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Kadri Cemil AKYÜZ, İbrahim YILDIRIM, Nadir ERSEN, İlker AKYÜZ, Doğan MEMIŞ

COMPETITIVENESS OF FOREST PRODUCTS INDUSTRY SECTOR IN TURKEY: REVEALED COMPARATIVE ADVANTAGE INDEX

This study, aimed to determine the competitive advantage position of the forest products industry sector in Turkey between 2001-2017 by using the revealed comparative advantage approach. One of the three sub-production structures (wood and articles of wood; wood charcoal-21 sub-product group) of the forest products industry were examined at the level of their sub-product groups. As a result of the study, "the wood and articles of wood;wood charcoal" sector was far from the desired position in terms of competition. When "the wood and articles of wood;wood charcoal" sector was analyzed on sub-group basis, especially the products of 4411, 4413 and 4415 had competitive position. Moreover, it was found that the trend in Turkey's imports of wood and articles of wood sector was not high. However, imports carried out under specified product groups were carried above the level of imports in Turkey.
Keywords: wood and articles of wood; wood charcoal, comparative advantage, trade balance

Introduction

The existing resources and the imbalance in the existing and ever-increasing need structure at the individual and social levels requires new searches and the best use of the existing one. The fact that the phenomenon of globalization eliminated borders in the economic sense, especially after the 1980s, strengthened the commitment countries had for each other and the advantage it provided in accessing the resources, caused an increase in the number of production units. This increase has lead to problems in resource use, which is

Kadri Cemil AKYÜZ (*akyuz@ktu.edu.tr*), İbrahim YILDIRIM (*ibrahim@ktu.edu.tr*), Ilker AKYÜZ (*iakyuz@ktu.edu.tr),* Doğan MEMIŞ (*nadirersen28@gmail.com*), Karadeniz Technical University, Trabzon, Turkey; Nadir ERSEN✉ (*nadirersen20@artvin.edu.tr*), Artvin Çoruh University, Artvin, Turkey

limited, while bringing a serious dimension to competition. In this structuring, production units, faced with many opportunities and threats, must seek success and continuity in competition and limit their production forces to specific areas. The effort to attract the largest share in international markets brings about the increase in competition among companies and countries.

The developments of countries are closely related to the success of foreign trade. In evaluations where the export level is one of the success criteria, the strategic successes and production forces of companies are accepted as the starting point in the development of the sector they are involved and in achieving international success. The changes in foreign trade figures over the years at the sectoral level indicate the fields where importance and resources should be allocated. The increase in the level of exports at the sectoral level cannot be considered as a comparative advantage at the international level and it should also be acknowledged that the decrease is not a failure. Interpreting these increases and decreases, which may occur due to various factors, accurately ensures that the previous years are evaluated in integration.

The micro-level sectoral power and success of countries are the determinants of macro success and power. In order to achieve success at an international level, it is necessary to determine the sectoral competitive advantages. The projections made for the coming years indicate that a certain number of countries in the world, including Turkey, will get a bigger share of world value added and will increase their global competitiveness [Erkan 2012].

The forest products industry sector, which comes under the manufacturing industry and has hundreds of different products and production power, is divided into two sub-groups: intermediate goods and consumer goods. According to the International Standard Industrial Classification of All Economic Activities (ISIC), the forest products sector is grouped in three main fields: wood, wood products and mushroom; paper and paper products; furniture. Although there are occasional differences in the classifications made internationally, the accepted classifications are the classifications made by Statistical Classification of Economic Activities in the European Community (NACE) and ISIC.

In order for social and economic changes in society to increase the demand for forest products industry and take a share of the sector in the expanding market, it is necessary to follow the developing technologies and determine consumer needs accurately. Therefore, it is important to accurately evaluate the competitive advantage regarding product variety and make analyzes that contribute to the country's economy.

In this study, it was aimed to reveal the comparative advantages of the forest products industry sector in Turkey on the basis of sub-product groups by using various competitiveness indices. Within the scope of the study, the period between 2001 and 2017 was examined in two parts. Moreover, the changes that occurred in the sub-product groups over the years and the product groups that

should be given weight in production and export by the most appropriate resource distribution in the comparative advantage were tried to be determined. This study also detailed how periodic trends change at sub-group levels.

Competition, competitiveness and theoretical approaches that explain competitiveness

The concept of competitiveness, on which there is no consensus regarding its exact definition, is a concept that includes phenomena such as continuity in production, increase in value added, sustainable income increase, and production in compliance with standards.

The theory of absolute advantage, which was introduced by Adam Smith [1776] and accepted as the first theory of international trade, states that the export of goods produced inexpensively and the importation of expensive goods will give countries an advantage. While this theory evaluates the individual production superiority of countries, Ricardo [1817] stated that countries and production units are not internationally independent and operate in competition and argued that production should be carried out considering the corrections of price of other countries. According to this theory, which is known as the theory of comparative advantage and is one of the oldest international trade theories, it is not necessary for countries to have an absolute advantage over another to carry out international trade. According to Ricardo, countries should act on the basis of relative price differences in the international arena. In other words, countries do not have to produce goods cheaper than each other.

Countries should specialize and export in the areas in which they have comparative advantage, and import the products which would be costly to produce. In such cases, the exporting and importing countries will all profit [Miral 2006]. On this basis, the actions of all the countries and production units will contribute positively to the welfare and development of the countries and the world [Sharma 2004]. In order to eliminate the shortcomings of the theory of comparative advantage, the factor density theory developed by Heckscer [1919] and Ohlin [1933], bases the superiority between countries on the means of the production of the countries. The excessive use of intensively owned factors will provide an advantage over other countries in production. While these classical approaches try to explain the international competitive advantage on a country basis, in the modern approaches pioneered by Michael Porter, competitiveness is explained to be industry-based. Porter stated that the available resources will decrease and consequently the comparative advantage may change, and that the new competitiveness concepts will be cost, quality, product differentiation, technological differences and market structures [Porter 1998].

In the literature, there are many studies on these indices used in order to make comparisons between countries and sectoral evaluations. Bojnec [2001]

examined the countries that have an important share in world agricultural trade in terms of comparative advantages and determined that South American countries have comparative advantage. The objective of the study by Dieter and Englert [2007] was to analyze the competitiveness of the German forest industry sector against the international timber markets. In order to determine the competitiveness of the Turkish furniture industry in the international arena, Altay and Gürpınar [2008] calculated the data collected between 2001 and 2006 with the help of the Balassa and Volltrath indices. They determined the changes in the sector and made various recommendations. De Carvalho et al. [2009] analyzed the competitiveness of Brazil in the international market of wood pulp with the RCA and the Relative Position in the Market (RPM) indices. Aini et al. [2010] examined the comparative advantage of Malaysian timber products in the European market. Erkekoğlu et al. [2014] examined the competitiveness of the furniture sector in Kayseri using the Balassa and Volltrath indices and explained that this sector has the comparative advantage both in Turkey and the world. Sujova and Hlavackova [2015] evaluated the level and development of competitiveness of the wood processing industry in the Czech Republic in the sub-sectoral structure. In a study by Palus et al. [2015], the trade performance and competitiveness of the Slovak wood processing industry sectors and their comparison with the Visegrad group countries were analyzed. In their study, the competitiveness of wood and semi-finished wood products in Slovakia and the selected Central European countries was compared [Parobek et al. 2016]. Maksymets and Lönnstedt [2016] evaluated the changes in the international competitiveness of the forest products industries in three countries, namely Sweden, the US, and Ukraine. Maxir et al. [2017] analyzed Brazil's international trade in forest products between 2000 and 2014, emphasizing its role by using the RCA and Revealed Comparative Disadvantage (RCD) indices. In their study-Milicevic et al. [2017], the competitiveness of the wood processing industry in the Republic of Serbia between 1995-2015 was determined by using six partial indicators of competitiveness. De Souza et al. [2018], determined the competitiveness of the exports of sawn wood and tropical plywood and compared the performance of both products.

Materials and methods

Material

In the present study, the paper and paper products and furniture sectors were excluded and all the sub-groups of wood and articles of wood sector were analyzed within the scope of the determined indices. The reason why we focus on "wood and wood products, charcoal" sector is that many businesses operating

in this sector in Turkey and is used as input in many sectors of wood and wood products. The analysis covered the period between 2001 and 2017, which was divided into two sub-groups as 2001-2009 and 2010-2017. Therefore, it was aimed to determine the differences in terms of the competitive characteristics of the periodic changes. The data were taken from TradeMap website and the product groups defined by this site were taken into consideration.

-Wood and articles of wood; the wood charcoal

The wood and articles of wood, including wood charcoal contributing to production and employment in Turkey with thousands of enterprises in different scale groups was defined in 21 sub-products (Table 1).

Table 1. Wood and articles of wood; wood charcoal

Codes of products	Definition
4401	Fuel wood, in logs, billets, twigs, faggots or similar forms; wood in chips or particles; sawdust and wood waste and scrap, whether or not agglomerated in logs, briquettes, pellets or similar forms
4402	Wood charcoal, incl. shell or nut charcoal, whether or not agglomerated (excluding wood charcoal used as a medicament, charcoal mixed with incense, activated charcoal and charcoal in the form of crayons)
4403	Wood in the rough, whether or not stripped of bark or sapwood, or roughly squared (excluding rough-cut wood for walking sticks, umbrellas, tool shafts and the like; wood in the form of railway sleepers; wood cut into boards or beams, etc.)
4404	Hoopwood; split poles; piles, pickets and stakes of wood, pointed but not sawn lengthwise; wooden sticks, roughly trimmed but not turned, bent or otherwise worked, for the manufacture of walking sticks, umbrellas, tool handles or the like; chipwood, wooden slats and strips and the like (excluding hoopwood cut to length and chamfered; brush surrounds and shoe trees)
4405	Wood wool; wood flour "wood powder able to pass through a fine", 0,63 mm mesh, sieve with a residue of <= 8% by weight
4406	Railway or tramway sleepers "cross-ties" of wood
4407	Wood sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded or end-jointed, of a thickness of > 6 mm
4408	Sheets for veneering, incl. those obtained by slicing laminated wood, for plywood or for other similar laminated wood and other wood, sawn lengthwise, sliced or peeled, whether or not planed, sanded, spliced or end-jointed, of a thickness of <= 6 mm
4409	Wood, incl. strips and friezes for parquet flooring, not assembled, continuously shaped "tongued, grooved, rebated, chamfered, V-jointed beaded, moulded, rounded or the like" along any of its edges, ends or faces, whether or not planed, sanded or end-jointed

4410	Particle board, oriented strand board "OSB" and similar board "e.g. waferboard" of wood or other ligneous materials, whether or not agglomerated with resins or other organic binding substances (excluding fibreboard, veneered particle board, cellular wood panels and board of ligneous materials agglomerated with cement, plaster or other mineral bonding agents)
4411	Fibreboard of wood or other ligneous materials, whether or not agglomerated with resins or other organic bonding agents (excluding particle board, whether or not bonded with one or more sheets of fibreboard; laminated wood with a layer of plywood; composite panels with outer layers of fibreboard; paperboard; furniture components identifiable as such)
4412	Plywood, veneered panel and similar laminated wood (excluding sheets of compressed wood, cellular wood panels, parquet panels or sheets, inlaid wood and sheets identifiable as furniture components)
4413	Metallised wood and other densified wood in blocks, plates, strips or profile shapes
4414	Wooden frames for paintings, photographs, mirrors or similar objects
4415	Packing cases, boxes, crates, drums and similar packings, of wood; cable-drums of wood; pallets, box pallets and other load boards, of wood; pallet collars of wood (excluding containers specially designed and equipped for one or more modes of transport)
4416	Casks, barrels, vats, tubs and other coopers' products parts thereof, of wood, incl. staves
4417	Tools, tool bodies, tool handles, broom or brush bodies and handles, of wood; boot or shoe lasts and shoetrees, of wood (excluding forms used in the manufacture of hats, forms of heading 8480, other machines and machine components, of wood)
4418	Builders' joinery and carpentry, of wood, incl. cellular wood panels, assembled flooring panels, shingles and shakes, of wood (excluding plywood panelling, blocks, strips and friezes for parquet flooring, not assembled, and pre-fabricated buildings)
4419	Tableware and kitchenware, of wood (excluding interior fittings, ornaments, cooperage products, tableware and kitchenware components of wood, brushes, brooms and hand sieves)
4420	Wood marquetry and inlaid wood; caskets and cases for jewellery or cutlery, and similar articles, of wood; statuettes and other ornaments, of wood; wooden articles of furniture (excluding furniture, lighting fixtures and parts thereof)
4421	Other articles of wood, n.e.s.

Method

There are many different methods developed to measure international competitiveness. These methods, primarily use foreign trade data to measure the competitiveness of companies, industries and countries. In this study, RCA, which was proposed by Liesner [1958] and was developed by Balassa [1965],

and three different indices, which were formulated by Volltrath [1991], were used. Because Balassa and Voltrath indices are commonly used to measure competitiveness. The first index formulated by Voltrath is the Relative Trade Advantage (RTA), which consists of the difference between Relative Export Advantage (RXA) and Relative Import Advantage (RMA). The second index was lnRXA, which is the simple logarithm of the Relative Export Advantage Index. The third index was the Revealed Competitiveness (RC), which consists of the difference between the logarithmic forms of RXA and RMA.

-Balassa index (or Revealed Comparative Advantage, RCA)

Balassa's [1965] index, which stands out in terms of measuring specialization in international trade, allowed the share of a targeted group of goods in the total exports of a country to be divided into the share of the world's total exports. As a result of the analysis, a value of RCA less than 1 indicates that the country does not have competitiveness in terms of the revealed comparative advantages in the relevant product level and a value of RCA greater than 1 indicates that the country has a revealed comparative advantage in the product group [Balassa 1965; Kum 1999; Altay and Gürpınar 2008]. The Balassa index compares the specialization of a country in a product group with that of the world. Here, it is determined whether it has comparative advantage at the product group or sectoral level rather than the elements that determine the comparative advantage [Mykhnenko 2005; Beningo 2005]. The index developed by Balassa is shown in Equation 1.

$$RCA_{ij} = \frac{\left(\frac{X_{ij}}{X_{it}}\right)}{\left(\frac{X_{wj}}{X_{wt}}\right)} \quad (1)$$

In the index;

X_{ij}: the goods j's exports of country i

X_{it}: total exports of country i

X_{wj}: the goods j's exports in the world

X_{wt}: total exports in the world

-Vollrath's Revealed Comparative Advantage indices

The Balassa index, which is criticized only for taking export data into account, was revised by Vollrath [1991]. The new calculation, which was made by subtracting the total export data in order to prevent the export data in the product group to be counted twice, consists of three different measurements to determine the export competitiveness.

- Relative Trade Advantage (RTA)

The Relative Trade Advantage index, which has a more complex structure than the RCA index, is equal to the difference between the RXA index and the

RMA index [Vollrath 1991; Utkulu and İmer 2008]. The index, which determines the net trade effect by using export and import values, is shown in the equation below.

$$RTA_{ij} = RXA_{ij} - RMA_{ij} \quad (2)$$

If the result obtained from the calculation is greater than 0, it indicates that the country has a competitive advantage at the product or sector level and, if it is smaller than 0 this indicates that it has a competitive disadvantage.

- Relative Export Advantage (RXA)

Vollrath's RXA index prevents the country and product (sector) to be counted twice, unlike the Balassa index. This index can be defined as the ratio of domestic specialization of a country's exports of a particular product or sector to the world specialization of the same product or sector exports [Sarıçoban and Kösekahyaoğlu 2017]. The index is formulated given in the equation below;

$$RXA = \frac{\frac{X_{ij}}{(X_{it}-X_{ij})}}{\frac{(X_{wj}-X_{ij})}{(X_{wt}-X_{it})}} \quad (3)$$

If RXA> 1 is obtained, it means that the country's export share in this goods group is greater than the export share of the world or other country groups compared. In this case, it is concluded that there is an export competitive advantage of the country in this goods group. RXA <1 indicates that the country has a competitive disadvantage. 1 indicates that there is a balance in the export competitiveness.

- Relative Import Advantage (RMA)

The RMA index shows the situation of a country in the world in terms of imported commodity. The equation of the index is given below [Fronberg ve Hartmann 1997];

$$RMA = \frac{\frac{M_{ij}}{(M_{it}-M_{ij})}}{\frac{(M_{wj}-M_{ij})}{(M_{wt}-M_{it})}} \quad (4)$$

M_{ij}: the goods j's imports of country i

M_{it}: total imports of country i

M_{wj}: the goods j's imports in the world

M_{wt}: total imports in the world

It can be concluded that there is a competitive disadvantage at this product group level if the RMA value is greater than 1 and there is a competitive advantage if it is smaller than 1.

- Simple logarithm of the Relative Export Advantage (lnRXA)

This index is widely used because it allows comparison of competitiveness based on export performance of the competitor countries. In the classification of the lnRXA, the following results are obtained;

If lnRXA changes between 0.5 and ∞, the comparative advantage is high,

If lnRXA changes between -0.5 and 0.5, the comparative advantage is marginal,

If lnRXA changes between $-\infty$ and -0.5, the comparative advantage is low. The index logarithm was shown below [Erkekoğlu et al. 2014].

$$lnRXA = ln[X_{ij}/(X_{it} - X_{ij})/(X_{wj} - X_{ij})/(X_{wt} - X_{it})] \quad (5)$$

-Revealed Competitiveness (RC)

This index consists of the logarithmic forms of the RXA and RMA indices. The positive value to be obtained as a result of this index shows that there is a competitive advantage and the negative value shows that there is a competitive disadvantage. It is also a more preferable measurement than lnRXA and RTA in terms of reflecting the supply and demand balance [Sarıçoban and Kösekahyaoğlu 2017].

$$RC = lnRXA - lnRMA \quad (6)$$

Results and discussion

Wood and articles of wood; wood charcoal

The period between 2001 and 2017 in the defined sub-product was divided into two groups with the aim of comparing the results of the periodic competition index. The data of the foreign trade of the products within the determined periods were summarized in Table 2 [TradeMap 2018a].

Table 2. Foreign trade figures at "wood and articles of wood; wood charcoal" sub-product level (thousand dollars)

Codes of products	2001-2009 Imports	2001-2009 Exports	2001-2009 Balance of trade	2010-2017 Imports	2010-2017 Exports	2010-2017 Balance of trade
4401	80378	96.555	**-80281.445**	231394	772	**-230622**
4402	2875	7.777	**-2867.223**	26787	653.375	**-26133.625**
4403	159334	3176	**-156158**	108184	2850	**-105334**
4404	112	128.111	**16.111**	998	157.875	**-840.125**
4405	1473	9.777	**-1463.223**	1361	35.75	**-1325.25**
4406	1588	294.555	**-1293.445**	689	253.625	**-435.375**
4407	73317	17649	**-55668**	230126	12633	**-217493**
4408	15094	20257	**5163**	41654	26247	**-15407**
4409	10994	9253	**-1741**	16368	15540	**-828**
4410	41296	48971	**7675**	84320	91032	**6712**
4411	171998	95102	**-76896**	216362	289708	**73346**
4412	60530	16305	**-44225**	288003	14895	**-273108**
4413	3361	7310	**3949**	8884	26615	**17731**
4414	1692	810	**-882**	3391	1587	**-1804**
4415	3062	19239	**16177**	8102	33160	**25058**
4416	714	87	**-627**	1503	181	**-1322**
4417	634	486	**-148**	2117	993	**-1124**
4418	30406	46676	**16270**	71197	158730	**87533**
4419	2394	990	**-1404**	11577	2685	**-8892**
4420	4370	770	**-3600**	8325	1897	**-6428**
4421	10571	8033	**-2538**	26177	18688	**-7489**

It can be that a significant foreign trade deficit occurred at the level of sub-products within the period examined in the production of wood and articles of wood, including wood charcoal. In a significant number of sub-products (4401, 4402, 4404, 4405, 4408, 4409, 4410, 4411, 4413, 4414, 4415, 4416, 4417, 4418, 4419, 4420 and 4420), there was an increase in exports in the periods examined. When the import size was examined within the periods, it was observed that there were increases in the products of 4401, 4402, 4404, 4407, 4408, 4409, 4410, 4411, 4412, 4413, 4414, 4415, 4416, 4416, 4417, 4418, 4419, 4420 and 4421. Although foreign trade surplus was observed in the products of 4404,

4408, 4410, 4413, 4415 and 4418 in the period of 2001-2009, the obtained values were in low amounts. Considering the averages of the period of 2010-2017, foreign trade surplus was seen in the products of 4410, 4411, 4413, 4415 and 4418. In the comparative evaluation of two periods, the sub-products that were positive in the period of 2001-2009, but turned into negative in the period 2010-2017, were the products of 4404 and 4408, and the product that turned from negative to positive in the period of 2010-2017 was 4411. In addition, it is noteworthy that the trade deficit in the products of 4401, 4402, 4407 and 4412 increased significantly.

Table 3 summarizes the index values of the sub-products of ”wood and articles wood; wood charcoal” obtained by using Balassa's RCA and Volltrath's RCA.

Table 3. Competitiveness of “wood and articles of wood; wood charcoal” at sub-product level

	2001-2009						2010-2017					
Codes	**RCA**	**RXA**	**RMA**	**RTA**	**InRXA**	**RC**	**RCA**	**RXA**	**RMA**	**RTA**	**lnRXA**	**RC**
4401	0.004	0.004	1.86	**-1.85**	-5.49	-6.11	0.01	0.01	2.12	**-2.11**	-4.37	-5.12
4402	0.003	0.002	0.52	**-0.52**	-5.87	-5.23	0.09	0.08	1.87	**-1.78**	-2.4	-3.03
4403	0.042	0.042	1.16	**-1.11**	-3.15	-3.3	0.02	0.02	0.45	**-0.42**	-3.71	-2.92
4404	0.113	0.112	0.05	**0.05**	-2.18	0.7	0.08	0.08	0.34	**-0.25**	-2.42	-1.35
4405	0.023	0.023	2.72	**-2.69**	-3.74	-4.74	0.04	0.04	1.35	**-1.31**	-3.09	-3.4
4406	0.194	0.193	0.63	**-0.44**	-1.64	-1.19	0.09	0.09	0.16	**-0.06**	-2.31	-0.52
4407	0.087	0.086	0.22	**-0.13**	-2.44	-0.96	0.04	0.04	0.49	**-0.44**	-3.11	-2.4
4408	0.945	0.945	0.43	**0.5**	-0.05	0.77	1.13	1.14	1.04	**0.1**	0.13	0.09
4409	0.303	0.302	0.22	**0.07**	-1.19	0.3	0.39	0.39	0.26	**0.12**	-0.93	0.39
4410	1.064	1.065	0.62	**0.44**	0.06	0.53	1.48	1.49	0.88	**0.61**	0.4	0.52
4411	1.832	1.845	2.4	**-0.56**	0.61	-0.26	3.62	3.71	1.8	**1.91**	1.31	0.72
4412	0.226	0.225	0.53	**-0.3**	-1.49	-0.86	0.12	0.12	1.66	**-1.54**	-2.1	-2.61
4413	2.49	2.518	1.32	**1.19**	0.92	0.64	11.5	12.6	2.47	**10.2**	2.54	1.63
4414	0.118	0.117	0.16	**-0.04**	-2.13	-0.33	0.2	0.2	0.29	**-0.08**	-1.57	-0.35
4415	1.222	1.224	0.13	**1.08**	0.2	2.18	1.29	1.3	0.21	**1.08**	0.26	1.79
4416	0.022	0.022	0.13	**-0.11**	-3.81	-1.78	0.02	0.02	0.36	**-0.33**	-3.54	-2.54
4417	0.271	0.269	0.26	**0.007**	-1.31	0.02	0.37	0.37	0.22	**0.14**	-0.98	0.51
4418	0.594	0.593	0.28	**0.3**	-0.52	0.72	1.3	1.31	0.42	**0.88**	0.27	1.13
4419	0.232	0.23	0.29	**-0.06**	-1.46	-0.25	0.35	0.34	0.78	**-0.43**	-1.05	-0.81
4420	0.088	0.087	0.26	**-0.17**	-2.43	-1.09	0.14	0.14	0.36	**-0.21**	-1.92	-0.9
4421	0.287	0.285	0.21	**0.06**	-1.25	0.27	0.41	0.41	0.33	**0.07**	-0.88	0.19
Mean	**0.48**	**0.48**	**0.68**	**-0.2**	**-1.82**	**-0.95**	**1.08**	**1.13**	**0.85**	**0.29**	**-1.4**	**-0.9**

The RCA index value for “wood and articles of wood;wood charcoal” was an average of 0.48 between 2001-2009. It had no competitiveness during this period. With an average of 1.08 between 2010-2017, it had a revealed comparative advantage. The identification of the sub-products that caused this change will contribute to a realistic discussion of the competitive advantage of the sector. As a result of the evaluations, it was seen that 4 sub-products (4410, 4411, 4413 and 4415) had a revealed comparative advantage between 2001-2009. It is accepted that the higher the RCA coefficient, the higher the competitiveness and competitive advantage. As a result of the calculation made by taking the average of the values of the period between 2010-2017, the sub-products that had a comparative advantage, increased numerically. It was seen that 6 out 21 of the sub-products (4408, 4410, 4411, 4413, 4415 and 4418) had a revealed comparative advantage and that this sector reached a better position in terms of export data in the period between 2001-2009. It is noteworthy that the products of 4408 and 4415, which did not have a comparative advantage in the period between 2001-2009, had a comparative advantage in the period between 2010-2017. In addition, it was determined that only 5 sub-products (4403, 4404, 4406, 4407 and 4412) showed a downward trend in the sub-product comparisons, while all the other sub-products showed an upward trend. The values observed demonstrated that the disadvantageous situation decreased, however the competitiveness was far from the desired level.

RXA, which is a relative export advantage index, was calculated within the periods examined and showed significant similarities with RCA.

In the calculations made within the context of the relative import advantage index, the results obtained as 1 and above are indicative of the competitive disadvantage in imports. Within the periods examined, it was seen that the sector averages remained within the limits of competitive advantage but increased in the period between 2010-2017. The sub-products, which caused this change, were the products of 4401, 4402, 4413 and 4415. As a result of the calculations made considering the average values of the period of 2001-2009, it was determined that 5 sub-products (4401, 4403, 4405, 4411 and 4413) had values of 1 and above. The products of 4401, 4403, 4405, 4411 and 4413 had a disadvantage in terms of import while the other sub-groups had an advantageous situation. This situation showed that there was an advantageous situation in the production of wood and articles of wood in the period of 2001-2009. Considering the period of 2010-2017, 7 sub-products (4401, 4402, 4405, 4408, 4411, 4412 and 4413) had a disadvantage in imports. The highest disadvantage in the period of 2001-2009 was in the product of 4405 and in the product of 4413 in the period of 2010-2017. It was found that the trend in Turkey's imports of wood and articles of wood sector was not high. However, imports carried out under specified product groups were carried above the level of imports in Turkey.

As a result of the calculations made regarding lnRXAN, which allows the comparison of competitiveness with respect to export performances, the low level of advantage in the wood and articles of wood sector in the period of 2001-2009 changed positively between 2010-2017. Although the wood and wood products sector had low levels of advantage, it is noteworthy that the competitive advantage in the products of 4411 and 4413 in the period of 2001-2009 had been high. In the products of 4410 and 4415, it was seen that the competitive advantage included the marginal values. Other product groups received values below the desired levels in terms of competition. In the analyses conducted in the period of 2011-2017, it was seen that the products of 4411 and 4413 had increased their competitive advantages. The products that were within the marginal limits were determined as 4 product groups (4408, 4410, 4415 and 4418) in the period of 2010-2017 and this indicated the existence of a positive change in the competitiveness of the sector.

The negative value of the RC index, which consists of the logarithmic forms of the RXA and RMA indices and shows the relative competitive advantage of the sector, indicates the existence of a competitive disadvantage. It was observed that there was a competitive disadvantage within the scope of the periods examined in the sector and that the trend leaned towards negative between 2010-2017. Considering the averages of the period of 2001-2009, it was seen that there was a competitive advantage in 8 sub-products (4404, 4408, 4409, 4410, 4413, 4415, 4417 and 4418). The high value of product of 4415 in these subgroups was remarkable. Considering the period of 2010-2017, the number of sub-product groups with competitive advantage increased to 9 (4408, 4409, 4410, 4411, 4413, 4415, 4417, 4418 and 4421). The product of 4404, which had a competitive advantage in the previous period (2001-2009), lost its advantage and the products of 4411 and 4421, which had a competitive disadvantage in the previous period, have become an advantage. Within this period (2010-2017), the 4415 coded product still had the highest value even though it experienced a decline compared to the previous period (2001-2009). Within the RC index value, products that negatively affected the competitive average of the sector were theproducts of 4401, 4402, 4403 and 4405 between 2001-2009 and the products of 4401, 4402, 4403, 4405, 4407, 4412 and 4416 between 2010-2017. Kayacan [2004] stated that forest-based sectors do not have sufficient advantages and power in international markets. Yıldırım et al. [2008] has said that it can compete with EU countries in Turkey's wood panels industry. Şahin [2016] found that the SITC 24 (cork and wood) and SITC 25 (pulp and waste paper) sectors have low competitiveness in Turkey. Moreover, it has been found that the competitiveness of SITC 63 (cork and wood manufactures, excluding furniture), SITC 64 (paper, paperboard and articles of paper pulp, of paper or of paperboard) and SITC 82 (furniture) have increased in

recent years. In a study by Keskingöz [2018], it was determined that the "wood and articles of wood, wood charcoal" sector of Turkey have a comparative disadvantage and it is a net importer. In other study, Turkey was found to have a competitive advantage in products of 4410 (particle board, oriented strand board "OSB" and similar board), 4411 (fibreboard of wood or other ligneous materials), 4413 (metallised wood and other densified wood in blocks, plates, strips or profile shapes) and 4415 (packing cases, boxes, crates, drums and similar packings, of wood) [Kara et al. 2019]. Müftüoğlu and Kayacan [2019] were found that Turkey has a low competitiveness in product of SITC 63 (wood and cork manufactures excluding furniture) whereas it has no competititveness in product of SITC 24 (wood, lumber and cork). Briefly, the results are seen to be similar to the studies conducted.

Conclusions

In the present study in which the competitive position of forest products industry of Turkey in the international arena was analyzed, one of the three main production areas of the sector (wood and articles of wood) were investigated. The determined periods were evaluated in two sections covering the periods of 2001-2009 and 2010- 2017 in order to determine periodic trends. 21 sub-products in wood and articles of wood, including the wood charcoal were investigated within the determined periods. According to the obtained data, the following results were obtained. Moreover, according to the results, the following suggestions were made:

- It was seen that "the wood and articles of wood;wood charcoal" sector cannot be evaluated at an adequate level and it is far from the desired position in terms of competition. Although there are positive or negative changes in the ability of different sub-products to compete over time, there seems to be a positive trend. In particular, the preservation of the competitive position of products of 4411, 4413 and 4415 and ensuring a sustainable quality are important for other sub-groups of the sector to reach the desired level.
- The calculations showed that these subgroups are the pioneers in the competition. However, it should be kept in mind that if the problems in the supply of raw materials are not solved, these subgroups may lose their advantage in the competitive position. It is known that problems in raw materials and by-products, which limit the competition in exports, constitute obstacles to different investments in sub-sectoral groups and limits the technological development. Measures should be taken in order to eliminate the import dependency in the procurement of raw materials

in all areas, and the quality of domestic production should be increased to world standards.

- The brand value of products in Turkey should be increased and Turkish production expressions should be used frequently. Industrialists, who plan to be permanent in foreign markets and enter into new markets, should not be left alone. All obstacles to participation in trade fairs and market events must be removed. New and especially high value-added products should be mobilized and the advantages gained should be increased.
- Finally, rational measures should be taken for the disadvantaged products to be able to compete.

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