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Research Article

Sectoral Patterns of Labor Productivity Growth in Turkey

Türkiye'de İşgücü Verimliliği Artışının Sektörel Kalıpları

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Öz

Bu çalışma, 1990-2018 yılları arasında Türkiye'nin işgücü verimliliği kalıplarını ve bu kalıpların zaman içindeki değişimlerini değerlendirmekte ve işgücü verimliliği artışının Türkiye'nin ekonomik performansı üzerindeki rolü hakkında yeni bulgular sunmaktadır. Ayrıca, işgücü verimliliği değişimini statik ve dinamik ölçümler aracılığıyla sektör-içi değişim ve sektörler-arası değişim (yapısal değişim) bileşenlerine ayrıştırmakta, böylece işgücü verimliliğindeki değişimlerin bir sektörün kendi içindeki verimlilik değişikliklerinden mi yoksa farklı verimlilik düzeylerine sahip sektörler arasında emeğin yeniden tahsis edilmesinden mi kaynaklandığını ortaya koymaktadır. Çalışmanın bulguları Türkiye'nin işgücü verimliliğinin, özellikle sanayi sektörü için, OECD ülkelerinin ortalamasının oldukça altında kaldığını ortaya koymaktadır. Ayrıca, işgücü verimliliğindeki artışın, istihdam oranı, işgücüne katılma oranı, çalışma yaşının toplam nüfusa oranı gibi diğer unsurlara kıyasla büyümenin itici gücü olduğunu göstermektedir. Son olarak çalışma, işgücü verimliliği artışında, sektör içi verimlilik artışının, yapısal değişimden çok daha önemli bir rolü olduğunu ortaya çıkarmaktadır. Çalışma aynı zamanda, işgücü verimliliğini artırmak, kaynakların tahsisini iyileştirmek ve ekonomik büyümeyi teşvik etmek için politikalar önermektedir.

Anahtar Kelimeler: *İşgücü verimliliği, ekonomik büyüme, Türkiye emek piyasası, yapısal değişim*

Abstract

This study analyzes the patterns and changes in Turkey's labor productivity between 1991 and 2018 and evaluates its contribution to overall economic growth in Turkey. Labor productivity growth is decomposed into its 'within-sector' and 'between-sectors' (structural change) components through static and dynamic measurement tools. In this way, it becomes possible to reveal whether the changes in labor productivity result from the productivity changes within a sector or the reallocation of labor across sectors. The findings of the study indicate that labor productivity growth is the driving force of Turkey's economic growth, even though Turkey lags behind the OECD countries in terms of labor productivity (especially in the industrial sector). One key result is that Turkey's labor productivity growth arises mainly from the 'within-sector' productivity improvements rather than structural change. Some policy implications are also discussed for Turkey to raise labor productivity, enhance resource allocation, and promote economic growth.

Keywords: *Labor productivity, economic growth, Turkish labor market, structural change*

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1. Introduction

Turkey's GDP has grown by around 4.7% over the past three decades, peaking at 11% in 2011. Turkey experienced significant growth and development process, and benefited much from the favorable conditions of the world economy, especially in the early 2000s. There may be many factors that underlie this growth process of Turkey. Labor productivity growth is one of these factors, even if it is mostly neglected. Labor productivity growth is important for an economy because it indicates that the economy is operating in the right way. Moreover, it promotes economic growth and development, reduces poverty, and improves the living standards, which are crucial for developing countries, like Turkey. (ILO, 2005; Su and Heshmati, 2013). On the other hand, changes in labor productivity growth are not only a factor behind a country's economic growth but also a source behind some economic problems such as unemployment, lower wages, poverty, inequality. (Restuccia, 2013). Despite its favorable growth progress, Turkey still has some socio-economic problems such as unemployment, poverty, and inequality. Therefore, the first aim of this study is to answer the question of whether the underlying reasons for Turkey's economic situation are related to labor productivity or other labor market characteristics. In this context, other labor market characteristics include employment rate, the labor force participation rate, and the working-age population rate.

Another issue that needs to be considered for developing countries is how to increase overall labor productivity. It can be achieved by at least two ways: i) by the productivity growth within a sector (within-sector growth) ii) by the re-allocation of labor from low-productive sectors to high-productive sectors (between-sectors growth or positive structural change). The first one, within-sector growth, realizes via the acquisition of new machines or new production techniques that enable producing more with the same amount of labor within a sector. It is crucial for the economies because the productivity increase that occurs in any sector of an economy can trigger other sectors and lead to an increase in productivity in all sectors. The second one, between-sectors productivity growth or positive structural change, realizes by the movement of labor from high-productive sectors to low-productive sectors. (McMillan and Rodrik, 2011) It is crucial, especially for developing countries. McMillan and Rodrik (2011) claim that if labor moves from low productive sectors to high productive sectors, then the overall productivity level and aggregate income of the country increase, even there is no change in the productivity levels of within-sectors. Also, De Vries, Timmer and De Vries (2015) observe that the sectors with higher productivity levels may exhibit lower productivity growth rates compared to the other sectors. Then, to account for this situation, they further decompose between-growth (structural change) into static and dynamic components where static effects are related to the sectors with above-average productivity levels while dynamic effects are related to sectors with above-average productivity growth.

The sources of labor productivity growth are as important as labor productivity growth, especially for developing countries. Because, in case of a decline in overall productivity growth, it is necessary to know the source of the decline to deal with it. For example, if the decrease in overall labor productivity is due to the decrease in within-sector productivity, the sector should be supported by new technologies, new capital investments, etc. However, if the decline results from the decrease in between-sectors productivity, the workers will need training and also the country will need channeling its capabilities further into relatively high-productive sectors. Despite its importance, the sources of labor productivity growth in terms of employment opportunities have not been sufficiently emphasized especially for developing countries like Turkey. Therefore, analyzing the sources of labor productivity growth of Turkey is the second aim of this study.

Turkey is a quite interesting country to study the dynamics of labor productivity growth. Because, the country is in a restructuring trend from the agricultural sector towards industry and services sectors since the 1950s. However, the sources and outcomes of this restructuring process in terms of labor market characteristics are important issues that have not been sufficiently emphasized especially for Turkey. The third aim of this study is to discuss the policies that increase the productivity of labor, improve the allocation of resources, and promote the economic growth of Turkey**.**

All in all, this study evaluates the change in Turkey's labor productivity and growth patterns over time, the role of labor productivity growth in overall economic growth, the importance of within-sector growth, and structural change in overall productivity growth for the period 1990-2018. Also, addressing the crisis periods, i.e. 2001 and 2008-2010, separately provides an assessment of the impact of the crisis in these processes. In the study, economic growth is decomposed into its productivity and labor market variables based on the World Bank's Growth Decomposition tool (World Bank, 2012b) which is a version of the Shapley decomposition methodology (Shorrocks, 2013). We apply the World Bank's Growth Decomposition as it is employed in ILO (2013). Then, the study further decomposes labor productivity growth into within and between (structural change) components. In this way, it reveals whether the change in labor productivity has resulted from the productivity changes within a sector or the reallocation of labor across sectors with different productivity levels. Moreover, the latter one is evaluated in terms of both static and dynamic measures based on the methodology by De Vries, Timmer and De Vries (2015) which is a variant of decomposition method by McMillan and Rodrik (2011). The study also suggests policies to increase the productivity of labor, improve the allocation of resources, and promote the economic growth of Turkey.

To the author's knowledge, this study is the first attempt to utilize these methodologies in the case of Turkey and to analyze the contributions of different labor market factors to overall economic growth. It is expected that the new features of these analyses will not only enrich the existing empirical literature but also provide an expanded choice set for growth and development strategy possibilities for Turkey.

2. Literature Review

Labor productivity is of great importance for a country's economic performance, growth and development. In the literature, there is some evidence on the positive relationship between an increase in labor productivity level and the growth rate of an economy. (Warr, 2006 for Thailand and Indonesia; Su and Heshmati, 2013 for China; Restuccia, 2013 for Latin America and the U.S.; Maia and Menezes, 2014 for Brazil and the U.S. and Korkmaz and Korkmaz, 2017 for OECD countries). However, most of these studies use econometric techniques or different decomposition approaches which do not take into account other labor market characteristics than labor productivity, because the labor market variables are in interaction and it can cause multicollinearity problems in these methods.

On the other hand, the World Bank's Growth Decomposition tool is useful to decompose economic growth into labor productivity and other labor market components. Also, it can measure the marginal effect of a component by eliminating the effects of other components on the economic growth. The tool was developed by the World Bank (2012b) as a version of Shapley's decomposition methodology developed by Shorrocks (1999, 2013). Shapley methodology decomposes growth into its poverty and inequality indicators at the aggregate level but it is useful to decompose the change of any variable between two times. World Bank's Growth Decomposition tool modifies Shapley methodology to decompose per capita growth into productivity and other labor market components, and it also allows the decomposition at the sectoral level. In the literature, World Bank's Growth Decomposition tool was used in few studies. For example, Gutierrez et al. (2009) use it to decompose per capita growth for developing countries for the period 1980-2002, Aggarwal (2018) for India between 1972-2012, Pirciog and Lincaru (2016) for Romania between 1997 and 2014, Ajakaiye et al. (2015) for Nigeria between 1990 and 2014, Bbaale (2013) for Uganda between 2006 and 2011. To my knowledge, this methodology was not yet used for the decomposition of Turkey's value-added per capita growth into labor productivity growth and other labor market components.

Labor productivity growth can be further decomposed into within- and between-growth components. As in the previous case, different decomposition methods can be used for this purpose such as accounting methods (e.g Pieper, 2000; Roncolato and Kucera, 2014), different versions of shift-share model originated by Chenery, Robinson and Syrquin (1986) (e.g. Ark and Timmer, 2003; Taymaz and Kılıçaslan, 2006; Ekmen-Özçelik and Karacaer-Ulusoy, 2018).

McMillan and Rodrik (2011) modified the traditional shift-share model by incorporating the shift effect for each sector relative to the average productivity level. Based on their methodology, McMillan and Rodrik (2011) decompose aggregate labor productivity into its within-growth and between-growth (structural change) components for 38 developed and developing countries for the 1990–2005 period. They conclude that the impact of structural change on labor productivity growth might be growth-enhancing in Asia but growth-reducing in Latin America and Africa. In another study, they used the same method, McMillan, Rodrik and Verduzco-Gallo (2014) emphasize that structural change in Africa turned from growth-reducing to growth-enhancing after 2000s., and hence it positively affected overall productivity growth.

De Vries, Timmer and De Vries (2015) modified the decomposition methodology by McMillan and Rodrik (2011) by expanding between-sector growth, i.e structural change, component as static and dynamic ones. Yılmaz (2016) used the methodology by De Vries, Timmer and De Vries (2015) to analyze and compare the sources of labor productivity growth in middle-income trap (MIT) countries and non-middle-income trap (NMIT) countries for the period 1950–2005. He emphasizes the importance of within-sector growth in overall productivity growth for all sample countries including Turkey except Bolivia and Mexico. Also, he reveals that the share of the manufacturing sector in within-sector productivity growth is the highest as compared to the other sectors. Foster-McGregor and Verspagen (2016) also follow De Vries, Timmer and De Vries (2015) methodology to analyze how structural transformation has changed the productive structure of Asian economies.

In the literature, Turkey's labor productivity patterns are examined by decomposition methodologies in a few studies, however, none of them used the methodology by De Vries, Timmer and De Vries (2015). For example, Atiyas and Bakis (2015) decompose labor productivity growth into its within-growth and between-growth components for the period 1990-2010 based on McMillan and Rodrik (2011) methodology. Their study reveals the importance of structural change in Turkey's labor productivity growth. Yurtsızoğlu and Kılıçaslan (2017) decompose Turkey's labor productivity growth in service sectors for the period 2003-2012 based on a version of the shift-share analysis. They found a decrease in total labor productivity in the service sector over the entire period and claimed the reason for this decrease as the decline in within-sector productivity. They also found a positive but little effect of structural change on the total labor productivity growth in the service sector.

As the literature review reveals, there are quite few studies focusing on the decomposition of economic growth and further decomposition of labor productivity growth. Also, the economic growth decomposition has not been used before for Turkey, decomposition of labor productivity growth was not considered in terms of dynamic changes before. Moreover, our data is updated compared to the previous studies in the literature. This article contributes to the literature along these lines. All in all, this study sheds new light on: i) how Turkey's labor productivity and growth patterns have changed over time, ii) the role of labor productivity growth in overall economic growth, iii) the roles of within- and between-sectors growth in overall labor productivity growth in static and dynamic manners iv) the effects of economic crises on these processes, and v) Turkey's ability to reallocate its labor towards high productive industries.

3. Methodology and Data

In this study, firstly, labor productivity and labor productivity growth rates of Turkey between 1990 and 2018 are evaluated. In this context, labor productivity is defined as value-added per employed person. It can be measured for the country as a whole, i.e., overall, or for individual sectors such as agriculture, industry and services. Overall labor productivity is calculated by dividing the total value added in constant 2010 US dollar prices into total employment. Similarly, sectoral labor productivity is calculated by dividing the sectoral value added in constant 2010 US dollar prices into the corresponding employment figure. Labor productivity growth is calculated as the percentage change of labor productivity levels in two consecutive years. The whole period is divided into sub-periods and the results are presented as averages of each sub-period.

Secondly, the study decomposes Turkey's value-added per capita growth into its components, which have significant implications on the growth patterns of countries. In this study, economic growth is represented by the increase in gross value added per capita rather than an increase in GDP per capita, because sectoral data are available only for value-added. The methodology of decomposing the value-added per capita into its components is based on the Shapley methodology (Shorrocks, 1999, 2013)[1] of which a version is developed in the World Bank's Growth Decomposition tool (World Bank, 2012b). In this study, this methodology is used as it is employed in ILO (2013).

In this methodology, value-added per capita in year t (y_t), can be written as follows:

$$y_t = f(w_t, e_t, l_t, p_t) \quad (1)$$

where w refers to labor productivity, e stands for the employment rate, l is the labor force participation rate, p is the working-age population rate. In this context, labor productivity (w) is calculated as gross value added divided by the number of employed people, the employment rate (e) is calculated as the ratio of employed people to sum of the employed and unemployed people, the labor force participation rate (l) is calculated as the ratio of employed and unemployed people to the total population and the working-age population rate (p) is calculated as the ratio of the working-age population to the total population.

Growth can then be written as:

$$\hat{y}_t = \overline{w_t} + \overline{e_t} + \overline{l_t} + \overline{p_t} \quad (2)$$

where $\hat{y}_t$ refers to value-added per capita growth between t and t-1 and, $\overline{w_t}$, $\overline{e_t}$, $\overline{l_t}$ and $\overline{p_t}$ refer the changes between t and t-1 in labor productivity, employment rate, labor force participation rate, and the share of working-age in total population, respectively. Thus, each component shows the contribution of its own change to the increase in value-added per capita. Among these components, labor productivity growth is the main concern of this study. Therefore, this decomposition aims to reveal how the growth is reflected in changes in output per worker, i.e. labor productivity.

As mentioned above, $\overline{w_t}$ in equation (2) refers to changes in labor productivity. It arises either from changes in labor productivity within sectors or from the structural change. Also, $\overline{e_t}$ and $\overline{l_t}$ in equation (2) refer to changes in employment rate and labor force participation rate, respectively. They contribute to the value-added per capita growth if there is a reduction in unemployment or if more people are added to the labor market. ILO (2013) attributes the slow growth patterns in many regions to the decreases in these rates with the onset of the crisis periods. Also, $\overline{p_t}$ in equation (2) refers to changes in the working-age population rate and it represents the age structure of the population. Value-added per capita growth is positively associated with the increases in this rate. It should also be noted that changes in the working-age population realize very slowly, and therefore these changes resist in reacting to policy interventions.

When Shapley decomposition methodology is applied, each component of $\hat{y}_t$ can be written as: [2]

$$\overline{w_t} = \frac{(w_t - w_{t-1})}{(y_{t-1})}\left(\frac{e_t l_t p_t}{4} + \frac{e_{t-1} l_{t-1} p_{t-1}}{4} + \frac{e_{t-1} l_t p_t}{12} + \frac{e_t l_{t-1} p_t}{12} + \frac{e_t l_t p_{t-1}}{12} + \frac{e_{t-1} l_{t-1} p_t}{12} + \frac{e_t l_{t-1} p_{t-1}}{12} + \frac{e_{t-1} l_t p_{t-1}}{12}\right) \quad (3)$$

$$\overline{e_t} = \frac{(e_t - e_{t-1})}{(y_{t-1})}\left(\frac{w_t l_t p_t}{4} + \frac{w_{t-1} l_{t-1} p_{t-1}}{4} + \frac{w_{t-1} l_t p_t}{12} + \frac{w_t l_{t-1} p_t}{12} + \frac{w_t l_t p_{t-1}}{12} + \frac{w_{t-1} l_{t-1} p_t}{12} + \frac{w_t l_{t-1} p_{t-1}}{12} + \frac{w_{t-1} l_t p_{t-1}}{12}\right) \quad (4)$$

[1] Shorrocks (1999) shows that Shapley decomposition could be applied to any function.

[2] For the details, see Shorrocks (1999, 2013) and ILO (2013)

$$\overline{l_t} = \frac{(l_t - l_{t-1})}{(y_{t-1})}\left(\frac{w_t e_t p_t}{4} + \frac{w_{t-1}e_{t-1}p_{t-1}}{4} + \frac{w_{t-1}e_t p_t}{12} + \frac{w_t e_{t-1}p_t}{12} + \frac{w_t e_t p_{t-1}}{12} + \frac{w_{t-1}e_{t-1}p_t}{12} + \frac{w_t e_{t-1}p_{t-1}}{12} + \frac{w_{t-1}e_t p_{t-1}}{12}\right) \quad (5)$$

$$\overline{p_t} = \frac{(p_t - p_{t-1})}{(y_{t-1})}\left(\frac{w_t e_t l_t}{4} + \frac{w_{t-1}e_{t-1}l_{t-1}}{4} + \frac{w_{t-1}e_t l_t}{12} + \frac{w_t e_{t-1}l_t}{12} + \frac{w_t e_t l_{t-1}}{12} + \frac{w_{t-1}e_{t-1}l_t}{12} + \frac{w_t e_{t-1}l_{t-1}}{12} + \frac{w_{t-1}e_t l_{t-1}}{12}\right) \quad (6)$$

In equations (3) – (6), the first terms on the right-hand side show that the changes between t and t-1 in each variable are weighted by value added per capita in t-1. The second term contains a weighted average of the other components remaining unchanged. The sum of all components equal to value-added per capita growth.

Thirdly, the study further decomposes the labor productivity growth, represented as $\overline{w_t}$ in equations (2) and (3), into its sector-specific components such as within-sector growth as well as static and dynamic structural changes. This decomposition is based on De Vries, Timmer and De Vries (2015), which is a version of the methodology by McMillan and Rodrik (2011). De Vries, Timmer and De Vries (2015) decompose labor productivity growth into its within-sector growth, static between-sector growth (static structural change) and dynamic between-sector growth (dynamic structural change).

Formally,

$$\overline{w_t} = \sum_j \overline{w_t^{WIT,J}} + \overline{w_t}^{BET-static} + \overline{w_t}^{BET-dynamic} \quad (7)$$

where

$$\sum_j \overline{w_t^{WIT,J}} = \sum_j (\alpha_{j,t-1} * \overline{w_{J,t}}) \quad (8)$$

$$\overline{w_t}^{BET-static} = \sum_j (w_{j,t-1} * \overline{\alpha_{J,t}}) \quad (9)$$

$$\overline{w_t}^{BET-dynamic} = \sum_j \overline{\alpha_{J,t}} * \overline{w_{J,t}} \quad (10)$$

In equations (7-10), $\overline{w_t}$ represents aggregate (economy-wide) labor productivity growth between t and t-1, $\sum_j \overline{w_t^{WIT,J}}$ represents the "within-sector" productivity growth, $\overline{w_t}^{BET-static}$ represents "static structural change" and $\overline{w_t}^{BET-dynamic}$ represents "dynamic structural change". Also, $\alpha_{j,t-1}$ is the employment share of sector j in t-1and it is calculated as the ratio of sectoral employment to overall employment; $\overline{\alpha_{J,t}}$ is growth rate of the employment share of sector j between t and t-1; $\overline{w_{J,t}}$ is the sectoral labor productivity growth between t and t-1 and it is calculated as the ratio of sectoral value added to the corresponding employment figure; $w_{j,t-1}$ is labor productivity level of sector j in t-1.

Therefore, equation (8) shows the "within-sector" productivity growth which consists of the weighted sum of the productivity growth within each sector. Labor productivity growth resulting from changes in labor productivity within sectors can be achieved by the application of new machines and innovative technologies that provide more output with the same amount of labor input.

On the other hand, equation (9) shows the static structural change, resulting from the multiplication of productivity levels in t-1 by a change in employment shares between sectors. It is a static measure since it considers productivity across sectors in terms of the level rather than change. (De Vries, Timmer and De Vries, 2015). This component demonstrates the impact of the labor movement across sectors on aggregate productivity growth. Static structural change can be accomplished by reallocating workers between sectors with different levels of productivity. This change can discourage as well as it can encourage overall labor productivity. It depends on whether workers move from low-productivity sectors to high-productivity sectors (e.g. from

agriculture to industry or services) or from high-productivity sectors to low-productivity sectors (e.g. from industry to services). The former one is considered as 'positive' or 'growth-enhancing' structural change while the latter one is considered as 'negative' or 'growth-reducing' structural change. Growth-enhancing structural change shows that the movement of labor across sectors is positively correlated with the productivity levels. Therefore, the country is capable of moving labor from the low-productivity sectors to the sectors with above-average productivity levels. The opposite is true for growth-reducing structural change.

Also, Equation (10) shows the dynamic structural change, resulting from the combined effect of changes between t and t-1 in employment shares and sectoral productivity levels. It is considered as a dynamic measure because it takes into account changes in productivity levels across sectors.

The positive value of this variable indicates that workers have moved to sectors where productivity has increased, and the negative value indicates that the workers have passed to sectors where productivity has decreased. In other words, positive dynamic structural change shows that productivity increases in sectors where employment shares increase. In contrast, negative dynamic structural change shows that productivity decreases in sectors where employment shares increase. (De Vries, Timmer and De Vries, 2015: 16).

All data used in this study is taken from the World Bank's World Development Indicators (WDI) database. The period covers the years between 1991 and 2018. However, data for some variables are available only until 2017. The results are presented at the overall level as well as sectoral levels such as agriculture, industry and services.

4. Results

4.1. *Descriptive Analysis on Sectoral Distribution of Turkish Economy*

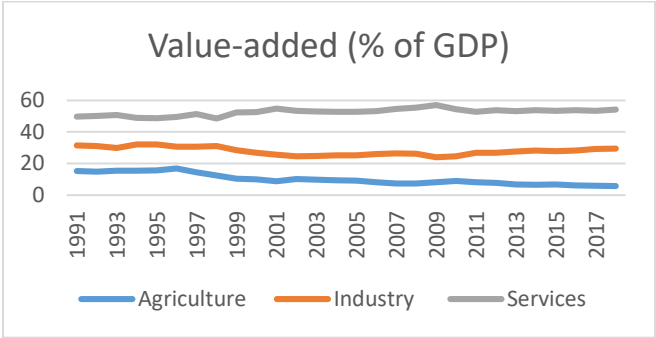
Descriptive and empirical analysis for this study can only be made after 1990, since sectoral employment data are available after that year. However, Turkey has been experiencing a significant change in the sectoral distribution of its GDP since 1950s.[3] Therefore, it would be beneficial to mention the structural transformation of the Turkish economy between 1950-1990 briefly. [4]

1950s displayed an agriculture-based integration of Turkey to the world economy. Agriculture was the main sector of liberal economic policies in these years. More than half of GDP was made by the agricultural sector until the 1960s. However, due to the economic and financial difficulties such as high inflation and high external debt in those years, 1960s and 1970s witnessed the protectionist trade policy and import-substituting industrialization strategy. So, the share of industrial sector rose while the share of agricultural sector decreased in those ten years. On the other hand, there was a rising service sector along with the industrial sector, which is not in line with the policies implemented in the 1960s. In the second half of the 1970s, import-substituting industrialization strategy has completed its period. Increasing current account deficit and the world oil shocks in 1973 and 1979 gave rise to the neoliberal models characterized by liberalization and export-oriented trade policies in 1980s. As a result, between 1970 and 1980, the share of industry increased slightly. On the other hand, the services sector continued to rise during 1970s and it became the dominant sector in 1980 by the share of 49 %. Increasing current account deficit and the world oil shocks in 1973 and 1979 gave rise to the neoliberal models characterized by liberalization and export-oriented trade policies after 1980. Thus, after 1980s, the importance given to export-oriented sectors in the economy started to emerge. The following graphs show the sectoral structure of the economy from 1990s to the present.

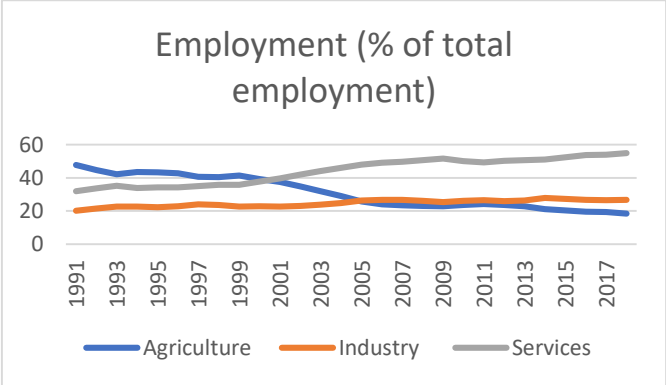
[3] For the structural analysis of Turkish economy before 1950, see Koçtürk and Gölalan (2010)

[4] For the details of Turkish Economy after 1950, see Öniş, Ziya and Şenses, Fikret (2007), "Global dynamics, domestic coalitions and a reactive state: Major policy shifts in post-war Turkish economic development", METU Studies in Development, 34, December, pp. 251-286.

Graph-1 and Graph-2 below show the sectoral distribution of value-added and employment, respectively, for Turkey after 1990.



Graph-1: Sectoral distribution of value-added as a percentage of GDP, Turkey, 1991-2018.



Graph-2: Sectoral distribution of employment as a percentage of total employment, Turkey, 1991-2018

Graph-1 and Graph-2 show that Turkey experiences significant changes in the structure of its economy even after 1990. The first thing noticeable from the graphs is the significantly shrinking agricultural sector, significantly expanding services sector, and a slightly changing but still in the middle industry sector. Therefore, in the Turkish economy, we can not talk about a regular shift from agriculture to industry and then from industry to services over time. However, we see a shift from agriculture to industry and services sectors as well. The graphs also show the sharp reduction in the employment share of the agricultural sector especially until the mid-2000s, most probably due to rural migration. More specifically, agricultural employment decreased from 48 percent in 1991 to 26 percent in 2005, i.e. 22 percentage-points while During the same period, agricultural value-added in total GDP decreased only by 6 percentage-points. Therefore, it can be claimed that the adoption of new technologies to compensate for decreasing the labor force prevented a sharp decline in agricultural production until 2005. From 2005 to 2018, the decrease in employment rate (2 percentage-point) slowed down while a decrease in value-added was still 7 percentage-point in agriculture. On the other hand, in the industrial sector, employment share increased from 20 percent in 1991 to 27 percent in 2018, i.e. by 7 percentage-points, while the share of value-added decreased by 2 percentage-points in the same period. The graphs also show that the services sector is the main sector of the Turkish economy in terms of its contribution to GDP as well as employment. As of 2018, more than half of the production is made by the service sector, and also more than half of the employed people work in the services sector. When the annual averages of the sectors over the entire period in terms of value-added and employment are considered, it can be said that agricultural value-added constitutes 11 % of Turkey's GDP while agricultural employment constitutes 31 percent of total employment. Industrial sector constitutes 29 percent of Turkey’s GDP and 25 percent of total employment, and services sector constitutes 53 percent of Turkey’s GDP and 44 percent of Turkey’s total employment.

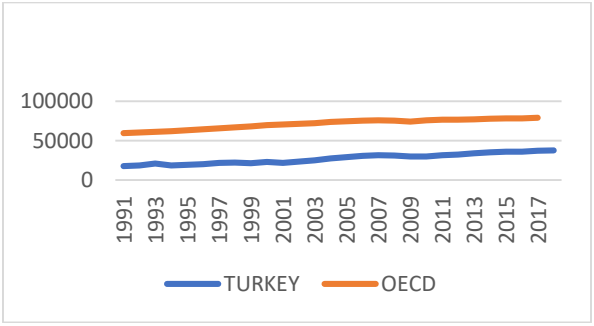
The following graphs show how labor productivity and labor productivity growth accompanies the sectoral changes in Turkish economy from 1990s to todays.

Patterns of Labor Productivity and Labor Productivity Growth

In this part, we present Turkey's labor productivity patterns at the overall and sectoral levels (agriculture, industry, services) respectively, compared with the OECD between 1991 and 2018.

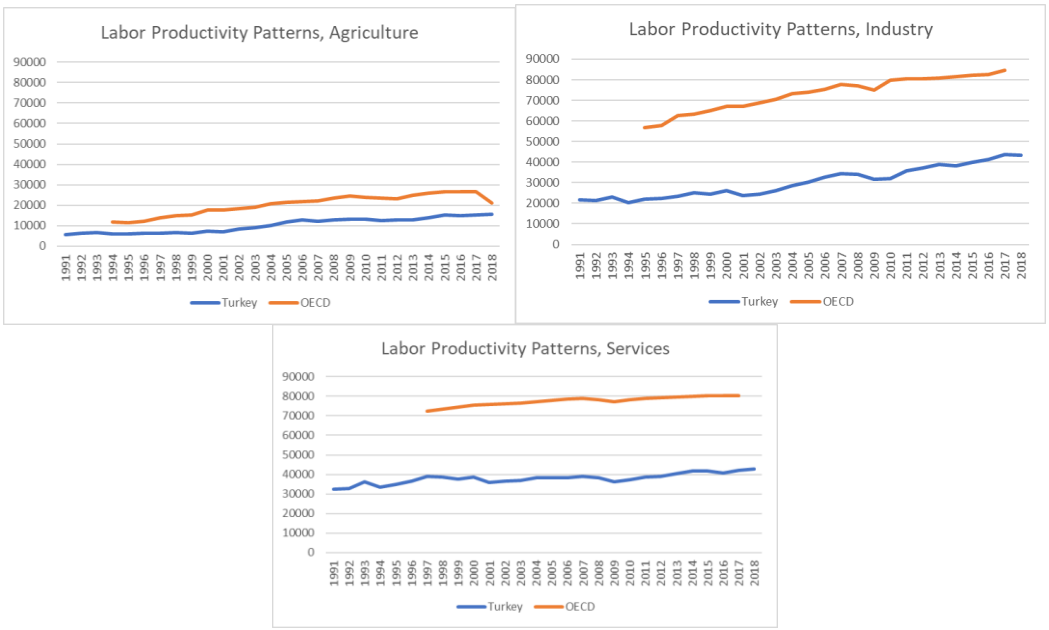
Graph-3 below shows the labor productivity patterns of Turkey and OECD at the economy-wide (overall) level. According to Graph 3, in terms of labor productivity levels, Turkey lags behind the average of OECD countries in the whole period. For example, one worker in OECD, on the average, produced $59,695 (at 2010 PPP dollars) worth of goods in 1991, while a worker in Turkey produced only $17,590 (at 2010 PPP dollars) worth of goods in the same year. Similarly, one worker in OECD, on the average, produced $79,020 (at 2010 PPP dollars) worth of goods in 2017, while a worker in Turkey produced only $37,306 (at 2010 PPP dollars) worth of goods in the same year. ILO (2013) explains the divergence in labor productivity levels between South-Eastern Europe countries, such as Turkey, and advanced countries by the lack of productive employment and high informal employment rates in the former countries. Moreover, the educational status of the workers and different qualities of capital goods in which the workers work or wage level differences may be the other factors behind productivity gaps among the countries. Salvatore (2008) also mentions the adoption speed of new technologies as a factor behind differences in labor productivity levels.

Graph-3 also shows that productivity levels of both Turkey and the OECD have increased, although not very much, over the period. For example, the labor productivity level in Turkey is 2.15 times higher in 2018 compared to 1991. Similarly, the labor productivity level in OECD is 1.32 times higher in 2017 compared to 1991. The graph also reveals a sharp decrease in labor productivity levels in 2009, the crisis year, both for Turkey and OECD. However, after 2009, the levels continued to increase for both countries.



Graph-3: Overall labor productivity patterns, Turkey and OECD, 1991-2018

Graph 4 shows labor productivity at the sectoral level (agriculture, industry and service) for Turkey and the OECD between 1991 and 2018.



Graph-4: Labor productivity patterns, Turkey and OECD, 1991-2018, Agriculture, Industry and Services.

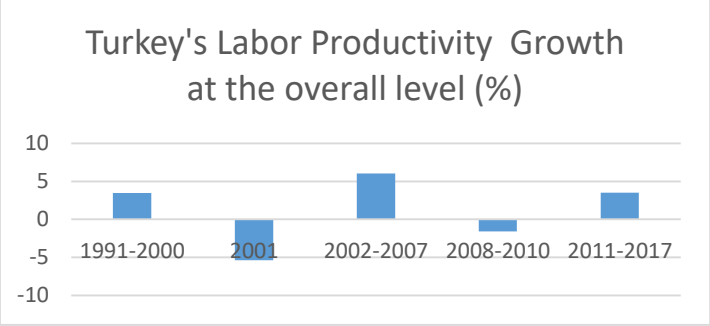
According to Graph 4, labor productivity levels for the OECD is higher in all sectors during the whole period than Turkey. This difference is the highest in the industrial sector and lowest in the agricultural sector. On the other hand, labor productivity levels are the lowest in agriculture and highest in services among all sectors, both for Turkey and the OECD. Also, Graph 4 clearly shows a significant decrease in labor productivity levels of industry and services sectors in 2009 both for Turkey and OECD, most likely due to the global financial crisis in 2008.

To sum up, both Graph-3 and Graph-4 show the huge gap between labor productivity levels of Turkey and the other OECD countries, especially in the industry and services sectors. Differences in the educational backgrounds of the workers, different qualities of capital goods which the workers work, differences in the wage levels, lack of productive employment, high informal employment rates might be some of the reasons for labor productivity differences between countries. (Ekmen-Özçelik and Karacaer-Ulusoy, 2018). Considering the high brain drain rates of Turkey, it can be claimed that ensuring a good economic environment to keep the highly productive workforce in the domestic labor market, and thus preventing the brain drain can help reduce the productivity gap between Turkey and OECD countries. All in all, in line with the ideas from the literature that higher labor productivity could reduce poverty and inequality, it can be claimed that Turkey should have more effort to increase labor productivity with respect to other OECD countries.

Patterns of Labor Productivity Growth

From now on, we focus on Turkey and evaluate the changes in Turkey's labor productivity patterns for the period 1991 and 2018. First, the whole period is divided into sub-periods according to the developments in Turkish economy history.[5] These sub-periods cover the years 1991-2000, 2001, 2002-2007, 2008-2010, 2011-2018. 2001 and 2008-2010 are evaluated as crisis years in Turkish economy. Calculations are made for each year and the results are presented as the average of each sub-period.

Graph-5 presents the changes in Turkey's labor productivity levels during the given sub-periods.

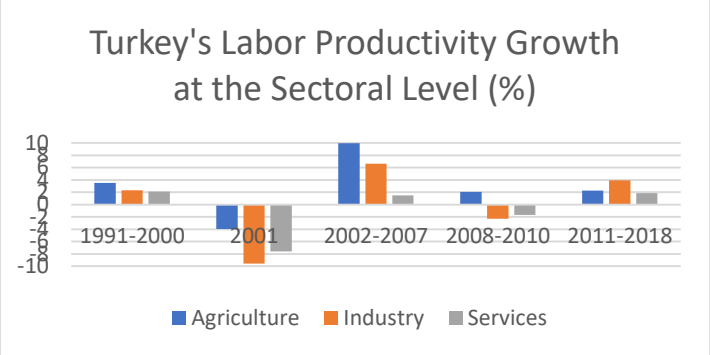


Graph-5: Changes in labor productivity, Turkey, overall level,1991-2018, yearly average, %.

According to Graph-5, Turkey's labor productivity growth is positive in all sub-periods except the crisis times. It is the highest in 2002-2007 period (6 percent), although some part of it comes from recovering from the 2001 crisis. In the first and last sub-periods, labor productivity growth is an average of 3.5 percent annually. The graph also reveals the significant decreases in labor productivity levels in crisis periods, i.e. 2001 and 2008-2009 sub-periods. Turkey's labor productivity decreased by 5.7 percent and 1.7 percent in 2001 and 2008-2010 periods, respectively. Thus, it can be claimed that the Turkish economic crisis of 2001 affected the labor productivity of Turkish workers more than the global crisis of 2008-2009. The graph also reveals the improvement in labor productivity levels in the post-crisis periods.

[5] For the details on developments in Turkish economy history and grounds for the sub-periods, see Şenses (2017)

Graph-6 presents the changes in Turkey's labor productivity at the sectoral level (agriculture, industry, services) for each sub-period



Graph-6: Labor productivity growth, Turkey, sectoral level,1991-2018, yearly average, %.

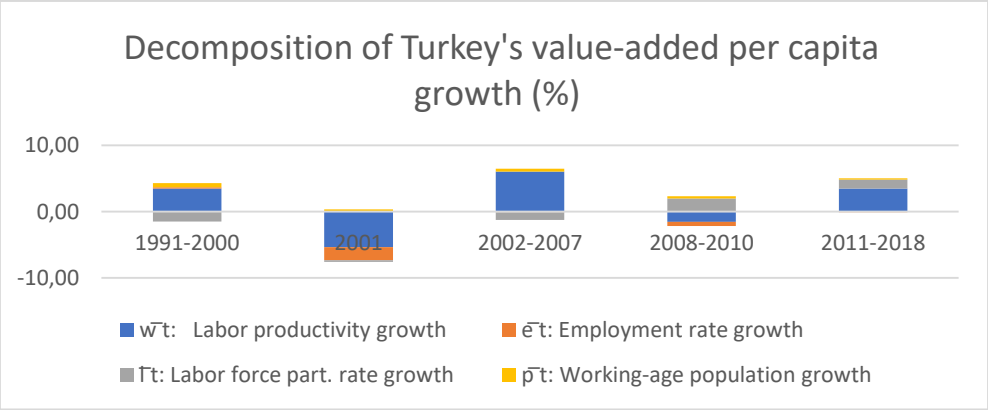
According to Graph-6, labor productivity growth in the agricultural sector has been at the highest rate among other sectors in the first and third sub-periods. As mentioned before, the adoption of new technologies in agricultural production in these sub-periods contributed to an increase in labor productivity in this sector. Labor productivity growth in the industry sector has been positive except for crisis periods. Moreover, in the last sub-period, it has been higher than the agriculture and service sectors. On the other hand, labor productivity levels in the service sector have changed much less than in other sectors.

Graph-6 also reveals that labor productivity levels are significantly affected by the crisis. Moreover, the sector in which labor productivity is most affected during times of crisis is the industrial sector. This result was discouraging because the industrial sector is the driving force of economic growth and employment. However, the negative impact of the crisis on labor productivity in this sector has been quickly overcome and has increased by an average of 3.4 percent annually between 2011 and 2018. On the other hand, in the 2008-2010 crisis period, labor productivity in the agriculture sector remained positive. When two crisis periods are compared, it seems that the 2001 crisis affected the sectors more negatively than the 2008 crisis in terms of labor productivity levels.

4.2. *Decomposition of Value-added per capita Growth*

In this part, Turkey's value-added per capita growth is decomposed into labor productivity growth and other labor market components such as employment, labor force participation, and share of working age. The decomposition is based on the methodology described in equations (1) – (6). Graph-7 shows the results for given sub-periods.

Graph-7 shows that the increase in the value-added per capita varies considerably between sub-periods. The highest growth rate per capita belongs to the period 2002-2007 (5.2%). The growth in the period of 2011-2018 is 4.9% and between 2011 and 2018 it is 2.8%. As expected, value-added per capita growth is negative in both crisis periods. However, the economy was more negatively affected by 2001 domestic crisis compared to 2008-2009 global crisis.



Graph-7: Decomposition of Turkey's value-added per capita growth into its components,1991-2018, %

When the decomposition is considered, a general conclusion that can be drawn from Graph-7 is that labor productivity growth is the main driving force of value-added per capita growth during the whole period. It indicates that policies to increase labor productivity can be used as a primary tool to prevent poverty, reduce inequality and maintain sustainable economic growth. On the other hand, the graph shows that in some sub-periods changes in labor market characteristics negatively.

In the first sub-period (1991-2000), the graph shows a positive contribution of employment and working-age population while the negative contribution of labor force participation rate to the value-added per capita growth. Positive contribution of employment can be explained by the decline in the number of unemployed people in this sub-period. [6] Based on the argument by Aggarwal (2018), negative effect of labor force participation rate together with positive effect of working-age population can be explained as follows: the rise of sectors seeking skilled workers and the rise in wages of skilled workers motivate people to turn to school and get the education to gain skills before starting to work. The declining labor force participation rate can also be explained by the fact that most women were out of the labor market in those years. (Ekmen - Özçelik, 2018). This result points out a relatively weaker labor market conditions in Turkey. The importance of female labor force participation in economic growth is also revealed in Karlılar and Kıral (2019).

In the third sub-period (2002-2007), similar to the first one, labor force participation rate negatively contributed to the value-added per capita growth while the contribution working-age population was positive. Therefore, in this sub-period, most women were still out of the labor market. Also, it is noteworthy that employment rate growth was negative in this sub-period, which is the period with the highest economic growth. A decrease in employment rate accompanying economic growth is referred to as 'jobless' growth and it is one of the main concerns of policymakers. In this sub-period, Also, the decrease in employment and the resulting drop in labor force participation was compensated by a significant increase in labor productivity. As a result, Turkey experienced an annual average growth rate of 5.23 % in value-added per capita in this sub-period.

In the last sub-period, value-added per capita growth (4.95 %) was resulted from increases in labor productivity, decreases in the employment rate, increases in labor force participation rate and increases in working-age population. Even, working-age population is still positive, its contribution to economic growth significantly decreases in this sub-period. It indicates that each working-age person should support more people on his/her income (Gutiérrez et al., 2009). Moreover, the contribution of labor productivity to economic growth is much less in this sub-period compared to the pre-crisis period, i.e. 2002-2007 period. On the other hand, growth of labor force participation rate turns out to be positive, indicating that the labor market is getting

[6] According to Turkish Statistical Institute data, the number of unemployed people decreased from 1,722 thousand in 1991 to 1,422 thousand in 2000. (www.tuik.gov.tr)

stronger. This improvement was most likely due to an increase in women's participation in labor market (Ekmen - Özçelik, 2018).

In 2001 crisis year, the value-added per capita decreased significantly because of a decrease in labor productivity and a decrease in employment rate compared to the previous period. Negative employment rate growth implies fewer people are working and so fewer people are earning. This result indicates the weakness of the labor market, especially during the crisis periods. In crisis periods, decreases in employment rates together with decreases in labor productivity levels turn into permanent unemployment in the future.

In 2008-2010 crisis period, value-added per capita growth is only 0.16 %. This growth has resulted from decreases in labor productivity, decreases in the employment rate, increases in labor force participation rate, and increases in working-age population. However, the decline in labor productivity during this crisis period was much less than the decline in the 2001 crisis, so value-added per capita growth was still positive in 2008-2010 crisis period.

4.3. *Decomposition of Labor Productivity Growth into its Static and Dynamic Components*

As it is clear from the previous part, labor productivity growth is one of the most important determinants of the value-added per capita changes. Therefore, the components of labor productivity growth need to be analyzed in detail. This part decomposes labor productivity growth into its within and between components.

Table-1 shows decomposition of Turkey's labor productivity growth into its within-sector and between sector (structural change) components, as given in Equations (7) - (10). In the table, labor productivity growth and its components are calculated in terms of percentage change (%).

Table 1: Decomposition of Turkey's overall labor productivity growth into its components

	1990-2000	2001	2002-2007	2008-2010	2011-2018
Within-sector growth (%)	**67.9**	**-76.5**	**65.8**	**-134.6**	**53.2**
Between-sectors growth (Structural Change) (%)	**32.1**	**- 23.5**	**34.2**	**34.6**	**46.8**
Static	33.1	-23.8	35.0	33.9	50.0
Dynamic	-1.0	-0.3	-0.8	-0.7	-3.2

Table-1 shows that labor productivity growth in Turkey mainly arises from the within-sector growth of labor productivity during the whole period. For example, in the first sub-period, within-sector productivity growth contributed around 67.9 percent to overall productivity growth. The rest 32.1 percent contribution came from structural change, i.e. labor reallocation between sectors. Table-1 also shows that the contribution of the within-sector productivity effect decreased over time. More specifically, within-sector growth decreased from 67.9 percent in the first sub-period to 65.8 percent in the third sub-period and 53.2 percent in the last sub-period.

According to Table-1, in 2001 crisis, both within-sector and between-sectors growth are negative while in 2008-2010 crisis period, some part of fall within sector growth is compensated by the between sector growth. That's, in 2008-2010 crisis period workers rationally moved from low-productive sectors to high productive sectors.

According to Table-1, the share of structural change in labor productivity growth was lower than within-sector growth in the whole period, but it increased significantly in the last sub-period. It means that the contribution of workers' movement across sectors to overall productivity growth increased significantly after 2011.

Table-1 also reveals the differences between static and dynamic structural changes. According to the table, a significant portion of structural change has resulted from static changes. Moreover, static structural change is positive during the whole period, except in 2001. It implies that in general, workers in Turkey moved from low-productive sectors to high productive sectors, and the positive effects of these movements on overall productivity growth significantly increased in the last sub-period. Therefore, positive and increasing static structural change implies that labor

has moved from low productive sectors, i.e. agriculture to high productive sectors, i.e. industry and services.

In contrast, the contribution of dynamic structural change to the overall productivity growth is both very little and negative throughout the period. It means that workers are moving from the sectors with high productivity growth to the sectors with low-productivity growth. When positive static structural change and negative dynamic structural change are evaluated together, it can be concluded that in Turkey workers moved from low-productive sectors to high productive sectors but these high productive sectors experienced lower productivity growth. That's, new workers moving to the high-productivity sector could not create value-added, at least as much as existing workers. De Vries, Timmer and De Vries (2015) called such situations "static gains but dynamic losses from resource reallocation". They also claim that between-dynamic effect is small for most Asian countries in contrast to most African and Latin American countries. So, our results are in line with findings by De Vries, Timmer and De Vries (2015).

Tables 2-4 below show the decomposition of labor productivity growth into within-, static-between-and dynamic-between-growth components at the sectoral level.

Table-2 shows the contribution of each sector to the overall within-sectors growth. In the table, the sum of within-growth of each sector gives the aggregate within-sector growth, given in Table-1. As mentioned before, within-sector growth results from the change in productivity levels within the sectors. That is, it is assumed that there is no change in the employment shares of the sectors during each sub-period.

Table-2 Turkey's within-sectors growth at the sectoral level

	Within-sectors productivity growth (%)									
	1990-2000		2001		2002-2007		2008-2010		2011-2018	
	LP Change (pp)	Within-growth (%)	LP Change (pp)	Within-growth (%)	LP Change (pp)	Within-growth (%)	LP Change (pp)	Within-growth (%)	LP Change (pp)	Within-growth (%)
Agriculture	262	**19.2**	-979	**-27.6**	890	**15.2**	256	**17.7**	380	**4.4**
Industry	370	**24.0**	-1342	**-25.2**	1823	**32.7**	-811	**-97.6**	1760	**87.3**
Services	451	**24.8**	-751	**-23.6**	547	**18.0**	-660	**-54.8**	869	**-38.5**
OVERALL		**67.9**		**-76.5**		**65.8**		**-134.6**		**53.2**

According to Table-2, overall, within-sector productivity of Turkey was highly skewed in favor of industry sector throughout the period, excluding the crisis periods. For example, within-industry growth was 24 percent in the first sub-period, 32.7 percent in the third sub-period and 87.3 percent in the last sub-period. Aggarwal (2018) attributes the significant contribution of industrial sector to the total labor productivity in developing countries to the high capital accumulation, economies of scale and technological improvement. On the other hand, industry was mostly affected sector in both crisis period compared to other sectors. This result was discouraging because industry sector was saving the economy in crisis times. However, the negative impact of the crisis on labor productivity in this sector has been quickly overcome in the last sub-period.

Table-2 shows that although within-agriculture growth significantly decreased in the last sub-period, it was still positive, except 2001. In the first and third sub-periods, although agricultural employment decreased significantly, agricultural sector contributes to the overall labor productivity positively. As mentioned below, the adoption of new technologies in agricultural sector kept within-agriculture sector productivity growth positive. Moreover, in the 2008-2010 crisis period, increase in within-agriculture productivity compensated a deeper drop in overall labor productivity

Table-2 also shows a decrease in within-services growth in the last sub-period. This decrease has resulted from 2015 and 2016 years. In other years, within-services productivity growth was positive.

Table-3 shows the contribution of each sector to the overall static between-sectors growth. In the table, the sum of static between-growth of each sector gives the aggregate static between-sector growth, given in Table-1. As mentioned before, static between-sector growth results from the change in employment levels across the sectors. That is, it is assumed that there is no change in the labor productivity levels of the sectors during each sub-period.

Table-3 Turkey's static between-sectors growth at the sectoral level

	Static between-sectors productivity growth (Static structural change) (%)									
	1990-2000		2001		2002-2007		2008-2010		2011-2018	
	Emp. Change (pp)	Static between-growth (%)	Emp. Change (pp)	Static between-growth (%)	Emp. Change (pp)	Static between-growth (%)	Emp. Change (pp)	Static between-growth (%)	Emp. Change (pp)	Static between-growth (%)
Agriculture	-1.3	**-7.8**	1.6	**9.8**	-2.4	**-12.9**	0.1	**-14.9**	-0.6	**-26.6**
Industry	0.4	**8.4**	-1.3	**-25.2**	0.7	**9.9**	-0.2	**-53.4**	0.1	**-25.4**
Services	0.9	**32.5**	-0.3	**-8.5**	1.7	**38.1**	0.1	**102.2**	0.5	**101.9**
OVERALL		**33.1**		**-23.9**		**35.0**		**33.9**		**50.0**

Table-3 shows that the overall static between-sector productivity of Turkey was highly skewed in favor of the services sector throughout the period, excluding the crisis periods. According to the table, in both 1990-2000 and 2002-2007 periods, most of the labor moved from agriculture to services and some from agriculture to industry. This movement led to a positive overall structural change, which is referred to as "growth-enhancing". In other words, a decrease in agricultural productivity due to the movement of labor was overcompensated by the other sectors. Therefore, overall structural change was positive in both sub-periods. In the last sub-period, the labor again moved from agriculture to industry and services but different from the previous periods, labor also moved from industry to services. This can be seen in Table-2 as the negative static between-growth in agriculture and industry. However, the movement of labor was "growth-enhancing" at the overall level since the static between growth in the service sector, i.e. the most productive sector, was significantly high in this sub-period. In other words, labor moved from low-productive sectors to high-productive sectors and this movement resulted in a significantly high and positive static structural change in the last sub-period. On the other hand, in crisis periods there was a movement of labor from other sectors, especially industry, to agriculture. This movement resulted in a negative overall structural change which is referred to as "growth-reducing".

Table-4 shows the contribution of each sector to the overall dynamic between-sectors growth. In the table, the sum of dynamic between-growth of each sector gives the aggregate static between-sector growth, given in Table-1. As mentioned before, dynamic between-sector growth results from the change in employment levels across the sectors as well as changes in labor productivity levels.

Table-4 Turkey's dynamic between-sectors labor productivity growth at the sectoral level

	Dynamic between-sectors productivity growth (Static structural change) (%)														
	1990-2000			2001			2002-2007			2008-2010			2011-2018		
	LP Change	Emp. Change	Dynamic growth	LP Change	Emp. Change	Dynamic growth	LP Change	Emp. Change	Dynamic-growth	LP Change	Emp. Change	Dynamic-growth	LP Change	Emp. Change	Dynamic-growth
Agriculture	262.0	-1.3	-0.7	-978.8	1.6	1.2	890.2	-2.4	-1.7	256.0	0.1	-0.2	380.1	-0.6	-0.3
Industry	370.0	0.4	-0.1	-1341.5	-1.3	-1.4	1822.6	0.7	0.4	-811.3	-0.2	0.0	1760.2	0.1	-1.1
Services	451.0	0.9	-0.1	-751.4	-0.3	-0.2	547.4	1.7	0.5	-659.5	0.1	-0.5	868.7	0.5	-1.8
OVERALL			**-1.0**			**-0.3**			**-0.8**			**-0.7**			**-3.2**

According to Table-4, in the first sub-period, labor moved from agriculture to industry and services. However, output growth in these sectors appears to be insufficient to absorb agricultural workers. Then the result was a negative dynamic change in sectors as well as in overall. In the third sub-period, although the dynamic growth rate for industry and services are positive, the rate

of growth could not overcome the negative growth in the agricultural sector. In the last sub-period, the negative contribution of dynamic growth to overall growth was most severe. One of the reasons for this was that workers mostly moved from agriculture to the slower-growing service sector, not to the fastest-growing industry. However, productivity growth in the services sector was low, and agricultural workers were absorbed faster than output growth in the services sector, resulting in a negative dynamic productivity change. Moreover, the negative dynamic between-sectors effect in the overall level suggests that the marginal productivity of additional agricultural workers in industry and services sectors was below that of existing activities.

5. Conclusion

Turkey has been experiencing a significant change in the form of the contraction of the agricultural sector, expansion of the services sector, and the slightly changing industrial sector in terms of the share of value-added in GDP. Similar sectoral changes were also observed in employment shares, such as the decrease in the employment share of the agricultural sector, and the increases in that of the industrial and services sectors.

One of the main research questions of this article is about the contribution of labor productivity growth to Turkey's per-capita value-added growth. According to the findings, labor productivity growth is the main driving force of economic growth during the whole period. This result is in line with the previous literature (Warr, 2006; Su and Heshmati, 2013; Restuccia, 2013; Maia and Menezes, 2014; Korkmaz and Korkmaz, 2017). On the other hand, although the decrease in labor productivity during the 2008-2010 crisis period was much less than that in the 2001 crisis, the reason for the economic contraction in both crisis periods is largely due to the decreases in labor productivity. The results indicate that policies to increase labor productivity can help prevent poverty, reduce inequality and maintain sustainable economic growth. Therefore, it would be better for Turkey to focus on policies aimed at increasing labor productivity. To do this, some measures can be taken at managerial level in firms. For example, using management practices actively, such as adapting collaborative technology, supporting diversity and innovative organizational structures (Mburu, 2020); increasing the quality of the workplace (Samson, Maina, and Joel, 2015; Omari and Haneen, 2017); improving the training activities of workers (Ibrahim, Isa and Shahbudin, 2016); ensuring trust and communications between employers and workers (Hiyassat, Hiyari, and Sweis, 2016). Also, the government can take some measures to increase labor productivity such as increasing the level and quality of education, and ensuring that workers receive sufficient wages that encourage them to work more efficiently. (Ekmen-Özçelik and Karacaer-Ulusoy, 2018). R&D supports to the private sector provided by the government is also likely to yield highly beneficial consequences in terms of enhancing innovativeness and productivity (Özçelik and Taymaz, 2008).

The study also shows that although their effects are very limited compared to labor productivity growth, other labor market characteristics negatively contribute to the economic growth in some sub-periods. The negative contribution of the labor force participation rate in the first (1991-2000) and third sub-periods (2002-2007) can be explained by the fact that most women were out of the Turkish labor market in those years. This result points out a relatively weaker labor market conditions in Turkey. The negative contribution of the employment rate in 2002-2007, which is the period with the highest economic growth, is referred to as 'jobless' growth and it is one of the main concerns of policymakers. Also, in crisis periods, a decrease in employment rate accompanied to a decrease in labor productivity turns into permanent unemployment in the future.

The other main research question of this article is about the contribution of within-sector growth, static between-sectors growth and dynamic between-sectors growth to the overall labor productivity growth. The results of the study show that labor productivity growth in Turkey mainly arises from within-sector growth that refers to producing more with the same amount of labor, and can be achieved by the application of new machines and innovative technologies in a given sector. This result is in line with Yılmaz (2016) and Roncolato and Kucera (2014), who argue that within-sector productivity growth for many countries, including Turkey, is the main determinant of overall labor productivity growth.

Also, static between-sectors growth is significantly positive during the whole period, except in 2001. It implies that workers in Turkey moved from low-productive sectors to high productive sectors. This result is in line with McMillan and Rodrik (2011), who argue that structural change is positive for Turkey and Asian countries, and negative for Latin American and African countries. The results of the study also show that static between-sectors growth rate increases remarkably in the last sub-period. This result is the opposite of Latin America's case, which experienced a rapid decline after 1975, and a negative structural change between 1990-2005 as opposed to the very high positive rate of structural change between 1950-1975 (Pagés, 2010). Turkey's experience can be evaluated as more successful, compared to the Latin American case.

In contrast, the contribution of dynamic structural change to the overall productivity growth is both insignificant and negative throughout the period. Therefore, even though workers in Turkey moved from low-productivity sectors to high-productivity ones, such high productive sectors experienced lower productivity growth. That is to say, new workers moving to the high-productivity sectors could not create value-added as much as the existing workers. This finding reveals that there have been some problems in the absorption of workers from one sector to another. This result is in accordance with De Vries, Timmer and De Vries (2015) who find a very low share of dynamic structural change in most Asian countries.

As emphasized in ILO (2013: 103), both static and dynamic positive structural change can be achieved by directing workers into highly and increasingly productive sectors. Therefore, in case of Turkey, it can be achieved by investing in high-productivity sectors. Investing in such sectors will raise wages and expand the infrastructure and urban facilities that facilitate the movement of employees, thereby making high-productive sectors attractive for workers.

At the sectoral level, the study shows that Turkey's within-sector productivity has been highly skewed towards the industrial sector throughout the period. In other words, similar to the finding by Pieper (2000) for developing countries, and Yılmaz (2016) for developed and developing countries, the industrial sector is the highest contributor to labor productivity growth in Turkey. This result can be attributed to such factors as high capital accumulation, economies of scale, and technological improvement in the industrial sector of Turkey. Moreover, the contribution of industrial sector to the within-sector labor productivity growth increased considerably in the last sub-period. Many studies have shown that trade liberalization leads to stronger competition, especially in the industrial sector, and that low-productivity firms in this sector exit the market, and consequently the productivity in the industrial sector increases (Pavcnik 2002; Paus, Reinhardt and Robinson, 2003; Fernandes ,2007; Eslava et al., 2013). One of the possible implications of this study is that a similar development may have occurred in Turkey's industrial sector in recent years. In order to sustain this positive development, competition should be supported and strengthened. Additionally, as mentioned in Chikabwi, Chidoko and Mudzingiri (2017), trade openness, technology transfer and capital investment are important for enhancing labor productivity growth in the industrial sector.

Another important finding of this study is that static between-sector productivity of Turkey has been highly skewed towards the services sector, suggesting that significant segments of labor moved from agriculture to services. This result is consistent with the findings of Roncolato and Kucera (2014) who emphasize the importance of the services sector (as well as the industrial sector) to achieve overall labor productivity growth in developing countries.

Last but not the least, negative dynamic structural change can be attributed to the fact that labor productivity growth in industry and services have not been sufficiently high. Therefore, agricultural workers were absorbed faster than output growth in the industry and services.

All in all, this study reveals the importance of labor productivity in Turkey's economic growth and development. In addition, it accentuates the crucial role of within-sector productivity in terms of the improvement of overall labor productivity in Turkey. Despite the relatively higher contribution of within-sector growth as compared to between-sectors growth (structural change), the study also reveals the significant increase in between-sectors growth rate in the 2011-2018 period. This development, implying that structural change is positive, is highly promising for

Turkey. On the other hand, the findings also indicate that the positive structural change has resulted only from static change, rather than dynamic change. De Vries, Timmer and De Vries (2015:683) regard such situations as "static gains but dynamic losses from resource reallocation". Therefore, from a short-term viewpoint, Turkey may benefit from positive static structural change, but this situation may not be sustainable in the medium-to-long run, because dynamic structural change will matter more for growth in the future.

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Araştırma Makalesi

Sectoral Patterns of Labor Productivity Growth in Turkey

Türkiye'de İşgücü Verimliliği Artışının Sektörel Kalıpları

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Genişletilmiş Özet

Giriş

Bu çalışma, 1990-2018 yılları arasında Türkiye'nin işgücü verimliliği kalıplarını ve bu kalıpların zaman içindeki değişimlerini değerlendirmekte ve işgücü verimliliği artışının Türkiye'nin ekonomik performansı üzerindeki rolü hakkında yeni kanıtlar sunmaktadır.

İşgücü verimliliği ve işgücü verimliliğindeki değişimler, bir ülkenin ekonomik performansının değerlendirilmesinde önemli kriterlerdir. İşgücü verimliliği çalışan kişi başına üretim değeri olarak tanımlanır. Bu değerdeki artış ise sektör-içi veya sektörler-arası verimlilik artışı ile sağlanabilir. Sektör-içi verimlilik artışı bir sektörde aynı miktarda emekle daha fazla üretim yapılmasını sağlayan yeni makineler veya yeni üretim tekniklerinin alınmasıyla sağlanabilir. Sektörler-arası verimlilik artışı ise, işgücünün farklı verimlilik düzeylerine sahip sektörler arasında yeniden dağıtılmasıyla gerçekleşir. Sektörler-arası verimlilik değişiminin diğer bir adı yapısal değişimdir. Yapısal değişim, işgücünün düşük-verimli sektörlerden yüksek-verimli sektörlere hareketiyle gerçekleşirse, ülkenin genel verimlilik düzeyi ve toplam refahını arttır ki bu da "büyümeyi-destekleyici yapısal değişim" olarak anılır.

Gelişmekte olan ülkeler için, işgücü verimlilik düzeyini arttırmak ve büyümeyi-destekleyici yapısal değişimi gerçekleştirmek oldukça önemlidir, çünkü bu ülkeler için en zorlu konulardan biri, geleneksel düşük verimli ürünlere bağımlılıklarını azaltma ihtiyacıdır. Bu nedenle, geleneksel düşük verimli ürünlere bağımlılığı kırmak ve yeteneklerini nispeten yüksek verimli ürünlere yönlendirmek, gelişmekte olan bir ülke için arzu edilen gelişmelerdir. Türkiye için işgücü verimliliğinin büyümeye katkısı ve yapısal değişimin işgücü verimliliğindeki rolü yeterince vurgulanmamış önemli bir konudur. Bu çalışma, ilgili yazında var olan bu boşluğu doldurmaya katkı yapma amacını taşımaktadır. Çalışma aynı zamanda, işgücü verimliliğini artırmak, kaynakların tahsisini iyileştirmek ve Türkiye'nin ekonomik büyümesini teşvik etmek için politikalar önermektedir.

Yöntem

Bu çalışmada işgücü verimliliği çalışan kişi başına katma değer olarak tanımlanmaktadır. Çalışmada, işgücü verimliliği sabit 2010 ABD doları fiyatlarındaki toplam katma değerin toplam istihdama bölünmesiyle hesaplanmaktadır. Bu değişken tarım, sanayi ve hizmetler gibi bireysel sektörler için de ayrı ayrı ölçülebilir. İşgücü verimliliğindeki değişim ise, birbirini izleyen iki yıl içinde işgücü verimliliğindeki yüzde değişim olarak hesaplanmaktadır. Çalışma 1991-2018 yıllarını kapsamakta olup, Türkiye ekonomisindeki gelişmeler gözönüne alınarak bu dönem alt dönemlere bölünür ve sonuçlar her alt dönemin ortalaması olarak sunulur. Çalışmada kullanılan

veriler Dünya Bankası'nın Dünya Kalkınma Göstergeleri (WDI) veri tabanından alınmıştır. Sonuçlar ülke düzeyinin yanısıra tarım, sanayi ve hizmetler gibi sektörel düzeyde de sunulmaktadır.

Çalışma, Türkiye'nin kişi başına katma değer artışını bileşenlerine ayırmaktadır. Kişi başına katma değeri bileşenlerine ayırma yöntemi, Shapley metodolojisine dayanmaktadır. Çalışmada bu yöntemi ILO (2013) 'te kullanıldığı şekliyle uygulanmaktadır. Bu yönteme göre, kişi başına katma değer artışı şu bileşenlerine ayrılmaktadır: işgücü verimliliğindeki artış, istihdam oranındaki artış,işgücüne katılma oranındaki artış çalışma çağındaki nüfus oranındaki artış. Bu bağlamda, işgücü verimliliği brüt katma değerin istihdam edilen kişi sayısına oranı, istihdam oranı istihdam edilenlerin çalışan ve işsizlerin toplamına oranı, işgücüne katılma oranı çalışan ve işsiz kişilerin toplam nüfusa oranı, çalışma çağındaki nüfus oranı ise çalışma çağındaki nüfusun toplam nüfusa oranı olarak hesaplanmaktadır.

Çalışma ayrıca işgücü verimliliği artışını sektör-içi verimlilik artışı ve yapısal değişim bileşenlerine ayırmaktadır. Yapısal değişimi de statik ve dinamik değişimler olarak ayrı ayrı ele almaktadır. Bu ayrışmalar, McMillan ve Rodrik'in (2011) metodolojisinin bir versiyonu olan De Vries, Timmer ve De Vries (2015) tarafından kullanılan yönteme göre yapılmaktadır.

Bu bağlamda sektör-içi verimlilik artışı her sektördeki verimlilik artışının ağırlıklı toplamından oluşur. Statik yapısal değişim ise sektörler arasındaki istihdam paylarındaki değişim ile bir önceki yılın verimlilik seviyelerinin çarpılması sonucu elde edilir. Statik bir bileşendir çünkü sektörler arasında verimliliği değişimden ziyade seviye olarak değerlendirmektedir. Bu bileşen, sektörler arasındaki emek hareketinin toplam verimlilik artışı üzerindeki etkisini göstermektedir. Statik yapısal değişim, farklı verimlilik düzeylerine sahip sektörler arasında işçilerin yeniden tahsis edilmesiyle gerçekleştirilir. Bu değişiklik işçilerin düşük verimli sektörlerden yüksek verimli sektörlere (örneğin tarımdan sanayiye veya hizmetlere) veya yüksek verimli sektörlerden düşük verimli sektörlere (örneğin endüstriden hizmetlere) geçişine bağlıdır. Birincisi "pozitif" veya "büyümeyi artıran" yapısal değişim olarak kabul edilirken, ikincisi "negatif" veya "büyümeyi azaltan" yapısal değişim olarak kabul edilir. Büyümeyi artıran yapısal değişim, emeğin sektörler arası hareketinin verimlilik seviyeleri ile pozitif korelasyon gösterdiğini göstermektedir. Diğer bir deyişle, pozitif yapısal değişim, ülkenin işgücünü düşük verimli sektörlerden ortalamanın üzerinde verimlilik düzeylerine sahip sektörlere taşıyabilme konusunda başarısını göstermektedir. Büyümeyi azaltan yapısal değişim için bunun tersi geçerlidir.

Çalışmada yapısal değişim ayrıca dinamik ölçümler aracılığı ile de analiz edilmiştir. Dinamik yapısal değişiklik istihdam payları ile sektörel verimlilik seviyelerinde içinde bulunulan yıl ve bir önceki yıl arasındaki değişimlerin birleşik etkisinden kaynaklanmaktadır. Sektörler arasında verimlilik düzeylerindeki değişiklikleri dikkate aldığı için dinamik bir ölçüm olarak kabul edilir. Dinamik yapısal değişimin pozitif değer alması, çalışanların verimliliklerinin arttığı sektörlere taşındığını, negatif değer alması ise çalışanların verimliliklerinin azaldığı sektörlere geçtiğini göstermektedir. Diğer bir deyişle, pozitif dinamik yapısal değişim istihdam paylarının arttığı sektörlerde verimliliğin arttığını göstermektedir. Aksine, negatif dinamik yapısal değişim istihdam paylarının arttığı sektörlerde verimliliğin azaldığını göstermektedir.

Bu çalışmada kullanılan veriler Dünya Bankası'nın Dünya Kalkınma Göstergeleri (WDI) veri tabanından alınmıştır. Dönem, 1991 ile 2018 yılları arasındaki yılları kapsamaktadır. Ancak, bazı değişkenlere ilişkin veriler sadece 2017 yılına kadar mevcuttur. Sonuçlar tarım, sanayi ve hizmetler gibi sektörel seviyelerin yanı sıra genel düzeyde sunulmaktadır.

Bulgular

Çalışmanın bulguları öncelikle işgücü verimliliği açısından, Türkiye'nin tüm dönem boyunca OECD ülkeleri ortalamasının gerisinde kaldığını söylemektedir. Bulgular, ayrıca Türkiye'nin gerekse verimlilik düzeylerinin dönem boyunca çok olmasa da arttığını göstermektedir. Sektörel açıdan değerlendirildiğinde ise işgücü verimliliği seviyeleri tarım sektöründe sanayi ve servis sektörlerine kıyasla en düşük düzeydedir. Sanayi sektöründe dönem boyunca artan bir verimlilik seviyesi gözlenirken servis sektöründe durağan bir eğilim gözlenmektedir. Sanayi sektörü en fazla

istihdam yaratan sektör olması sebebiyle, bu sektördeki nispeten yüksek verimlilik seviyeleri umut vericidir. Öte yandan, hizmet sektöründeki işgücü verimlilik düzeyleri diğer sektörlere göre daha durgundur. Ancak, kriz dönemlerinde tüm sektörlerde işgücü verimliliği düzeylerinde düşüşler söz konusudur. Ancak bu düşüşler en fazla sanayi sektöründe gözlenmektedir. Ancak, bu olumsuz etki hızla aşılmış son 10 yılda sanayi sektörünün işgücü verimliliğinde önemli artış gözlenmiştir.

Çalışmada, katma değer artışının bileşenlerine ayrılması sonucunda, verimlilik artışının büyümenin itici gücü olduğu ortaya çıkmaktadır. Ayrıca, bazı dönemlerde işsizliğin arttığı ve buna bağlı olarak işgücüne katılımdaki azalmanın işgücü verimliliğindeki önemli artışlar ile telafi edildiği ve büyümenin sağlandığı görülmektedir. Diğer bileşenlerden biri olan işgücüne katılım oranının büyümeye etkisi ise 2008 yılına kadar negatif olup sonrasında positif değere dönüşmektedir. Bu dönüşüm büyük olasılıkla kadınların işgücü piyasasına katılımındaki artıştan kaynaklanmaktadır.

İşgücü verimliliğindeki artışın da bileşenlerine ayrıldığı çalışmanın sonuçları Türkiye'de işgücü verimliliğindeki artışın, yapısal değişimden ziyade sektör-içi verimlilik artışından kaynaklandığını göstermektedir. Öte yandan, yapısal değişimin payı, son alt dönemde önemli ölçüde artmıştır. Dolayısıyla, işçilerin sektörler arasında yeniden tahsisinin, özellikle son yıllarda Türkiye'de işgücü verimliliği artışına daha fazla katkıda bulunduğu söylenebilir. Ayrıca, yapısal değişikliğin önemli bir kısmı statik değişikliklerden kaynaklandığı yani Türkiye'deki işçilerin, kriz dönemleri hariç, tüm dönem boyunca tarım gibi düşük verimli sektörlerden sanayi ve servisler gibi yüksek verimli sektörlere geçtiklerini göstermektedir.Bu, Türkiye için arzu edilen bir durumdur, çünkü işçileri ekonominin daha gelişmiş sektörlerinde daha yüksek verimlilik düzeylerinden yararlanmaya ve refahlarını artırmaya yönlendirmektedir.

Diğer yandan, dinamik yapısal değişim katsayısı tüm alt dönemlerde negatiftir. Bu durum Türkiye'deki işçilerin verimliliğin azalmakta olduğu sektörlere doğru ilerlediğini göstermektedir. Diğer bir deyişle, istihdam paylarının arttığı sektörlerde işgücü verimliliği azalmaktadır. Statik ve dinamik yapısal değişim birlikte incelendiğinde işçilerin, verimlilik seviyelerinin nispeten yüksek olduğu ancak zaman içinde azaldığı sektörlere taşındığı sonucuna varılabilir.

Tartışma ve Sonuç

Çalışmanın sonuçları, işgücü verimliliği artışının Türkiye'nin ekonomik büyümesinin temel itici gücü olduğunu ortaya çıkarmaktadır. Dolayısıyla Türkiye'nin işgücü verimliliğini artırmaya yönelik politikalara odaklanması iyi olacaktır. Bunun için firmalarda yönetim düzeyinde bazı önlemler alınabilir. Örneğin, işbirliğine dayalı teknolojiyi uyarlama, yenilikçi organizasyon yapılarını destekleme, işyerinin kalitesinin artırılması, işçilerin eğitim düzeylerinin arttırılması, işverenler ve işçiler arasında güven ve iletişim sağlanması gibi. Ayrıca hükümet, işçilerin daha verimli çalışmalarını teşvik edecek yeterli ücret almalarını sağlamak gibi bazı önlemler alabilir. Devlet tarafından özel sektöre sağlanan Ar-Ge desteklerinin de yenilikçiliği ve üretkenliği artırmak açısından oldukça faydalı sonuçlar doğurması muhtemeldir. Ayrıca, Türkiye'de verimliliği yüksek sektörlere yatırım yapılması ve bu sektörlerin işgücü için cazip hale getirilmesi beklenmektedir.