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Research Article

DEVELOPMENT OF AGRO-INDUSTRIES IN THE WORLD AND TÜRKİYE

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ABSTRACT. This study aims to reveal information about the developments in the agro-industry sector. In the research, statistical information about the development of Agro-Industry enterprises and previous studies on the subject were used. agro-industries; industries based on agriculture (the branch of industry that improves the quality and quantity of agricultural products by using them as raw materials and undergoing different processes) and industries related to agriculture (the branch of industry that provides raw materials/inputs to agriculture). The development of agro-industries has an important role in matters such as increasing the usage period of agricultural production by processing, creating added value and contributing to the development of exports. The developments in the industry are reflected in every part of agriculture. As a result of these advances, chemical fertilizers, plant and animal protection, better feed and additives, improved new machine types, highly productive plant varieties, and vegetable raw materials are processed to produce long-lasting and value-added products. In addition, the ever-evolving and changing activities also include improvements in the managerial skills of farmers, which is a factor that cannot be measured. It is the developments in the agricultural sector, which is the first stage of the industrialization process in Western Europe, especially in France, England, and Germany, in the formation of industrial societies. It is known that with the acceleration of the industrialization process in Türkiye, agriculture-based industries were supported in various ways, especially in the 1940s. Today, the agriculture-based industry has created agro-industries in which the private sector also operates, apart from the state institutions established by the state to support more agricultural producers. The fertilizer industry in the agriculture-related industry in Türkiye received priority and support throughout the planned periods. On the other hand, machine power entered Turkish agriculture with the plows produced by the factories in England and Germany in the Balkan War and the years after this war. Agro-Industry enterprises in Türkiye showed an increase of 40.07% between 2010 and 2019 years. Thus, the Agro-Industry production value in Türkiye has increased continuously over the years. The total production value of agro-industries has increased by 483.69% from 2010 to 2019. All these developments have enabled the transformation of agricultural productions into foodstuffs beneficial to society and the development of other industries. This change is seen in this study.

Keywords: *Agro-based industries, Agro-linked industries, Agro-industries*

INTRODUCTION

Thanks to the law of supply and demand, which caused them to find ways to produce better and more efficient resources in agriculture and related industry, a series of industrial revolutions took place in the history of the world, and each of them increased the available resources. As a result of the developments, it has a significant impact on the welfare and development of societies. (Conway, 2009).

In a study by Rostow (1990) it was argued that development has a gradual growth model and that a country goes through successive stages of development. According to this theory, it is stated that a country passes through several linear stages in its development. These stages are; **Traditional society stage:** At this stage, the economic system is static and the traditional mode of production dominates in the agricultural

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sector. Productivity per working hour is slower than the other growth stages noted below. Society is characterized by a hierarchical structure and therefore both vertical and social mobility. **Preconditions for take-off:** A dynamic development begins with increasing investment rates. Such economic development emerges because of the industrial revolution. As a result of this change, which includes the development of agriculture, the use of labor has decreased. The prerequisite for the precondition to take-off is the industrial revolution that has continued in the last century. **Take-off stage:** It is associated with dynamic economic growth. The main feature of this economic growth is self-sustaining growth with no need for external input. As with the UK's textile industry, development can be supported by several leading industries. In general, the take-off phase lasts two to three years; It took place in England in the middle of the seventeenth century or in Germany at the end of the seventeenth century. **Drive to maturity stage:** It is dominated by economic and technological development, characterized by continuous investments of 40 to 60 percent. New industries are emerging, such as industries with new technology (e.g. chemical industry, electrical industry or machinery industry). As a result of this development, social-economic welfare, especially economic welfare is increasing. Generally, maturity has begun about 60 years after takeoff. **Age of high mass-consumption stage:** It is the final stage in Rostow's five-stage development model. Most of the society here lives in wealth, and those who live in this society are offered both abundance and many choices. According to Rostow, the West or North today falls into this category.

A good balance should be established between the agriculture and industry sectors to ensure the development of a country's economy, food safety, food security and self-sufficiency. While the Agro-Industry provides input and technology to the agricultural sector, on the other hand, agricultural products are processed to create added value, create employment, etc. contributes to the country's economy for reasons (Ulaş & Çakır, 2006).

For the development of the agro-industry sector in Türkiye, it is important to integrate into the world market and to cooperate with local companies operating in certain fields with their own corporate identities. In this respect, it is aimed to examine the past and present of the agro-industry sector in the world and in Türkiye.

MATERIALS AND METHOD

The main material of the study consists of data obtained from statistics on the subject and information obtained from various previously published sources. The obtained data were presented in tables within the study, and simple and chain index calculations were made in order to examine the annual changes in the relevant statistical data. In simple indexes, the aim is to determine how much the value of each period has increased compared to the previous period, in chained indexes, to examine the proportional changes in the values. (Kaul & Chowdhury, 2007). simple index; It is calculated with the general formula $I_t=(y_t/y_0)*100$. It: shows the simple index number for the t period, y_t: shows the t period value to be calculated, and y_0: shows the selected period value as the basis. If the chain index is; It is calculated with the formula $I_t=(y_t/ y_{(t-1)})*100$. It is the number of chain indexes for the t period, and the $y_{(t-1)}$: index is calculated with the value of the previous (t-1) period before the t period to be calculated.

RESEARCH FINDINGS AND DISCUSSION

Development of Agro-Industries in the World

The developmental stages of human beings in the world took the form of agricultural production from a primitive society and finally the information society. The industrialization process is also evaluated in the transition phase from agricultural production to information society. According to economists, the beginning of the industrialization process in the development stages is characterized as increasing the efficiency and durability of agricultural production, that is, the stages after the agricultural society. The developments made in order for an economy to turn into an industrial society are generally called the industrialization process (Işık, 2009).

The beginning of the industrialization process differs among historians. According to to it was stated that a radical change process was started in the English economy in the 1750s and a rapid and general industrialization stage was reached by the 1850s. It has emerged in the economists who objected to this historical process of Toynbee. J.H. Clapham It is claimed that in the 1850s, industrialization was limited to the cotton weaving and iron industries, one of the agriculture-based industries, and a general industrialization process took place in the following years (Güran, 1988).

The first development in industry In 1765, James Watt's development of the steam engine and the creation of a more efficient machine paved the way for the establishment of the theoretical frameworks of the industrial revolution that started in England and all the conditions of modern industry (Güran, 1988). The Industrial Revolution thus began in the second half of the 18th century. James Watt greatly improved the steam engine invented by Thomas Newcomen in 1764-1782 and made it commercially available. The period of 1765-1850 is known as the Industrial Revolution period (Soydemir, 2013).

Before the development of the atmospheric steam engine, the industry relied on water and wind power. In 1780 and later, steam energy was used as a power source in the industry. In the textile industry, which was one of the leading sectors in the Industrial Revolution, the speed of weaving machines was increased thanks to the so-called "flying shuttle", invented in 1733 by John Kay, who worked as a worker in England. The increase in weaving speed has led to the need for more yarn. A spinning jenny was built by Hargreaves in 1766, which could spin yarns at the same time faster (spinning jenny). Richard Arkwright produced the water frame spinning loom in 1769, and Samuel Crompton a spinning machine called the 'spinning mule' in 1779. In this way, the production of weaving yarn has been increased rapidly and new inventions have been revealed in the weaving and textile sector. The water-powered mechanical loom, invented by Edmund Cartwright in 1785, led to the rapid development of the weaving industry, and within the next 30 years, looms began to be widely used in both the woolen and cotton weaving industries (Günay, 2002).

In this process, the increase in the demand for some materials such as wool both inside and outside the country has led to the efficiency of the products produced in this field, and thus a market-oriented production style has been started. As a result of the expansion of the transportation network, the prices of raw materials and processed products decreased, and there were developments in commercial relations, which contributed to the emergence of the industrial revolution (Heaton et al., 2005).

After the first industrial revolution, England entered a rapid development process. When the production of industrial products is considered quantitatively, it has shown a continuous increase and has been increased in agricultural production. Without the development in the agricultural field, the industrial revolution would have been

unthinkable. When this development in agriculture was transferred to the industrial sector, which could use the products it produced and increase efficiency and production, it provided both the durability of the products in production, the consumer goods of the processed products and cheap labor for the emerging capitalist class (Işık, 2009).

Looking at the developments throughout the history of humanity, as a result of the Industrial Revolution had a great impact on the world, both the communication between people with each other and the relationship they experience with nature has changed in many different ways (Aksoy, 2017). The pace of change that started with the Neolithic period and continued with the long agricultural period and the pace of change in the modern period after the industrial revolution are very different from each other. The change in the means of production in the historical process is given in Figure 1. In Figure 1, it shows the speed of change experienced towards more complex tools with the industrial development of the means of production used to change them in line with their wishes and needs in human life.

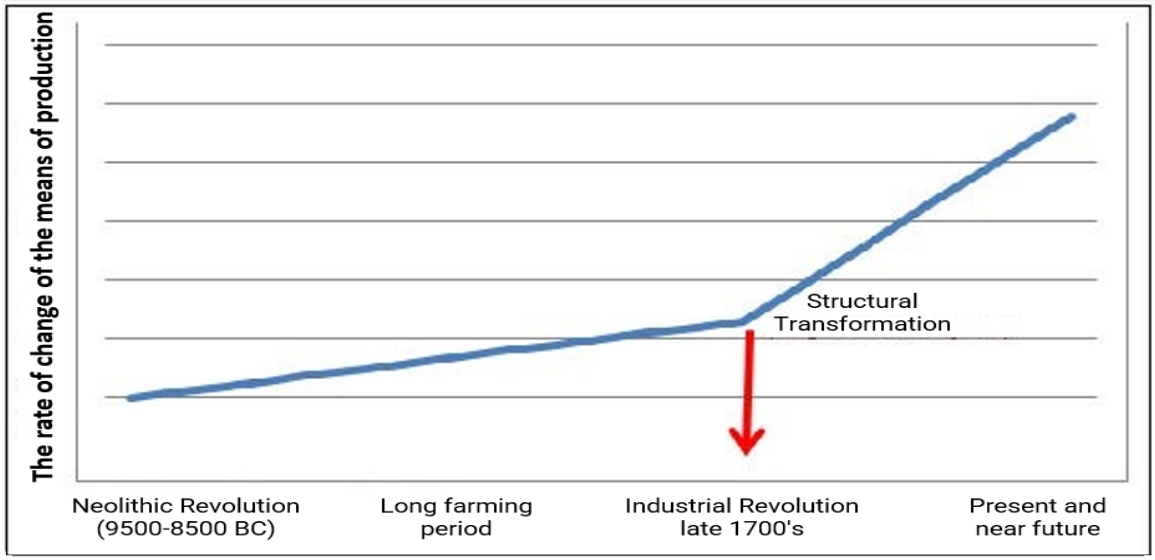

Figure 1. *The Speed of Change of Technology / Production Tools (Çelik, 2020)*

When we look at the development of the history of humanity until today, it is seen that the transition to the settled agricultural system took more than a thousand years, and the transition from the agricultural society to the industrial society took place only in three centuries. Today, the course of social development has accelerated considerably (Bensghir, 1996).

In industrial societies, the use of human and animal power as an energy source has been greatly reduced, and a new field has emerged by replacing them with machines using water and steam energy or electrical energy (Gültekin, 2017). The first stage of the industrialization process in France, England, Germany, and briefly Western Europe, shows the developments in the agricultural sector. For this reason, it is seen that the developments in agriculture carry the elements that determine and support the industrial revolution (Hamitoğulları, 1986).

The industrial revolution took place in the middle of the 18th century and there were great developments in the world. At the beginning of the industrial revolution, the

symbols of heavy industry such as steam power, railways, iron, and steel were accepted as the most important criteria and strategies in development (Yücel, 2003).

It cannot be said that the transformation experienced by the industrial revolution is experienced in the agricultural sector at the same speed. With the invention of the harness, the use of horses instead of oxen increased labor productivity, water mills and windmills became widespread, and the developments in the field of grinding, weaving, and tanning of wheat, are the simplest indicators of the slow progress of the agricultural sector for centuries (Köymen, 2009).

Developments in the industry are in every part of agriculture. These advances include chemical fertilizers, sprayers, better feed, and feed additives, improved and new types of machinery, high-yielding crop varieties, improved livestock, and, most importantly, great advances in the managerial skills of the farmer, which is perhaps an incalculable factor (Doll & Orazem, 2005).

When the important developments in terms of agro-linked industry that took place in the industrial period are examined; The seeder was invented by Jethro Tull in England in 1701. This machine makes holes in neat rows in the field where the seed will be planted. Thus, less seeds were used, and it was easy to hoe the soil between the rows. Tull also invented the horse-drawn seeder in 1731 (Gölçek & Köktaş, 2016). Thanks to this machine, it has replaced the manual seed sowing, which causes the seeds to be wasted. Hargreaves invented the multi-spinning machine in 1766, Jethro Tull's cotton gin in 1786, and Patrick Bell in Scotland in 1828, McCormick reapers in the USA in 1831 (Wallerstein, 2016). From the Andes of South America, fertilizer began to be brought to Europe. In addition, the German chemist Justos von Liebig determined the positive effects of phosphorus, potassium, and nitrogen on plant growth in 1840 and invented artificial fertilizer in line with these findings. Also, in England, John Lawes and Henry Gilbert produced artificial fertilizers by reacting phosphate-rich rocks with sulfuric acid. The use of machinery and fertilizers has provided a great increase in production (Direk, 2012).

The development of the industrial sector led to the loss of population in agriculture, and the entry of machinery into the agricultural sector led to a great change in the agricultural field. With the adoption of mechanization technologies and a money economy in agricultural production, new production methods with high profitability have emerged. Thus, the economic basis has been prepared for the transfer of the surplus population from the agricultural sector to other areas (Gültekin, 2017).

It cannot be said that the transformation in the industrial revolution that started in the 18th and 19th centuries was experienced in the agricultural sector at the same speed. For example, agricultural mechanization started to develop only at the beginning of the 20th century (Hoell & Doğkan, 1975).

The transformation in the Agro-Industry took place in the middle of the 20th century. Before this period, the need for food is adequately met by actively working on small farms and participating in the production of basic agricultural products (Saygılı et al., 2018).

The statist development policies that started after the years of 1923-1930, which can be defined as the years of growth based on agriculture and large production, were carried out during the Second World War. It's over after World War II. II. The technology accumulations obtained after World War II were directed to the production areas and the technology products left over from the war industry can be expressed as the use of capitalist production. The reflections of this situation on the agricultural sector were not delayed too long. The capacity to produce passenger cars from the war industry has been

allocated to the tractor, and the explosives production capacity has been allocated to fertilizer investment (Günaydın, 2018).

Development of Agro-Industries in Türkiye

With the beginning of the industrialization period in Türkiye, agricultural products were supported in various ways, especially in the 1940s, due to their contribution to the country by processing agricultural products into industrial products. (Gürler et al., 2000). Within the framework of the decisions taken with the development of agriculture-based industries in Türkiye; At the Izmir 1st Economics Congress, the focus was on the development of agriculture and natural resources, and the integration of agriculture and industry in Türkiye, whose economy is largely based on agriculture. In Türkiye, in the 1933-1950 period of the statist economic policies, a planned industrialization policy was followed in economic development, and importance was given to the sale of agricultural products in processed and semi-finished conditions to agriculture-based industrial establishments. Türkiye II. In the Industry Commission of the Economics Congress, it was stated that first of all, the agriculture-based industry should not be defined. It has been concluded that the sub-sectors to be given priority should be differentiated between those that provide input to agriculture and those that receive input from agriculture, and that the segment that provides input to agriculture should be primarily supported. After the 1980s, export-oriented economic policies, incentives, and conveniences applied to exports have been developed by encouraging agriculture-based industries. Today, agro-industry has emerged as an industry branch in which the private sector also operates, apart from the agro-based industrial establishments where the state was initially established to support more agricultural producers.

The fertilizer industry, which is one of the agriculture-related industries in Türkiye, became a priority area and a sub-branch of the Agro-Industry that was supported during the planned period. In this respect, although the fertilizer industry has not been experienced in the long term, its development has been very rapid and today it has become a sector that has the power to compete in the domestic and foreign markets with its certain potential and technological level. After 1986, while the share of the public sector in fertilizer marketing gradually decreased, the share of private sector organizations increased. Machine power entered Turkish agriculture with plows produced by factories in England and Germany in the Balkan War and in the years after this war, and it was used by large agricultural enterprises. Tractor production, which started with the assembly of Minneapolis-brand tractors in the Turkish tractor factory established in Ankara, continued with other organizations that came into operation in the following years (Sümer et al., 2004). Since the 2000s in Türkiye, construction equipment used in agriculture, in general, has been produced domestically at a rate approaching 100%. However, some important agricultural tools and machinery, which require high technology, can be imported from abroad due to the exemption from customs duty (Gürler et al., 2000). The production of pesticides in Türkiye started with formulation production. Firstly, The Shell Company of Türkiye Ltd. The white oil plant he founded became operational in 1950. In 1951, Protection Pesticides Inc. established, and versatile formulation facilities started to work.

Informality in the Agro-Industry sector in Türkiye is at a significant level. For this reason, the number of enterprises operating in the Agro-Industry differs due to different records and sources. However, the Agro-Industry has an important place in the Turkish economy (DPT, 2007).

The number of enterprises in Agro-Industries is shown in Table 1. The number of Agro-Industries in Türkiye, which was 27,501 in 2010, increased to 38,522 in 2019. When the share of the Agro-Industry in the manufacturing industry and industry is examined, it was 56.69% in 2010 and 53.89% in 2019. While the highest share of agro-industry enterprises in the manufacturing industry and industry in 2010 and 2019 was in 2010, the lowest share was realized in 2015. When the change trends in the number of enterprises in Türkiye's Agro-Industries over the years are examined with simple and chain index values; It has been determined that the number of agro-industrial enterprises has increased in the last 9 years in Türkiye. From 2010 to 2019, there was an increase of 40.07% in the number of Agro-Industry enterprises in Türkiye. The number of Agro-Industry enterprises has increased over the years at a varying rate compared to 2010. In the last 9 years, there has been an annual increase of 3.74% in the number of enterprises in Agro-Industries.

Table 1. *Number of agro-industry enterprises and change in Türkiye by years*

Years	Industry	Manufacturing Industry	Agro-Industry	Share of Agro-Industry in Industry (%)	Share of Agro-Industry in Manufacturing Industry (%)	Agro-Industry Simple Index	Agro-Industry Chain Index
2010	48.514	46.900	27.501	56,69	58,64	100,00	100,00
2011	53.537	51.627	29.826	55,71	57,77	108,45	108,45
2012	60.847	58.713	33.631	55,27	57,28	122,29	112,75
2013	60.627	58.432	32.892	54,25	56,29	119,60	97,80
2014	62.767	60.584	33.360	53,15	55,06	121,30	101,42
2015	62.746	60.657	33.147	52,83	54,65	120,53	99,36
2016	75.619	73.129	40.637	53,74	55,57	147,77	122,59
2017	75.309	72.785	40.358	53,59	55,45	146,75	99,31
2018	69.932	67.629	37.298	53,33	55,15	135,62	92,41
2019	71.478	69.241	38.522	53,89	55,63	140,07	103,28

Source: (TÜİK, 2020)

The number of personnel in the Agro-Industry sector is given in Table 5. When the change in the number of personnel in Türkiye's Agro-Industry enterprises is evaluated according to the years, it is seen that the number of employed personnel has an increasing trend. The number of personnel in Agro-Industry enterprises, which was 1,196,973 in 2010, increased to 1,641,055 in 2017. While the number of personnel of Agro-Industry enterprises in the industry sector was 3,758,637 in 2016, it increased by 2.45% in 2017 to 3,854,637 people. In the manufacturing industry, the number of employees, which was 3,634,477 in 2016, increased by 1.98% to 3,723,677 personnel. It has been determined that the number of Agro-Industry personnel in Türkiye has increased over the years. Agro-Industry has shown an increase of 37.10% in the number of personnel in the period from 2010 to 2017. When the chain index results are evaluated, it is determined that the number of personnel has changed at different levels compared to the previous year. The highest increase (9,10) was experienced in the transition from 2010 to 2011. After 2015, it was determined that there was a decrease. It has been determined that there is an average increase of 4.11% on an annual basis.

Table 2. *The share of the number of personnel in the industry in Agro-Industry enterprises by years in Türkiye*

Years	Industry	Manufacturing Industry	Agro-Industry	Share of Agro-Industry in Industry (%)	Share of Agro-Industry in Manufacturing Industry (%)	Agro-Industry Simple Index	Agro-Industry Chain Index
2010	2.740.138	2.617.991	1.196.973	43,68	45,72	100,00	100,00
2011	3.028.111	2.896.584	1.305.912	43,13	45,08	109,10	109,10
2012	3.302.850	3.165.267	1.453.038	43,99	45,91	121,39	111,27
2013	3.500.612	3.361.143	1.543.638	44,10	45,93	128,96	106,24
2014	3.677.412	3.540.868	1.620.700	44,07	45,77	135,40	104,99
2015	3.751.760	3.621.817	1.623.899	43,28	44,84	135,67	100,20
2016	3.758.813	3.634.477	1.609.209	42,81	44,28	134,44	99,10
2017	3.854.637	3.723.677	1.641.055	42,57	44,07	137,10	101,98

Source: (TÜİK, 2020)

The total production value (million TL) in the Agro-Industry sector is given in Table 8. It is seen that there is a continuous increase in the production value of the Agro-Industry in Türkiye over the years. The total production value in the Agro-Industry, which was 139,436 million TL in 2010, increased to 685,074 million TL in 2019. The change in the total production value of the Agro-Industry in Türkiye over the years is given in Table 9 according to the simple index and chain index values. It is observed that the Agro-Industry production value in Türkiye has increased continuously over the years. A 483.69% increase is seen in the total production value of the Agro-Industry from 2010 to 2019. It has been determined that there is a linear increase in the total production value over the years. It has been determined that there is an average increase of 17.45% on an annual basis.

Table 3. *Change status of total production value of Agro-Industry in Türkiye by years*

Years	Industry	Manufacturing Industry	Agro-Industry	Share of Agro-Industry in Industry (%)	Share of Agro-Industry in Manufacturing Industry (%)	Agro-Industry Simple Index	Agro-Industry Chain Index
2010	325.120	314.689	139.436	42,89	44,31	100,00	100,00
2011	428.980	415.296	190.071	44,31	45,77	136,31	136,31
2012	487.583	471.989	214.867	44,07	45,52	154,10	113,05
2013	567.605	548.458	251.271	44,27	45,81	180,21	116,94
2014	663.552	639.961	304.582	45,90	47,59	218,44	121,22
2015	720.837	702.736	329.298	45,68	46,86	236,16	108,11
2016	810.019	788.184	374.759	46,27	47,55	268,77	113,81
2017	1.028.055	998.110	449.648	43,74	45,05	322,48	119,98
2018	1.334.117	1.296.531	578.903	43,39	44,65	415,17	128,75
2019	1.572.588	1.527.533	685.074	43,56	44,85	491,32	118,34

Source: (TÜİK, 2020)

CONCLUSION AND RECOMMENDATIONS

The relationship between the industrial revolution and agricultural developments started the industrialization process. In the textile industry, which was one of the leading sectors in the Industrial Revolution, the speed of weaving machines was increased thanks

to the so-called "flying shuttle", invented in 1733 by John Kay, who worked as a worker in England. When the important developments in terms of the agriculture-related industry that took place in the industrial period in the world are examined; In England, Jethro Tull invented the seeder in 1701 and invented the horse-drawn seeder in 1731. Hargreaves invented the multi-spinning machine in 1766, Jethro Tull the cotton gin in 1786, Patrick Bell in Scotland in 1828, and McCormick reapers in the USA in 1831. Fertilizer began to be brought to Europe from the Andean coasts of South America. The German chemist Justos von Liebig invented fertilizer in 1840. In England, John Lawes and Henry Gilbert produced artificial fertilizers. Considering all these developments, the developments in the industry are included in agriculture.

In the 1940s, agricultural products were processed and turned into industrial products in Türkiye, and the state gave importance to the sale of agricultural products as processed and semi-finished products in the following years (1933-1950). In the 1980s, the state supported the agricultural producer by giving importance to exports. With the progress and widespread use of mechanization in agriculture, construction equipment in agriculture was produced locally in the 2000s.

When the number of Agro-Industry enterprises in Türkiye is examined, 11,021 enterprises increased between 2010 and 2019, that is, an increase of 40.07% was experienced. When the change in the number of personnel in Türkiye's Agro-Industry enterprises is evaluated according to the years, it is seen that the number of employed personnel has an increasing trend. The number of personnel in Agro-Industry enterprises, which was 1,196,973 in 2010, increased to 1,641,055 in 2017. While the number of personnel of Agro-Industry enterprises in the industry sector was 3,758,637 in 2016, it increased by 2.45% in 2017 to 3,854,637 people. It is seen that there is a continuous increase in the production value of the Agro-Industry in Türkiye over the years. The total production value in the Agro-Industry, which was 139,436 million TL in 2010, increased to 685,074 million TL in 2019. It is observed that the Agro-Industry production value in Türkiye has increased continuously over the years. A 483.69% increase is seen in the total production value of the Agro-Industry from 2010 to 2019. It has been determined that there is a linear increase in the total production value over the years. It has been determined that there is an average increase of 17.45% on an annual basis.

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