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Research Article

AN ANALYTICAL HIERARCHY PROCESS APPLICATION: DETERMINING THE MOST IMPORTANT BOARD TYPE OF TURKEY REGARDING EXPORTATION IN RECENT YEARS

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Abstract

In this paper, the board industry of Turkey which occupies an important place in Turkish forest product industry was accepted as the research subject. Turkey exports various forest products and the boards have a great importance among them. Therefore, regarding export: determining the most important of these products in recent years was aimed. So, the purpose of the study was turned into a decision-making problem, for the decision-making analyses, criteria are needed. Thus, some criteria were derived from different export related data.

According to the conducted research, the latest and most up to date statistical data were found at The Food and Agriculture Organisation of the United Nations Statistical Database (FAOSTAT) and which are from 2015. So, the data were taken from FAOSTAT. For solving this decision-making problem, one of the multi-criteria decision-making methods: Analytic Hierarchy Process (AHP) was used.

The chosen board types are fibreboard (hardboard, MDF and HDF), particle board (particle board and OSB) and plywood. These products were selected because of their wide range of industrial uses, market share and the ease of finding statistical data about their production amount, export amount and export value. The results of the AHP analysis are as follows: Fibreboard is the most important product among the boards while particle board takes second place and the plywood is the last one. At the discussion part, the possible causes of this results were discussed and some suggestions were made.

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INTRODUCTION

Turkey occupies an important part in the world regarding forest products and forest products industry has an important place in national economy [1]. She exports various products and wood-based panels have great importance among these. Wood-based panels are used in: furniture industry, forestry enterprises, glue industry, timber factories, paper industry and other fields [2]. In this paper we wanted to determine which of the selected product types is the most important regarding export. As it is seen: now the issue has turned into a decision-making problem. The export related data were taken from FAOSTAT database and while the situation was examined it was found that it is possible to derivate some export related criteria based on the gotten data. Therefore, one of the widely used multi-criteria decision-making methods: AHP was adopted in this research. AHP has been used in various settings for decision making [3]. For instance: in public administration there have been lots of applications, in 2001 it was used to determine the most appropriate relocation site for the earthquake devastated Turkish city Adapazarı, in 1999 Ford Motor Company used AHP to establish priorities for criteria that improve customer satisfaction and etc [3]. AHP is about breaking a problem down and then aggregating the solutions of all the subproblems into a verdict. It eases decision making by organising perceptions, feelings, judgements and memories into a framework that shows the forces that influence a decision [4]. So, With the help of the AHP it will be possible to rank the selected products, see their current situation in the market and make some suggestions to remove disadvantage of the neglected products and to increase the export. Another intention of this paper is to prove different use of AHP and lead to the future studies.

MATERIAL AND METHODS

The data were collected from FAOSTAT database and then were arranged as follows: The fibreboard related data stands for cumulative sum of MDF, HDF and hardboard, the particle board related data stands for the cumulative sum of particle board and OSB. The following table shows the values in 2015.

Table 1. The data regarding production and exportation of selected products in 2015 (FAOSTAT 2017)

Area	Element	Item	Unit	Value
Turkey	**Export Amount**	**Plywood**	**m3**	**14000**
		MDF/HDF		534000
		Hardboard		57000
		Other fibreboard		19900

		Fibreboard Total		**610900**
		Particle board		407100
		OSB		2900
		Particle board + OSB		**410000**
	Export Value	**Plywood**	**1000 US$**	**10743**
		MDF/HDF		236862
		Hardboard		30142
		Other fibreboard		9226
		Fibreboard Total		**276230**
		Particle board		79765
		OSB		861
		Particle board + OSB		**80626**
	Production Amount	**Plywood**	**m3**	**116000**
		MDF/HDF		4777000
		Hardboard		0
		Other fibreboard		15000
		Fibreboard Total		**4792000**
		Particle board		4361000
		OSB		75000
		Particle board + OSB		**4436000**

As already mentioned, the AHP was used for analysing the data. The AHP is a method developed by Saaty to support multi-criteria decision making [5]. The AHP is widely used by decision makers and researches [6]. It has been extensively used in nearly all kinds of multiple criteria decision making (MCDM) because of its simplicity, ease of use and excellent flexibility [7] . In theory and reality, it is often used to solve strategic decision problems [8]. The approach is based on three major components:

1-Decomposition: The AHP begins by decomposing a complex problem into a hierarchy with each level consisting of a number of manageable elements [9].

2-Measurement methodology: A measurement methodology is used for establishing the priorities among the elements within each stratum of the hierarchy [10].

3- Measurement theory: A measurement theory to establish the priorities of the hierarchy and the consistency of the judgmental data provided by the group of respondents [10].

For the AHP analysis, the hierarchy was created like this: the related criteria were accepted as production amount, export amount and export value and the alternatives were accepted as plywood,

particle board and fibreboard. In the hierarchy all of the criteria were accepted to be equally important. See the following figure for a better understanding of the created hierarchy.

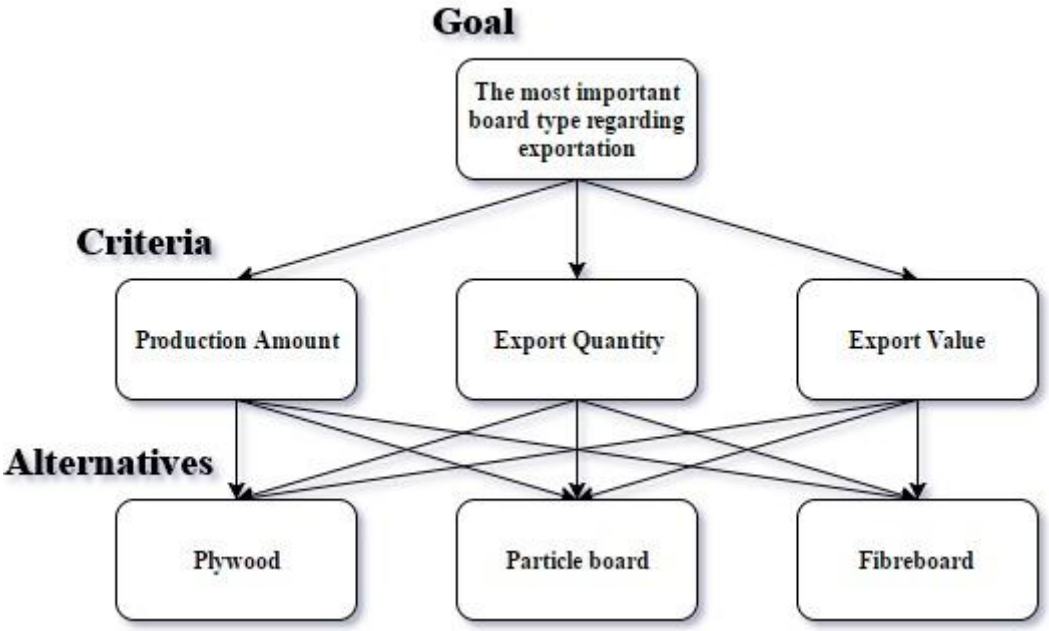

Figure 1. The created hierarchy

RESULTS & DISCUSSION

After the creation of the hierarchy the resolving process started. Because of being equally accepted, *all the criteria weight 0.333333.* Afterwards, the calculation of the alternatives weights was done and the results are as follows:

Table 2. Determination of the Alternatives Weights

Production Amount	**Weights**	**Export Amount**	**Weights**	**Export Value**	**Weights**
Plywood	**0.012414**	Plywood	**0.013528**	Plywood	**0.029225**
Particle Board	**0.474743**	Particle Board	**0.396174**	Particle Board	**0.219331**
Fibreboard	**0.512842**	Fibreboard	**0.590299**	Fibreboard	**0.751444**

Regarding all of the criteria and alternatives, the final resolution of the AHP was resulted as:

Table 3. Final resolution of AHP

ITEM	**Production Amount**	**Export Amount**	**Export Value**
Plywood	0.004138128	0.004509292	0.009741593
Particle Board	0.158247717	0.132057848	0.073110464
Fibreboard	0.170947489	0.196766193	0.250481276

Plywood= 0.018389014, Particle board= 0.363416028 and Fibreboard= 0.618194958.

According to the results, in our study fibreboard was found as the most important item in terms of export while particle board came second and plywood was third and the last. For exhibiting the difference between these items total points were divided into each other and the results mean that fibreboard is about 34 times more important than the plywood whilst it is about 1.7 times more important than particle board and the particle board is about 20 times more important than plywood. The findings prove that Turkey has an important part in the world at the fibreboard production. If it is considered that the production methods of other board types is quite similar, Turkey may be a successful exporter of the other items if the manufacturers focus on the others and canalise their expertise and experiences. Also, when the situation of the construction sector at the region is considered, it is too obvious that there will be definitely a great demand for the other board types. Because: generally, fibreboard is used in the production of furniture whilst particle board and plywood are mainly used in constructions.

CONCLUSIONS

In this study, regarding exportation: fibreboard was determined as the most important board type of Turkey whilst Particle board and plywood comes the second and third. However, Turkey has an important potential and chance to increase its share of the other manufactured board types. Therefore, focusing on the neglected items especially on OSB and plywood is suggested by the researchers.

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