

Full Length Research Paper

The forest products industry in Turkey

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This study was conducted to analyze the structure of Turkey's wood products industry and to suggest ways to improve the country's competitive position in global markets. The 415 largest solid wood manufacturers were surveyed using questionnaires administered in personal interviews and by mail. Results reveal that forest product enterprises are geographically clustered in a few provinces. Thirteen percent of respondents are using outdated technology while 63% are using relatively new technology and 24% are using advanced technology. The 2001 economic crisis seriously affected the wood products industry with a 38% decrease in the number of employees and a number of shuttered facilities. Overall, the research indicates that the Turkish forest products industry is fragmented and is experiencing a number of obstacles to further development. Turkey has an established but generally inefficient forest products industry. This article gives an overview of the sector and offers recommendations for improvement. Results from this study can be useful to manufacturers and policy makers in Turkey and other countries with similar industry structures in short and long-term sectoral planning and development.

Key words: Forest products, industry, enterprise, marketing, production, trade, organizational Issues.

INTRODUCTION

In the past 15 years, Turkey has made advances in Industrial production improvement for both export and import markets. In 2000, Turkey's solid wood products sector (excluding forestry and pulp and paper) employed approximately three percent of Turkey's workforce (FPISE, 1991; SII, 1999; Kurtoğlu et al., 1998) across 55,832 enterprises with the majority (98%) being small scale enterprises. An additional 1.4% is mid-sized and 0.8% is categorized as large companies. Nearly 60% of these companies are in the furniture sector (Koç and Aksu, 2001). Currently, the wood products sector represents about four percent of Turkey's General Directorate of Forestry (GDF) for all manufactured goods by value, ranking 8th among 33 industrial sectors tracked by the government (Koç et al., 2001).

In this paper, we discuss results of a study conducted to examine the current structure of the Turkey's wood

products sector and suggest technological, financial, and marketing improvements to enhance industry stability and competitiveness.

An overview of the forest sector in Turkey

Forest resources

Turkey lies in a transitional zone between temperate and tropical belts, and includes continental sections of Asia and the eastern part of the Mediterranean region. It is a gateway between Europe, the Middle East and the post-Soviet Union countries (Figure 1). Turkey has a total land area of close to 80 million ha. Forests cover 27.4% (21,363 million ha) of the country land area and continue to increase. According to The Food and Agriculture Organization of the United Nations (FAO) reports, Turkey is listed among the first ten countries that have realized afforestation works most extensively all over the world (GDF, 2010). Turkey has one of the richest floras in the world with 9,000 herbaceous and woody plant species

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Figure 1. Major regions in Turkey.

(173 families and 1,223 genera.) In the past, Turkey's forests covered about 50 million ha of the country (Boydak, 2001).. FAO estimates that around 9.6% of Turkey's forest cover consists of "primary forest" which is relatively intact, about 13.9% is classified as "protected" while about 7.6% is "conserved." Overall, 78.3% Turkey's forests are classified as "production forest." Between 2000 and 2005, Turkey gained about 123,000 ha of forest with a total reforestation rate of 0.2% per year over this period, gaining an average of 25,000 ha of forest annually (FAO, 2005).

The major tree species used for roundwood production are Calabrian pine (*Pinus brutia*), Crimean pine (*Pinus nigra*), Scots pine (*Pinus silvestris*), beech (*Fagus orientalis*), fir (*Abies bornmülleriana/alba/nordmaniana*), spruce (*Picea orientalis*), cedar (*Cedrus libani*), and oak (*Quercus*). The main sources of raw materials for the wood manufacturing industry are state forests, fast-growing plantation tree species such as poplar (*Populus spp.*) and eucalyptus (*Eucalyptus spp.*), and imports. Nearly all processed wood products are produced by the private sector which is composed primarily of small enterprises. Average annual wood production in the past nine years (2000 to 2008) from the Turkey's forests was 8.3 million m³ while consumption averaged 12.2 million m³ annually (GDF, 2010). High quality sawlogs and veneer logs supply is limited with 97% of log production falling into "third class" (the lowest quality grade) (GDF,

2005). As a result, the gap between domestic demand and production of high quality logs is narrowed by imports.

This shortage of domestic supply of high quality roundwood is a constraint to producing high quality final products that are competitive in international markets. In addition, high wood harvesting costs from forests located on steep terrain and high costs of transportation to manufacturing facilities, which are usually at long distances from the harvesting sites, are other disadvantages in the sector. However, consumption patterns, population increases, urbanization and a growing domestic market are advantages of the sector even if roundwood or other raw materials are imported for further processing. Overall, economic stabilization achieved in last three years has led to increases wood products production, consumption and trade.

Wood products industries

Wood processing industries are mainly composed of small enterprises although there are a few medium-scale companies. These enterprises are dispersed throughout the country although, as we found in our study, geographic clusters do exist. Many small-scale furniture enterprises and sawmills, with labor-intensive technologies, provide employment and income opportunities in

Table 1. Turkey wood product import and export value-Average percent of total value 2000 to 2004.

Products	HS codes of products	Total import value (\$)	Percent of import value	Total export value (\$)	Percent of export value
Round Wood, chips, particles	44.01 and 44.03	629.573	31.3	17.066	1.2
Sawnwood	44.07	155.804	7.7	97.023	6.7
Veneer sheet and plywood	44.08 and 44.12	128.494	6.4	119.260	8.2
Particle and Fibre board	44.10 and 44.11	466.070	23.2	209.717	14.5
Wooden wrapping and packing equipment	44.15 and 44.16	19.890	1.0	46.904	3.2
Builder's joinery and carpentry of wood	44.18	98.268	4.9	87.332	6.0
Others	The rest of Chapter 44	124.526	6.2	54.265	3.7
Prefabricated buildings	94.06.00.11.11	9.564	0.5	1.765	0.1
Wooden Furniture	Related sub-codes of chapter 94	380.079	18.9	817.309	56.3
Total		2.012.268	100.0	1.450.641	100.0

Source: Turkish Statistical Institute (TURKSTAT).

the poor, rural areas and, as such, the sector is of importance with respect to employment creation and reducing regional differences in income distribution. With few exceptions, wood products manufacturers are in the private sector. State-owned wood industry plants and enterprises, including those in the pulp and paper sector, have been privatized since 1993. However, anticipated goals of privatization, such as technological innovation and improved productivity, have not been achieved. Capital flows to Eastern European and CIS countries, which have raw material advantages and lower costs of production have contributed to this. Although a few plants are successful, many are still closed or are operating below capacity.

The Turkish forest sector employs over 168, 000 people with an average of three employees/company while the average number of employees/company in this sector in Italy and Germany is 6 and 78, respectively. Moreover, the average number of employees at lumber companies in the United States is 130 (Hansen et al., 2002; Scott et al., 2001; FAO, 2010). These comparisons may indicate insufficiencies of scale economies in Turkey.

Timber trade

Turkey's forest sector had an average annual export value of US \$2 million in the 1960's. This has increased dramatically since that time and reached to \$11 million in the 1970's, \$73 million in the 1980's and \$142 million in the 1990's. The increasing trend has continued in 2000's years and foreign trade value of all wood products including wooden furniture reached US \$ 3.307 million in the 2009 (TURKSTAT, 2010). Furniture and value added

end use wood products are the leading export products while raw materials such as round wood, chips and particles are the leading imported product in terms of value as can be seen in Table 1. Export and import shares for major product groups for the period of 2000-2004 are shown in Table 1. Major export markets are Germany, Greece, Netherlands, USA, Israel and Iraq. Major import origin countries are Russian Federation, Ukraine, Italy, Germany, USA, China and Indonesia. Both production and consumption have shown flat trends with few fluctuations between 1996 and 2002. The main factors adversely affecting demand were the contraction of the construction sector and reduced confidence of consumers due to abnormal fluctuations in financial markets, as well as a national economic crisis that existed in that period. There has been significant recovery since 2002 as a result of renewed consumer confidence and economic stabilization. Figure 2 shows production, consumption, import and export values for the furniture segment from 1996 to 2004.

MATERIALS AND METHODS

Although government supplied production and trade statistics are readily available, there is a gap in the literature regarding production structures, market conditions and competitive forces affecting the Turkish forest products sector. Accordingly, this study was conducted to examine these issues. A questionnaire-based survey was administered to a census of all 415 Turkish wood products manufacturers (excluding pulp and paper) with more than 25 employees. Firms with 25 and more workers are categorized as large-scale firms according to the Turkish Statistical Institute.

Ninety percent of the questionnaires were administered in personal interviews and 10% responded by mail. Respondents were either enterprise owners or upper level managers. The questionnaire was segmented into key areas including

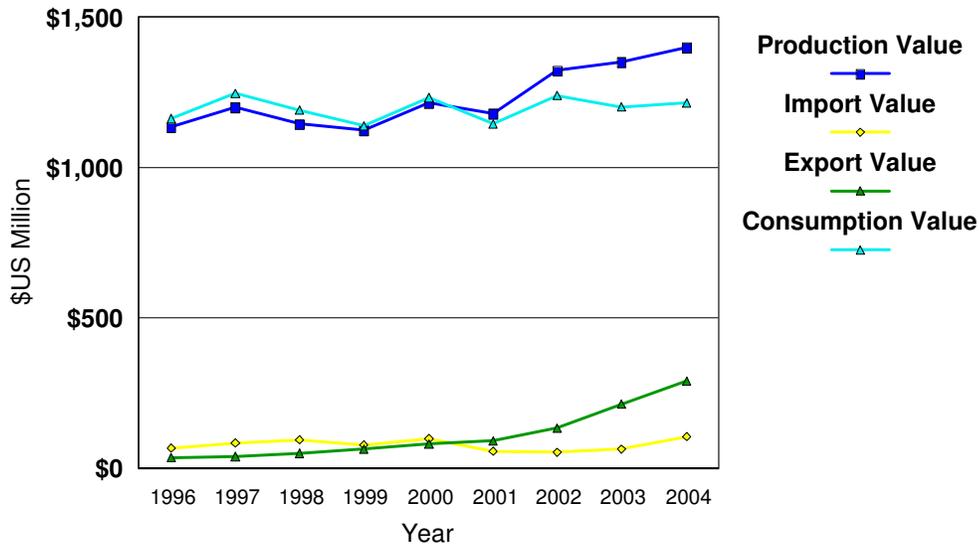


Figure 2. Turkey Wooden Furniture Production, Consumption, Imports and Exports by Value (1996-2004) (\$US Million). Source: (TURKSTAT).

Table 2. Sectors Represented by Respondents (n=300) Multiple responses possible.

Sector	Number of respondents	Percentage of respondents (%)
Furniture	165	35.3
Lumber	75	16.0
Parquet flooring	45	9.6
Framing	36	7.7
Plywood	29	6.2
Veneer	25	5.3
Wooden house	23	4.9
Particleboard	19	4.1
Packaging	9	1.9
Fiberboard	8	1.7
Other	34	7.3
TOTAL	463	100

demographics, employee training needs, organizational structure, use of technology, production quality, marketing conditions, the effect of the 2001 economic crisis, and international competition. Three hundred companies responded for a response rate of 72%.

RESULTS

Results show that 40% of the large-scale forest product respondents are located in Marmara Region, 26% in Central Anatolia, 19% in the Black Sea, 8% in Aegean, 8% in Mediterranean and 0.3% in East Anatolian regions (Figure 1). At the province level, the highest concentrations of manufacturers are in Istanbul (19%), Bursa (12%), Ankara (10%), Kayseri (6%) and Izmir (4%). Concentrations of wood industry enterprises also exist in

Germany, France, Belgium and most other European countries (CAEU, 2001). Establishment location decisions consider bringing together the main production factors in a rational way relative to marketing channels and customers (Yamak, 2001). In Turkey, the desire by a manufacturer to invest in the owner's home province is often the priority location decision criterion as surveyed results by observations and dialogues with the manufacturers. This approach is often contradictory to business-based location factors such as access to raw materials, energy availability, transportation, and proximity to markets.

The distribution of respondents by product group is shown in Table 2. Furniture represents 35.3% of the sector followed by lumber (16.0%), and parquet flooring

(9.6%). The fiberboard sector accounted for the least number of respondents (1.7%).

Organizational issues

The 300 respondent companies represent 22,154 workers or about 40% of the sector's total number of employees in 2003. Eighty-two percent of respondents employed less than 100 employees and 2 enterprises had more than 500 employees. We looked at the level of formal training for respondent employees. Seventy percent of respondents employ highly trained employees in positions of Forest Product Industrial Engineer (164 employees), Woodwork Industrial Engineer (138 employees) and Technician (2,124 employees) which represented eleven percent of all employees. Respondent functional areas in greatest need of highly trained employees were production (29% of respondents), marketing (16%) and production planning (14%).

Results reveal deficiencies in respondent organization structures. For example, only 47% of respondent companies had a formal organizational structure and of these, 35% had an organization handbook. Although formal structures were lacking, many respondents had defined departments such as export-import (29% of respondents), customer relations (12%), quality assurance (27%), research and development (21%), and human resources (21%). Fifty-five of the 84 respondents which had research and development departments employed highly trained personnel at the engineer level.

Most respondents said that they had adequate open and covered manufacturing areas and are not planning to expand capacity. Seventy-six percent of respondents have open manufacturing areas. Of this, 57% have an open area larger than 5,000 m², of which 41% are larger than 10,000 m². The smallest and the largest open manufacturing areas are 200 m² and 550,000 m² respectively. Nearly half of the enterprises (43%) have closed areas larger than 5,000 m². The smallest and the largest closed areas are 600 m² and 160,000 m², respectively.

Production

Production technology varies across respondent companies. Thirteen percent of respondents used traditional/outdated technology, 63% used "relatively advanced" technology and 24% used "advanced" technologies. Insufficient financing was stated as the primary reason for using outdated technology by 43% of respondents in traditional/outdated category. Of the 4,800 production machines used by respondents, 79, 13 and 8% were reported to be traditional equipment, Numeric Controlled (NC) and Computer Numeric Controlled (CNC), respectively. Forty percent of respondents that did not have NC and CNC production technology stated that they planned to develop this capability in the subsequent three years.

The average capacity usage by respondents was 58%. The reasons behind this low production capacity were insufficient demand resulting from a major economic crises experienced in 1981 and 2001 (38% of respondents) and a lack of adequate financing (20%). Poor quality of raw material (22% of respondents), lack of qualified workers (16%), and lack of demand (16%) are additional obstacles. As a result of economic conditions in these years, 42% of respondents had to reduce capacity and 30% reduced the number of company employees by an average of 38%. Seven percent of respondents, mostly exporters, were not affected by the crises.

Sixty-nine percent of respondents employ a number of techniques to increase productivity. Among these are providing employee business education (13%), quality control (13%), production planning (12%), computer usage (11%), and inventory control (11%). Awarding prizes to employees, financial analysis, provision of employee health care, business evaluations, and employee production bonuses were other techniques being used.

Quality control methods were used by a number of respondents. Thirty-eight percent of respondents controlled quality at the raw material entry stage of production. Finished product quality control was practiced by 28% of respondents and 25% said they controlled quality during the entire production process. Nine percent of respondents used statistical methods to monitor production quality.

Regarding future production, 29% of respondents had no investment plan. Of those that did plan to make additional investments in the future, respondents cited plans to improve technological development (25%), increase production capacity (24%), enlarge and/or rehabilitate manufacturing areas (23%). They planned to implement these improvements in the next three years.

Marketing

Eighty-five percent of respondents said they had marketing-related problems (Table 3.) First ranked was stagnation in domestic markets (33% of respondents) which is due to fundamental national economic conditions. Although domestic consumption for most wood products has increased since 2001, a lack of demand is still perceived to be hampering industry growth. Inefficient/inadequate sales and transaction procedures was ranked as the most serious problem by 17% of respondents.

Promotional methods used by respondents included brochures and catalogues (23% of respondents), face-to-face communication with customers (23%), maintaining a web page (18%), participating in domestic trade fairs (16%), advertising in newspapers (11%) and participating in international exhibitions (7%). Sixty-two percent of respondents participated in the export market. On average, 24% of production (by value) was exported by

Table 3. Most serious marketing-related problem experienced by respondents (n=300).

Problem	Percentage of respondents (%)
Stagnation in domestic markets	33
Inefficient/inadequate sales/transaction methods	17
International competition	16
Stagnation in export markets	16
Inefficient marketing techniques used by importers	3

respondents in 2000. Major markets include European Union (EU) countries (27% of respondents), Arab countries (23%), Turkic Republics (19%), Balkan countries (18%) and other countries (13%).

Turkey has been participating in the Customs Union of the EU since 1996. This was viewed by as an opportunity by the government and the public to create competitive trade conditions between Turkey and EU countries. However, 27% of respondents with said that they can't compete effectively in EU trade. Twenty-three percent felt that they had parity in competition while the balance was unsure if competitive opportunities existed.

Overall, a desire to increased exports has been restricted due to a lack of information about foreign markets (17% of respondents), inability to compete with regard to price and quality (14%), insufficient organizational structure (11%), and insufficient financing (10%). Additional reasons include insufficient technology, transportation and logistics difficulties, domestic markets take all production capacity, product design problems, difficulties adaptation products for export markets, and insufficiency of capacity.

CONCLUSIONS AND DISCUSSION

The Turkish forest product industry has developed considerably since 1980 largely due to the transition to a free market economy and investment encouragement provided by the government. However, the target of most investments was towards the domestic market rather than foreign markets. As a result, export development has been stifled, resulting in a national foreign trade balance deficit in this sector. In addition, government investment strategies have resulted in a rapid increase in the number of forest product enterprises, but technology, scale and establishment location placement have developed haphazardly. Deficiencies in technology and finance, lack of qualified employees and their rapid turnover, bureaucratic obstacles, and insufficiency in demand are the main problems in the Turkish forest sector.

Although 70% of respondents employ technical employees, continued technical (and managerial) training should be a priority to address changes in domestic and international wood products standards and customer requirements.

Most enterprises surveyed in this study are unable to utilize maximum production capacity. One of the main reasons behind this is insufficient demand. An effort to develop a customer-centric industry perspective, as opposed to a production-centric perspective, can help to make Turkish manufacturers more competitive. This would include market research, customer satisfaction studies and a strategic perspective of industry development.

In addition, one key element that can contribute to success in the forest sector is to improve dialogue with universities and research institutes, both domestic and foreign. There is a wealth of information and resources available that is currently not being exploited to its fullest potential. These and other communication networks with domestic and international forest industry professional organizations should be established. Unfortunately, the professional understanding of administration falls short in Forest Products Industry. Investments are generally directed toward domestic markets instead of foreign markets. Investments in foreign markets are not up to the mark. This situation has some negative effects such as many corporations going out of business. That is why the corporations need to invite the professional administrators in and employ more trained and specialized technical staff.

There is lack of communication between universities and manufacturers on a sectoral basis. Due to lack of some facilities, the universities move away from their guiding and leading structures and cannot keep up with the developments in technology. In the same vein, corporations are not able to provide enough support for universities. Unconscious production occurs because there is lack of trained staff specialized in wooden products and forest industry engineers and woodworking industry engineers educated at higher institutions do not prefer to work in Anatolia. The situation may get better if the related faculties and vocational schools of higher education analyse the processes in Turkey and convey the results to the manufacturers. Conferences need to be organized related to this subject and the consumer awareness should be raised. Chambers of industry and commerce should inform the corporations in their districts on any matter and be their guides. Foreign capital inflows must be increased with new partnerships that will take place.

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