Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development
Vol. 22, Issue 4, 2022
PRINT ISSN 2284-7995, E-ISSN 2285-3952

DEVELOPMENT OF THE WHEAT FLOUR INDUSTRY IN TÜRKİYE AND ANALYSIS OF THE INTERNATIONAL COMPETITIVENESS

Bahri KARLI, Bektas KADAKOGLU, Merve Muruvvet DAG, Alamettin BAYAV

Isparta University of Applied Sciences, Faculty of Agriculture, Department of Agricultural Economics, Isparta-Türkiye, Phone: +902462146233, Fax: +902462146399, Emails: bahrikarli@isparta.edu.tr, bektaskadakoglu@isparta.edu.tr, mervedag@isparta.edu.tr, alamettinbayav@isparta.edu.tr

Corresponding author: bektaskadakoglu@isparta.edu.tr

Abstract

This study revealed the development of wheat production and trade in the world and Türkiye, and the level of international competitiveness in wheat flour was determined. Türkiye ranks second in world wheat imports in terms of quantity and fourth in terms of value, and first in wheat flour export. Imported wheat is converted into flour and bakery products, most of which are exported. Türkiye exported 19.04% of world wheat flour in value and 22.45% in quantity. The study calculated competitiveness analysis for 2010-2020, and Balassa's Revealed Comparative Advantage Index (RCA) and Trade Balance Index (TBI) were used in the analysis. The mean index values were calculated as 21.10 in RCA and 0.99 in TBI. As a result of these values, it was determined that Türkiye has a high competitive advantage in wheat flour export and was a net exporter in wheat flour foreign trade.

Key words**:** *wheat flour, competitiveness analysis, revealed comparative advantage, trade balance, Türkiye*

INTRODUCTION

Wheat is a critical product due to its importance in human nutrition and its contribution to the national economy. It is grown in almost every region of the world. The fact that it is the raw material of bread, one of the basic foodstuffs of people, and it has a large producer mass increases its importance [22]. Wheat is the world's fourth most produced plant product after sugar cane, maize, and rice [19]. It is also used as animal feed and seed [14]. In the 2020/2021 production season, wheat produced in Türkiye was used 11.41% as animal feed and 6.08% as seed [37].

Processing agricultural products to add value is crucial for countries' economies. Wheat is the raw material of pasta, semolina, starch, biscuits, bulgur, tarhana, and flour. [34] emphasized the importance of structural transformation in the development processes of developing countries and stated that for this to happen, it is necessary to create value-added products in basic sectors such as agriculture, industry, and service.

Wheat flour, which has an important share in Türkiye's exports, is one of these value-added products. The export value of wheat flour in Türkiye constitutes 5.24% of the total export value of agricultural products. There are 640 wheat flour factories in Türkiye and the capacity utilization rate of these factories is 51% [35] [13]. In order to use the capacities of the factories effectively, a significant amount of wheat is imported in addition to the wheat produced in the country. The wheat import value constitutes 12.74% of total agricultural products' import value [13]. Türkiye's wheat import is made for the production of flour and bakery products and the export of these products. This import is carried out within the framework of the Inward Processing Regime communiqué numbered 2006/12, published in the Official Gazette dated 20.12.2006 and numbered 26,382 within the scope of the Inward Processing Regime (DIR). DIR has two systems: guaranteeing the taxes to be collected during import (conditional exemption system) and reimbursement of the taxes paid during import (repayment system) for the person with an inward processing permit/processing permit [26].

DIR is important for agro-industrial enterprises. In this way, enterprises are

exempt from customs taxes on the supply of raw materials, reduce input costs, and create employment by using their operating capacity more effectively [29]. Advantages of DIR; It creates a cost advantage by providing quality and cheap inputs to enterprises, the economic return of the products obtained from the imported inputs is high thanks to the export condition, and it has effects on increasing the competitiveness of the world countries [25].

The industry of wheat and its finished products, which are of great importance to the Turkish economy, has a problem supplying quality raw materials [6]. In this regard, one of the reasons for Türkiye to import wheat to the sector is the provision of higher quality raw materials in terms of protein ratio, variety characteristics, grain size, environmental conditions, breeding techniques and genotype [7] [27] [21]. The fact that the export price of wheat flour in Türkiye is below the world's average wheat flour price can be explained by this situation. Considering that the main problem in Türkiye is not production but quality, it is important to raise awareness of producers in order to carry out activities to increase quality.

Studies on the wheat and wheat flour industry in Türkiye were found in the literature. Wheat production and marketing in the world [32] [4], wheat and wheat flour quality [8] [6] and Türkiye's wheat foreign trade structure [10] [11] [26] were studied. This study aimed to analyze the international competitiveness of the wheat flour industry, in which Türkiye is the leader. In line with this purpose, firstly, wheat and wheat flour production, export, import and foreign trade balance were presented and discussed with statistical data. Then, the Revealed Comparative Advantage Index (RCA) and Trade Balance Index (TBI) were calculated for 2010-2020.

MATERIALS AND METHODS

The data for the main material of the study was obtained from the Turkish Statistical Institute (TURKSTAT), the United Nations Food and Agriculture Organization (FAOSTAT), and the International Trade Center (ITC-TRADE-MAP). In addition, sector reports prepared by national and international institutions and organizations related to the subject and academic studies published in scientific journals and books were also used. The data examined within the scope of the study covers the period from 2000-2020. The reason for considering the average of 2000-2002 as the starting year in the examined period was to eliminate factors such as precipitation, drought, disease, and increase and decrease in wheat cultivation areas which are effective in wheat production. The wheat and wheat flour data index was calculated, and the development progress over the years was examined.

The Revealed Comparative Advantages Index (RCA) developed by Balassa [5] and the Trade Balance Index (TBI) were used to analyze the competitiveness of wheat flour in foreign trade.

Balassa's Revealed Comparative Advantage Index was shown in equation 1.

$$RCA_j^i = \frac{x_j^i / \Sigma x^i}{\Sigma x_j^w / \Sigma x^w} \quad (1)$$

In equality 1; RCA_j^i The Revealed Comparative Advantage Index of country i in product j, x_j^i: the export value of product j of country i, Σx^i: the total export value of country i, Σx_j^w: the total export value of world product j, Σx^w: the total export value of the world. A country does not have a comparative advantage if the RCA value is 0-1; a country has a weak comparative advantage if the RCA value is 1-2; a country has a medium comparative advantage if the RCA value is 2-4, and a country has a high comparative advantage if the RCA value is greater than 4 [16].

The Trade Balance Index (TBI), which shows whether the country is a net exporter or a net importer of the relevant product, was shown in equation 2 [38] [17].

$$TBI_j^i = \frac{(x_j^i - m_j^i)}{(x_j^i + m_j^i)} \quad (2)$$

In equality 2, TBI_j^i is the trade balance that country i has in product j, x_j^i is the export

value of the j product of country i, m_j^i is the import value of product j of country. TBI takes a value between -1 and +1, and if this value is negative, it indicates that the country is in a net importer position, and if it is positive, it indicates that it is in a net exporter position [3] [28] [24] [36] [20].

RESULTS AND DISCUSSIONS

Developments in wheat and wheat flour production and trade

The average wheat production is influenced by a wide range of factors such as: farm size, crop variety, soil conditions, fertilization level, climate (rainfalls, drought), irrigation, plant protection, farmer training level and experience etc. [30].

World wheat production was 760.9 million tons in 2020. The top five countries that stand out in wheat production were China (17.64%), India (14.14%), Russia (11.29%), the USA (United States) (6.53%) and Canada (4.62%). These countries constituted 54.22% of the total wheat production in the world (Table 1). The highest share belonged to China, which has constantly increased its production over the years. The reason for the continuous increase in wheat production in China; [31] stated that high yields are genetic improvements that provide better resistance to diseases, adaptation to abiotic stresses, and better agricultural practices. In the examined period, from the beginning of the period (2000-2002) until 2020, the highest increase in production was in Russia at 1.95 times. [39] stated in their study that exports were the main incentive to increase wheat production in Russia. It can be said that the export incentive system applied forms the basis of the policies applied for wheat production in Russia. Türkiye ranked 10th in world wheat production. Its share in world wheat production was 2.69%. When the production quantities were analyzed by years, it was determined that Türkiye achieved an increase of 3.36% in 2020 compared to the 2000-2002 period and the changes in production remained constant throughout all periods (Table 1). [9] stated that the increased temperature level in Türkiye adversely affected wheat production and a 1% increase in the average temperature level would reduce wheat production by 0.29% and 0.38%. The study of [12] stated that wheat yield will decrease in Türkiye until 2100.

Table 1. Production quantities of leading wheat producing countries in the world (thousand tons)

Countries	2000-2002	2005-2007	2010-2012	2015-2017	2018	2019	2020	Percent (2020) %	Index (2002-02 = 100)
Chinese	94,600	105,070	117,877	133,389	131,447	133,601	134,250	17.64	141.91
India	72,939	71,266	87,519	92,443	99,870	103,596	107,590	14.14	147.51
Russia	44,026	47,303	45,156	73,711	72,136	74,453	85,896	11.29	195.10
USA	52,448	54,093	58,720	55,350	51,306	52,581	49,691	6.53	94.74
Canada	21,042	23,701	25,278	30,055	32,352	32,670	35,183	4.62	167.20
France	35,946	35,004	37,362	36,915	35,424	40,605	30,144	3.96	83.86
Pakistan	19,443	22,061	23,999	25,798	25,076	24,349	25,248	3.32	129.86
Ukraine	17,367	15,528	18,313	26,280	24,653	28,370	24,912	3.27	143.44
Germany	21,759	22,316	22,992	25,165	20,264	23,063	22,172	2.91	101.90
Türkiye	19,833	19,581	20,525	21,567	20,000	19,000	20,500	2.69	103.36
Others	189,026	200,075	212,740	233,517	219,613	232,693	225,340	29.61	119.21
Total	588,429	615,999	670,480	754,190	732,140	764,981	760,926	100.00	129.31

Source: [13].

World wheat export quantity was 117.1 million tons, and export value was 14.68 billion dollars in the 2000-02 average. In 2020, the export quantity increased by 69.55% to 198 million tons and the export value increased by 205.41% to 44.83 billion dollars. In wheat export, the leading countries in terms of export quantity were Russia (18.77%), the USA (13.16%), Canada (13.15%), France (9.97%) and Ukraine (9.09%). These countries constituted 64.14% of the total exports in the world (Table 2). The highest export quantity and value belonged to Russia. It was stated that the highest share in Russia's grain exports is wheat and the changes Russia will make in the wheat market will have a decisive impact on the entire grain industry [1]. In the same period, the country with the

highest increase in export quantity and value was Poland. However, this increase was a percentage, and the quantity and value of wheat exports were low compared to other countries. Türkiye's wheat export quantity (0.06%) and the share of export value (0.09%) were quite low compared to other countries. Compared to the average of 2000-02, there was a decrease of 87.24% in the export quantity and 65.06% in the export value in 2020 (Table 2). This situation is because Türkiye's wheat is exported by processing and creating added value. As a matter of fact, Türkiye is the leading country in wheat flour export.

Table 2. Export quantities and values of leading wheat exporting countries

Countries	2000-2002	2005-2007	2010-2012	2015-2017	2018	2019	2020	Percent (2020) %	Index (2002-02 = 100)
	Export Quantity (Thousand tons)								
Russia	4,105	11,489	14,374	26,529	43,966	31,873	37,267	18.77	907.84
USA	25,953	27,834	28,730	24,203	22,499	27,069	26,132	13.16	100.69
Canada	16,211	16,658	17,532	21,618	22,874	22,805	26,111	13.15	161.07
France	15,778	15,663	19,299	17,796	18,940	19,957	19,793	9.97	125.45
Ukraine	3,786	3,912	5,693	16,229	16,373	13,901	18,056	9.09	476.91
Australia	15,988	11,882	19,027	18,396	12,353	9,592	10,400	5.24	65.05
Argentina	10,287	9,925	7,970	9,226	11,725	10,543	10,197	5.14	99.13
Germany	5,384	5,126	7,359	9,625	5,229	5,551	9,259	4.66	171.97
Kazakhistan	3,986	4,091	5,139	4,113	6,198	5,376	5,199	2.62	130.43
Poland	184	478	942	3,714	1,790	2,080	4,689	2.36	2548.37
Türkiye	980	344	432	46	70	135	125	0.06	12.76
Others	14,450	16,443	26,405	34,347	28,885	31,290	31,300	15.77	216.61
Total	117,091	123,846	152,903	185,841	190,902	180,171	198,527	100.00	169.55
	Export Value (Thousand dollars)								
Russia	319,599	2,037,160	3,421,420	4,651,845	8,432,493	6,403,011	7,918,294	17.66	2,477.57
USA	3,467,019	5,650,944	8,686,157	5,704,382	5,458,267	6,265,916	6,318,111	14.09	182.23
Canada	2,333,256	3,270,877	5,476,228	5,271,564	5,711,500	5,379,229	6,317,889	14.09	270.78
France	1,838,418	2,869,904	5,476,972	3,536,176	4,111,875	4,298,894	4,528,591	10.10	246.33
Ukraine	313,915	479,349	1,396,975	2,571,804	3 ,004,359	3,224,194	3,594,217	8.02	1,144.97
Australia	2,236,248	2,142,570	5,439,994	4,214,392	3,036,049	2,482,945	2,698,498	6.02	120.67
Argentina	1,205,664	1,589,530	2,116,096	1,754,148	2,419,213	2,295,535	2,029,494	4.53	168.33
Germany	715,057	962,917	2,057,518	1,993,816	1,159,547	1,235,849	2,105,865	4.70	294.50
Kazakhistan	365,999	637,664	1,040,013	678,189	971,803	1,003,207	1,137,140	2.54	310.69
Poland	20,828	87,096	268,934	751,071	403,215	427,779	1,047,399	2.34	5,028.80
Türkiye	113,027	46,484	79,407	19,554	24,038	48,212	39,492	0.09	34.94
Others	1,751,000	3,077,241	7,366,217	6,930,186	6,333,935	6,694,784	7,099,117	15.83	405.43
Total	14,680,030	22,851,737	42,825,930	38,077,128	41,066,294	39,759,555	44,834,107	100.00	305.41

Source: [13].

World wheat import quantity and value were 116.9 million tons and 16.73 billion dollars on average in 2000-02. In 2020, the quantity of imports increased by 64.99% to 193 million tons, and the import value increased by 191.70% to 48.81 billion dollars. The top five countries leading in wheat imports were Indonesia (5.34%), Türkiye (5.01%), Egypt (4.69%), China (4.23%) and Italy (4.15%), respectively. The highest level of wheat import volume belonged to Indonesia. It was stated that flour consumption in Indonesia, which was 9.9 kg per capita in 2012, was 17.11 kg in 2017 [33]. Therefore, it can be said that the increase in consumption level and the increase in wheat consumption and demand in proportion to the population growth rate are effective in Indonesia's ranking in first place in wheat import. The highest increase in wheat import quantity (12.03 times) and import value (21.63 times) in the analyzed period was in Türkiye (Table 3). It is very important for countries to be self-sufficient in the products they grow. If a country is self-sufficient in its products, it meets domestic demand. Türkiye's self-sufficiency level in wheat in the 2020-2021 market period was 102.3% [37]. This showed that there was no problem with the degree of self-sufficiency. However, the fact that it meets the domestic demand does not mean there is no wheat import. This showed that the imported wheat was processed as wheat flour and exported with added value. Türkiye applies the "Inward Processing Regime" to wheat imports. With this system, input costs

are reduced, exports are increased, competitiveness is gained in international markets and export markets are developed in order to realize flour export. In short, there is re-export in the wheat trade.

Table 3. Import quantities and values of leading wheat importing countries

Countries	2000-2002	2005-2007	2010-2012	2015-2017	2018	2019	2020	Percent (2020) %	Index (2002-02 = 100)
	Import Quantity (Thousand tons)								
Indonesia	3,538	4,554	5,555	9,467	10,096	10,716	10,300	5.34	291.12
Türkiye	803	841	3,676	4,522	5,782	10,005	9,659	5.01	1,202.86
Egypt	4,961	7,311	10,607	11,577	12,505	10,424	9,043	4.69	182.28
Chinese	1,846	2,604	3,344	4,917	4,116	4,559	8,152	4.23	441.60
Italy	7,368	6,724	6,969	7,410	7,453	7,474	7,994	4.15	108.50
Algeria	5,301	5,168	6,286	8,270	8,422	6,776	7,054	3.66	133.07
Brazil	7,037	6,052	6,215	6,020	6,817	6,576	6,160	3.20	87.54
Philippines	2,882	2,200	2,544	4,504	6,691	7,154	6,150	3.19	213.39
Bangladesh	1,876	2,319	2,804	5,335	4,839	4,595	6,015	3.12	320.63
Nigeria	2,269	3,322	4,026	4,736	4,810	4,660	5,903	3.06	260.16
Others	78,968	82,756	101,120	116,198	116,274	106,863	116,355	60.36	147.34
Total	116,848	123,852	153,147	182,955	187,805	179,803	192,784	100.00	164.99
	Import Value (Thousand dollars)								
Indonesia	508,976	932,146	1,957,371	2,706,247	2,570,952	2,799,261	2,616,037	5.36	513.98
Türkiye	107,925	216,015	1,134,703	1,013,052	1,289,386	2,302,225	2,334,510	4.78	2,163.09
Egypt	731,814	1,484,358	3,162,166	2,385,204	2,636,468	3,024,161	2,693,851	5.52	368.11
Chinese	322,294	592,625	1,086,768	1,284,089	1,142,542	1,270,198	2,664,763	5.46	826.81
Italy	1,032,228	1,450,661	2,177,101	1,846,050	1,822,808	1,827,408	2,039,111	4.18	197.54
Algeria	824,374	1,140,898	2,053,268	1,993,165	2,071,961	1,636,591	1,828,931	3.75	221.86
Brazil	910,566	1,057,830	1,763,886	1,233,720	1,502,383	1,491,220	1,459,354	2.99	160.27
Philippines	435,066	451,822	792,721	1,108,797	1,682,640	1,847,093	1,573,208	3.22	361.60
Bangladesh	205,403	342,841	861,499	1,138,229	1,115,434	1,098,284	1,439,760	2.95	700.94
Nigeria	262,876	705,638	1,334,933	1,179,342	1,198,237	1,151,759	1,483,996	3.04	564.52
Others	11,390,350	17,498,256	30,876,145	26,930,857	27,927,568	25,870,509	28,672,962	58.75	251.73
Total	16,731,872	25,873,091	47,200,560	42,818,753	44,960,379	44,318,709	48,806,483	100.00	291.70

Source: [13].

World wheat flour export quantity and value were 8.71 million tons and 1.78 billion dollars in 2000-02 average. In 2020, the quantity of exports increased by 57.02 percent to 13.67 million tons, and the export value increased by 189.50% to 5.17 billion dollars. Türkiye, Kazakhstan, Germany, Uzbekistan, Argentina, and Türkiye were the top exporters of wheat flour, accounting for 22.45%, 12.79%, 6.73%, 5.39%, and 4.50% of global exports, respectively (Table 4).

Compared to the average of 2000-02, the highest increase in 2020 occurred in Uzbekistan.

The reason for this is the expansion of the wheat production area in Uzbekistan after 1991 and the agricultural reforms made in the last 22 years [23]. Türkiye's export share in world wheat flour is very important. In 2020, Türkiye's wheat flour export amounted to 983 million dollars, with a share of 19.04% of world wheat flour exports. Compared to the average of 2002-2002 years, Türkiye increased its wheat flour export quantity by 11.63 times and wheat flour export value by 19.87 times in 2020 (Table 4).

Türkiye is the leading country in wheat flour in terms of export quantity and value. In the Grain Sector Report of the Turkish Grain Board for 2019, it was stated that 640 wheat flour factories operate in Türkiye and the capacity utilization rate of these factories was 51% [35]. Türkiye's leadership in the world wheat flour sector depends on wheat imports, not depends on local dynamics [26].

This may be because wheat flour exports remained below wheat imports during the period. Türkiye's wheat flour export was 1.1 billion dollars in 2021. The main countries where wheat flour was exported were Iraq (43.37%), Yemen (9.64%), Syria (9.17%), Djibouti (5.86%), Angola (5.15%) and Venezuela (4.25%) (Figure 1). These countries constituted 77.45% of Türkiye's total wheat flour export.

Table 4. Export quantities and values of leading wheat flour exporting countries

Countries	2000-2002	2005-2007	2010-2012	2015-2017	2018	2019	2020	Percent (2020) %	Index (2002-02 = 100)
	Export Quantity (Thousand tons)								
Türkiye	264	1,505	2,004	3,320	3,400	3,344	3,070	22.45	1,162.88
Kazakhistan	256	1,170	2,148	2,180	2,307	1,569	1,749	12.79	683.20
Germany	660	537	681	891	937	958	920	6.73	139.39
Uzbekistan	1	3	2	202	309	419	737	5.39	73,700.00
Argentina	314	357	895	587	600	660	615	4.50	195.86
Egypt	7	16	82	217	427	680	394	2.88	5,628.57
Belgium	813	715	585	508	412	326	357	2.61	43.91
Italy	658	420	161	270	331	312	335	2.45	50.91
USA	640	244	317	329	284	285	281	2.06	43.91
India	387	38	105	225	191	206	262	1.92	67.70
Others	4,706	5,104	5,658	6,132	6,099	6,143	4,951	36.21	105.21
Total	8,707	10,110	12,635	14,859	15,296	14,901	13,672	100.00	157.02
	Export Value (Thousand dollars)								
Türkiye	49,489	325,738	808,469	1,057,957	1,039,914	1,082,657	983,498	19.04	1,987.31
Kazakhistan	33,949	217,980	564,709	490,031	450,425	363,878	491,852	9.52	1,448.80
Germany	136,989	170,499	290,881	316,695	360,167	361,402	359,408	6.96	262.36
Uzbekistan	135	546	500	44,798	70,085	104,575	218,609	4.23	161,932.59
Argentina	56,731	99,765	347,679	181,963	192,983	221,335	202,322	3.92	356.63
Egypt	1,993	4,755	35,746	90,096	164,911	225,963	141,831	2.75	7,116.46
Belgium	160,547	226,808	250,206	178,252	149,686	119,536	132,923	2.57	82.79
Italy	129,499	121,041	99,956	156,151	200,181	192,342	215,906	4.18	166.72
USA	135,736	83,433	155,964	160,647	142,438	147,906	154,325	2.99	113.69
India	46,718	12,320	43,152	102,441	107,980	111,534	146,310	2.83	313.18
Others	1,032,171	1,534,413	2,494,625	2,413,522	2,451,958	2,428,746	2,117,517	41.00	205.15
Total	1,783,957	2,797,298	5,091,888	5,192,552	5,330,728	5,359,874	5,164,501	100.00	289.50

Source: [13].

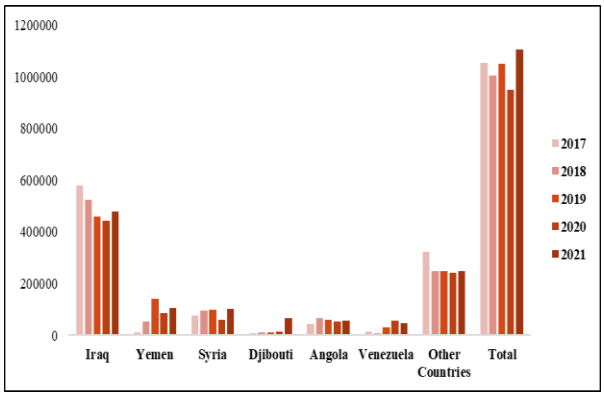

Fig. 1. Leading countries in Türkiye's wheat flour industry exports
Source: [18].

World wheat flour import quantity and value were 8.09 million tons and 1.75 billion dollars in 2000-02 average. In 2020, the quantity of imports increased by 68.41% to 13.63 million tons and the export value increased by 209.07% to 5.42 billion dollars. The leading countries in wheat flour import were Afghanistan with a share of 13.91%, Iraq with a share of 9.99%, the Netherlands with a share of 5.54%, China with a share of 3.13% and Yemen with a 2.80% share (Table 5). It was reported that the reason why Afghanistan ranks first in wheat flour imports is that 43% of the total household consumption expenditures in Afghanistan are spent on wheat-bread and grains and that imports are made intensively in order to meet the demand for these products [15]. Compared to the average of 2000-02, the highest increase in wheat flour import quantity and value was performed in Iraq in 2020. [2] stated that approximately 40% of daily food consumption in Iraq is wheat flour and its derivatives and if precautions are not taken, wheat productivity will decrease and dependence on imports will increase. Wheat flour import in Türkiye was scarcely any. In 2020, 0.10% of the world's wheat flour import quantity and 0.08% of the import value was made by Türkiye, ranking 108th in the world. Türkiye's wheat exports increased over the years, but wheat imports were higher in the same periods (Table 6). This is because Türkiye exports the wheat it imports after processing it into wheat flour. However, this foreign trade deficit is covered by the export of wheat flour. It was determined that Türkiye has self-sufficiency in wheat except for 2019.

Table 5. Import quantities and values of leading wheat flour importing countries

Countries	2000-2002	2005-2007	2010-2012	2015-2017	2018	2019	2020	Percent (2020) %	Index (2002-02 = 100)
	Import Quantity (Thousand tons)								
Afghanistan	356	638	892	1,887	2,273	1,769	1,896	13.91	532.58
Iraq	10	900	885	1,582	1,660	1,382	1,362	9.99	13,620.00
Holland	259	316	511	537	732	725	755	5.54	291.51
Chinese	228	240	216	285	438	498	426	3.13	186.84
Yemen	372	46	30	192	126	325	382	2.80	102.69
Bolivia	129	171	210	264	276	311	364	2.67	282.17
France	272	212	259	357	337	342	358	2.63	131.62
Uzbekistan	75	539	1,110	691	648	455	353	2.59	470.67
USA	181	210	199	295	334	321	343	2.52	189.50
Malaysia	41	54	237	221	275	304	297	2.18	724.39
Türkiye	1	0.08	0.20	59	15	22	13	0.10	1,300.00
Others	6 ,171	6,912	7,892	7,865	8,043	7,749	7,082	51.96	114.76
Total	8,094	10,238	12,442	14,236	14,881	13,891	13,631	100.00	168.41
	Import Value (Thousand dollars)								
Afghanistan	43,550	158,679	260,468	592,898	764,475	489,500	620,869	11.46	1,425.65
Iraq	1,883	184,918	419,490	603,838	605,870	522,314	506,690	9.35	26,908.66
Holland	52,616	101,781	191,216	181,782	250,742	227,589	244,262	4.51	464.24
Chinese	76,464	87,764	131,843	162,332	206,253	238,708	207,607	3.83	271.51
Yemen	55,467	7,924	11,839	74,858	41,321	126,828	130,845	2.41	235.90
Bolivia	29,248	42,366	80,109	88,554	97,805	116,053	127,777	2.36	436.87
France	60,934	83,495	129,991	155,944	158,849	163,856	179,172	3.31	294.04
Uzbekistan	14,731	111,573	313,629	151,966	109,030	87,270	89,701	1.66	608.93
USA	58,253	89,918	132,556	207,769	232,237	221,152	238,634	4.40	409.65
Malaysia	6,574	14,448	96,491	67,091	88,994	100,967	99,121	1.83	1,507.77
Türkiye	125	31	129	18,905	4,599	6,047	4,095	0.08	3,276.00
Others	1,353,265	2,100,043	3,491,729	3,159,129	3,096,010	3,026,215	2,969,507	54.81	219.43
Total	1,753,110	2,982,940	5,259,489	5,465,067	5,656,185	5,326,499	5,418,280	100.00	309.07

Source: [13].

Table 6. Türkiye wheat and wheat flour foreign trade balance

Indicators	2015	2016	2017	2018	2019	2020
Wheat exports (thousand dollars)	33,246	12,807	20,303	33,825	65,312	60,232
Wheat imports (thousand dollars)	1,111,453	1,079,760	1,275,251	1,477,326	2,556,404	2,468,086
Balance	-1,078,207	-1,066,953	-1,254,948	-1,443,501	-2,491,092	-2,407,854
Wheat flour export (thousand dollars)	999,480	1,259,806	1,251,358	1,198,580	1,178,626	1,082,325
Wheat flour import (thousand dollars)	1,601	22,386	35,092	4,831	7,352	4,385
Balance	997,879	1,237,420	1,216,266	1,193,749	1,171,274	1,077,940
Self-sufficiency rate	113.6	103.8	111.7	100.5	89.5	102.3

Source: [13] [37].

Competitiveness analysis in wheat flour

According to the revealed comparative advantage index, it was determined that the comparative advantage of Kazakhstan, Türkiye, Uzbekistan, Egypt and Argentina in world wheat flour export was high. The mean RCA values of these countries were calculated as 28.79, 21.10, 16.53, 11.18 and 11.13, respectively. It was determined that Belgium, India and Italy had a weak comparative advantage, while Germany and the USA did not have a comparative advantage (Table 7). It was determined that Uzbekistan did not have a comparative advantage between 2010 and 2013 but that since 2014, it has had a high comparative advantage. This can be explained by the fact that Uzbekistan's wheat flour export value increased 88 times in 2014 compared to the previous year. In Türkiye, the RCA values of wheat flour exports varied between 18.99 and 24.17, and it was determined that it maintains its competitiveness over the years. In their study, [21] calculated the average RCA values in Türkiye's wheat export as 0.26 from 2001-2018 and 2.82 in the export of wheat products. They found no comparative advantage in wheat exports but a moderate comparative advantage in wheat products export. They indicated that Türkiye is in a strong position among wheat products, especially in the wheat flour and pasta sectors.

Table 7. Revealed Comparative Advantage Index (RCA)

RCA	Kazakhstan	Türkiye	Uzbekistan	Egypt	Argentina	Belgium	India	Italy	Germany	USA
2010	35.10	20.45	0.23	2.44	15.97	2.20	0.29	0.66	0.69	0.43
2011	19.86	21.97	0.23	5.09	15.22	1.73	0.35	0.66	0.66	0.35
2012	21.86	18.99	0.25	4.46	14.75	1.87	0.91	0.74	0.78	0.34
2013	22.28	19.54	0.19	4.21	3.10	1.84	1.43	0.86	0.87	0.31
2014	23.97	19.31	20.71	6.27	7.28	1.57	1.46	0.91	0.83	0.29
2015	33.30	21.56	21.27	13.26	8.14	1.52	1.45	1.00	0.73	0.33
2016	43.22	24.17	18.21	11.43	10.34	1.33	1.12	1.05	0.72	0.38
2017	32.79	23.10	15.52	11.88	11.88	1.34	1.04	1.11	0.78	0.32
2018	26.79	22.45	23.27	20.28	11.32	1.16	1.21	1.32	0.84	0.31
2019	22.04	20.93	25.49	25.79	11.88	0.94	1.21	1.25	0.85	0.31
2020	35.51	19.65	56.44	17.93	12.49	1.07	1.80	1.47	0.88	0.37
Average	28.79	21.10	16.53	11.18	11.13	1.51	1.11	1.00	0.78	0.34

Source: Own calculation.

According to the trade balance index, it was determined that Kazakhstan, Türkiye, Egypt, Argentina, India, Italy, Germany, and Belgium were net exporters in wheat flour foreign trade, while Uzbekistan and the USA were net importers. The average TBI values were calculated as 1.00 for Argentina, 0.99 for Kazakhstan, 0.99 for Türkiye, 0.96 for India, 0.86 for Egypt, 0.80 for Italy and 0.78 for Germany in the examined years (Table 8). It can be stated that these countries are strong in terms of export in wheat flour foreign trade.

In Türkiye, the TBI value was calculated as 1.00 between 2010-2015, 0.96 and 0.94 in 2016 and 2017, and 0.99 between 2018-2020 (Table 8).

Table 8. Trade Balance Index (TBI)

TBI	Kazakhstan	Türkiye	Uzbekistan	Egypt	Argentina	Belgium	India	Italy	Germany	USA
2010	1.00	1.00	-1.00	0.94	1.00	0.52	0.91	0.72	0.69	0.10
2011	0.98	1.00	-1.00	0.91	1.00	0.43	0.95	0.79	0.66	0.06
2012	0.99	1.00	-1.00	0.92	1.00	0.44	0.96	0.54	0.78	0.09
2013	0.99	1.00	-1.00	0.82	1.00	0.43	0.97	0.70	0.87	-0.02
2014	0.99	1.00	-0.71	0.80	1.00	0.51	0.98	0.77	0.83	-0.13
2015	0.99	1.00	-0.67	0.80	1.00	0.51	0.98	0.85	0.73	-0.14
2016	0.99	0.96	-0.53	0.74	1.00	0.48	0.97	0.85	0.72	-0.07
2017	0.99	0.94	-0.33	0.83	1.00	0.49	0.97	0.89	0.78	-0.18
2018	0.99	0.99	-0.22	0.92	1.00	0.40	0.97	0.90	0.84	-0.24
2019	0.98	0.99	0.09	0.92	1.00	0.37	0.96	0.94	0.85	-0.20
2020	0.98	0.99	0.42	0.82	1.00	0.34	0.98	0.90	0.88	-0.21
Average	0.99	0.99	-0.54	0.86	1.00	0.45	0.96	0.80	0.78	-0.09

Source: Own calculation.

CONCLUSIONS

Wheat is a strategic product for countries in terms of its contribution to nutrition and the economy. Wheat flour obtained from wheat processing is important for Türkiye due to its export potential. Furthermore, since wheat is processed within the scope of DIR, it becomes an incentive element for businesses by bringing many advantages such as tax exemption, reduction of input costs and more efficient use of operating capacity. In the study, the international competitiveness of the wheat flour industry, in which Türkiye is the leader, is demonstrated by the Revealed Comparative Advantage Index (RCA) and the Trade Balance Index (TBI). The ranks of competitiveness of wheat flour exports in terms of RCA values were Kazakhstan, Türkiye, Uzbekistan, Egypt and Argentina. On the other hand, regarding TBI values, Kazakhstan, Türkiye, Egypt, Argentina, India, Italy, Germany and Belgium were net exporters, while Uzbekistan and the USA were net importers in foreign trade wheat flour. There is no problem in the production of raw materials in the Turkish wheat flour industry, but there is a problem in the supply of quality raw materials. For the producers to produce quality wheat, agricultural subsidies tools should be used effectively. For example, giving higher subsidies in wheat production to varieties with high protein content will direct the farmers to produce quality varieties. In this case, the quality raw materials demanded by the flour industry will be supplied from within the country and raw material imports will decrease.

REFERENCES

[1]Agapkin, A.M., Makhotina, I.A., 2021, The grain market of Russia. IOP Conf. Ser.: Earth Environ. Sci., 2021, 839: 022023.
[2]Al-Ansari, N., Abed, S.A., Ewaid, S.H., 2021, Agriculture in Iraq. J. Earth Sci. Geotech. Eng., 2021, 11 (2): 223-241.
[3]Amighini, A., 2005, China in the international fragmentation of production: Evidence from the ICT industry, Eur. J. Comp. Econ., 2005, 2 (2): 203-219.
[4]Anteneh, A., Asrat, D., 2020, Wheat production and marketing in Ethiopia: Review study, Cogent food Agric., 2020, 6 (1): 1778893.
[5]Balassa, B., 1965, Trade liberalization and "revealed" comparative advantage. Manch. Sch. Econ. Soc. Stud., 1965, 33 (2): 92-123.
[6]Bilgiçli, N., Soylu, S., 2016, The evaluation of wheat and flour qualities in sectoral perspective (in Turkish). J. of Bahri Dağdaş Crop Res., 2016, 5 (2): 58-67.
[7]Burnett, V., Clarke, S., 2002, Organic farming: wheat production and marketing. Agriculture Notes, 2002, AG1075, 1-4.
[8]Carson, G.R., Edwards, N.M., 2009, Criteria of wheat and flour quality. Wheat: chem. and tech., (Ed. 4), 2009, 97-118.
[9]Chandio, A.A., Gokmenoglu, K.K., Ahmad, F., 2021, Addressing the long and short-run effects of climate change on major food crops production in Turkey. Environ. Sci. Pollut. Res., 2021, 28 (37): 51657-51673.
[10]Dörtok, A., Aksoy, A., 2018, Estimation model with simultaneous process of Turkey's wheat industry (in Turkish). Kahramanmaraş Sütçü İmam Univ. Doğa Bilim. Derg., 2018, 21 (4): 580-586.
[11]Duru, S., Gül, A., Hayran, S., 2019, Wheat and wheat products structure of foreign trade in Turkey (in Turkish). Bilecik Şeyh Edebali Univ. J. of Soc. Sci., 2019, 4 (2): 552-564.
[12]Eruygur, O., Özokcu, S., 2016, Impacts of climate change on wheat yield in Turkey: A heterogeneous panel study (in Turkish). Ekonomik Yaklasim, 2016, 27 (101): 219-255.
[13]FAOSTAT, 2020, Food and Agriculture Organization of the United Nations. https://www.fao.org/faostat/en/#home, Accessed on 03 August, 2022.
[14]Gündoğmuş, E., Tanrıvermiş, H., Arısoy, H., 2001, Input usage and production costs in important products for some regions in Turkey (Türkiye'de Bazı Bölgeler için Önemli Ürünlerde Girdi Kullanımı ve Üretim Maliyetleri). In Turkish. Ministry of Agriculture and Forestry, Agricultural Economics Research Institute Publication No: 64, p. 109, Ankara, Türkiye.
[15]Hassanzoy, N., Ito, S., 2018, A study on the price volatility in wheat, wheat flour and rice markets in Afghanistan. IJFAEC, 2018, 6 (2): 27-47.
[16]Hinloopen, J., Van Marrewijk, C., 2001, On the empirical distribution of the Balassa Index. Weltwirtsch Arch., 137 (1): 1-35.
[17]Ishchukova, N., Smutka, L., 2013, Comparative advantage: Products mapping of the Russian agricultural exports, Agris On-line Pap. Econ. Inform., 2013, 5 (3): 13-24.
[18]ITC, 2021, Trade Map. https://www.trademap.org/, Accessed: 05 August 2022.
[19]Kadakoğlu, B., 2021, Analysis of technical and economic efficiency of potato production in Afyonkarahisar province (in Turkish). MSc. Thesis, Isparta University of Applied Sciences, Isparta.
[20]Kesgingöz, H., 2018, The analysis of Turkish agricultural sector by comparative advantage method (in Turkish), BMIJ, 2018, 6 (2): 508-523.
[21]Kılıç, O., Giray, F.H., 2021, Turkey's competitive power in the international wheat market. EJAE, 2021, 1 (1): 52-64.
[22]Kızılaslan, H., 2004, Wheat production and comparison of applied policies in Turkey and in the world (in Turkish). JAFAG, 2004, 21 (2): 23-38.
[23]Lombardozzi, L., Djanibekov, N., 2021, Can self-sufficiency policy improve food security? An inter-temporal assessment of the wheat value-chain in Uzbekistan. Eurasian Geogr. Econ., 2021, 62 (1): 1-20.
[24]Ma, A.S., 2013, Revealed comparative advantage measure: ASEAN-China trade flows. J. Econ. Sustain. Dev., 2013, 4 (7): 136-145.
[25]Nakiboğlu, A., Aydın, D., 2018, Analysis of the impacts of inward processing regime on Turkish economy and foreign trade (in Turkish). Turkish Stud., 2018, 13 (22): 373-400.
[26]Oral Dırık, E.N., Güzel, A., 2021, Turkey's flour exports under the inward processing regime. Ekonomik Yaklasim, 2021, 30 (112): 45-45.
[27]Otteson, B.N., Merqoum, M., Ransom, J.K., 2008, Seeding rate and nitrogen management on milling and baking quality of hard red spring wheat genotypes. Crop Sci, 2008, 48, 749-755.
[28]Özçalık, M., Okur, A., 2013, Competitiveness of turkish textile and clothing sectors against EU-15 countries after customs union (in Turkish), J.of Soc.Sci. of Celal Bayar Univ., 2013, 11 (1): 205-223.
[29]Parlakay, O., Duru, S., 2017, Investigation of the effects of inward processing regime in foreign trade of processed agricultural products by trend analysis method in Turkey (in Turkish). Harran J. of Agric. and Food Sci., 2017, 21 (1): 67-72.
[30]Popescu, A., 2018, Maize and wheat-top agricultural products produced, exported and imported by Romania. Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development, 2018, 18 (3): 339-352.
[31]Reynolds, M., Foulkes, M.J., Slafer, G.A., Berry, P., Parry, M.A., Snape, J.W., Angus, W.J., 2009, Raising yield potential in wheat. J. Exp. Bot., 2009, 60 (7): 1899-1918.
[32]Sharma, I., Tyagi, B.S., Singh, G., Venkatesh, K., Gupta, O.P., 2015, Enhancing wheat production-A global perspective. Indian J. Agric. Sci., 2015, 85 (1): 3-13.
[33]Soesilowati, E., Kariada, N., Paramita, O., 2019, Improving non-wheat flour quality as a form of local food conservation. KnE Soc. Sci., 2019, 146-156.

[34]Soyyiğit, S., 2019, The relationship between sectoral value added and structural transformation: An investigation for CEE countries and Turkey (in Turkish). Cumhuriyet Univ. J. of Eco. and Adm. Sci., 2019, 20 (1): 377-393.
[35]TMO, 2019, Grain sector report (in Turkish). https://www.tmo.gov.tr/Upload/Document/sektorraporlari/hububat2019.pdf, Accessed: 06 August 2022.
[36]Topçu, B.A., Sarıgül, S.S., 2015, Comparative advantage and the product mapping of exporting sectors in Turkey. JASSS, 2015, 3 (18): 330-348.
[37]TURKSTAT, 2022, Turkish Statistical Institute. https://biruni.tuik.gov.tr/medas/?kn=92&locale=tr, Accessed: 06 August 2022.
[38]Widodo, T., 2008, Shift in comparative advantage, dynamic market and purchasing power parity in the East Asia, PhD. Thesis, Hiroshima University of Economics, Hiroshima.
[39]Zyukin, D.A., Pronskaya. O.N., Golovin, A.A., Belova, T.V., 2020, Prospects for increasing exports of Russian wheat to the world market. Amazon. investig., 2020, 9 (28): 346-355.