts,

xii. Precautions against dumping attempts in importation should be taken and if necessary, as in the EU countries, quotas should be applied to the third countries.

xiii. The trend in agriculture is towards sustainable and environment friendly production in agriculture. In this respect, organic farming or ecological farming practices and the consumer demand for their products are to a large extent increasing all over the world. It is therefore necessary to consider the production and implementation of appropriate machinery, such as computer aided production technologies, precision farming, zero-tillage techniques, multi-farm use organizations, etc.

xiv. High power tractors and machine combinations, which reduces the number of passes on the field, will have to be encouraged and used in agriculture so that to save energy, time and money and also help conserve the soil resources.

xv. As in many parts of the EU, necessary steps should also be taken to encourage farmers for multi-farm use of agricultural machinery, which would diminish the surplus capacities of machines and increase the productivity.

8. Conclusions

European Council, after the Helsinki Meeting on 10 and 11 December 1999, declared the acceptance of Turkey's candidacy for full membership and required Turkey's progress towards fulfilling the Copenhagen economic and political criteria. Turkey will certainly intensify the legislation and practice harmonization with the EU.

And besides the improvements of the sector's productivity, technology and quality standards, there seems to be so many fundamental decisions to be taken for the development of the agricultural and agricultural machinery manufacturing sectors and harmonization with the Common Agricultural Policy (CAP) of the EU.

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