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Technology, Unemployment and Human Psychology: Journey to Strength from Crisis

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ABSTRACT: In today's world, the rapid advancement of technology causes radical changes in the business world and economy, causing significant transformations in the labor market. This article aims to discuss the advancement of technology and the effects of this advancement on unemployment from the perspective of human psychology. First of all, basic concepts and connections will be emphasized in order to understand the unemployment problem caused by the changes created by technology in the business world. It will be discussed how technology increases automation and how advanced technologies such as artificial intelligence affect labor demand. The social and economic consequences of unemployment crises will be examined, focusing on the direct effects of these changes on unemployment rates.

The article will also discuss in detail the psychological experiences of individuals experiencing unemployment and the emotional difficulties they face in this process. The effects of unemployment on individuals will be examined in the context of factors such as self-esteem, stress and hopelessness, and how psychological resilience can be protected or strengthened will be emphasized. In addition, the focus will be on how people can develop coping mechanisms in times of crisis and how they can learn from these processes, and how individuals can achieve their journey of empowerment from crisis. Issues such as resilience, adaptation and retraining will be discussed as exit strategies from crises, and methods that will facilitate individuals' re-entry into the workforce will be discussed.

As a result, this article aims to be an important resource for understanding the effects of technology on unemployment and discovering how individuals can emerge stronger from this difficult process. It aims to guide researchers, policy makers and social workers on how human psychology can be supported and how restructuring processes can be managed while dealing with unemployment crises.

KEYWORDS: Technology, unemployment, human psychology, crisis, empowerment, labor market, automation, artificial intelligence, digital transformation, resilience, psychological resilience, adaptation, retraining, social and economic consequences, re-entry into the workforce.

INTRODUCTION

In today's world, the rapid advancement of technology leads to profound changes in the business world and economy. These changes have the potential to alter traditional business models and transform some lines of business, while creating new demands in the labor market. The advancement of technology, the increase in automation and the spread of advanced technologies such as artificial intelligence radically affect the structure of the workforce and, accordingly, cause fluctuations in unemployment rates. Unemployment can have not only economic but also profound psychological effects on individuals. This process can be a source of great stress for individuals who have to cope with a series of challenges that come with job loss, such as financial uncertainty, decreased self-esteem, social isolation and concerns about the future. However, periods of unemployment can also be an opportunity for individuals to develop personally and professionally. In this process, resilience and adaptation skills can be developed, new skills can be learned, and career orientations can be reshaped. This article aims to examine in depth the effects of technology on business and unemployment, especially from the perspective of human psychology. First, we will focus on how technology has changed the labor market and the direct effects of this change on unemployment rates. Then, it will focus on the psychological experiences of individuals experiencing unemployment and how they can come out of this process stronger. Finally, it will be discussed how people can develop coping strategies in times of crisis and how they can learn from these processes. The aim of this article is to understand the complex effects of technology on unemployment and human psychology and to discover ways that individuals can emerge stronger from this process. Ultimately, this study aims to be a valuable resource for social workers, policy makers and crisis managers, as it can contribute to the development of effective strategies for supporting and restructuring individuals during periods of unemployment.

AIM

Technology, Unemployment and Human Psychology: Journey to Strength from Crisis

The aim of this article is to examine the effects of technological advances and unemployment crises on human psychology and to investigate how these effects can contribute to individuals' personal development and empowerment processes. The impact of technology on workforce dynamics is increasing in our rapidly changing world, and this has profound effects on people's careers, business lives and overall quality of life. This article is designed to understand the short- and long-term effects of a negative experience such as unemployment on human psychology and how this process can support people's transformation into a journey of discovery of their inner strengths and empowerment. It also aims to examine what role technology plays in this process and how the digital age can contribute to people's reintegration into the workforce and psychological healing processes. In conclusion, this article aims to provide both a theoretical and practical perspective on how individuals and societies can be strengthened in times of crisis.

METHOD

In this article, the literature review method is used to understand the relationship between technology, unemployment and human psychology. Literature review involves a systematic examination of scientific studies found in existing academic resources. The following steps were followed:

Data Sources and Search Strategy: First, appropriate keywords were determined for literature review using academic databases and sources such as Web of Science, Google Scholar, and PubMed. Keywords included terms such as "technology", "unemployment", "psychology", "crisis", "resilience".

Selection Criteria: Secondly, certain selection criteria were applied while conducting the literature review. These criteria are based on factors such as publication date, topic relevance, reliability of methods and findings. It was preferred that relevant studies were conducted only within the last decade and published in journals with a high impact factor.

Data Analysis and Synthesis: Thirdly, the identified literature sources were examined in detail and important findings and themes were identified. The focus is on main issues such as the relationship between technology and unemployment, the effects of unemployment crises on human psychology and empowerment processes during crisis periods.

Drawing Conclusions: Finally, based on the results of the literature review, these findings are discussed in the discussion section of the article and theoretical frameworks are proposed on the potential effects of technology on human psychology in unemployment crises. At this stage, how the results of the literature review contribute to the general purpose of the article and suggestions for future research are made.

This method allows the article to systematically examine the complex relationships between technology, unemployment and human psychology. The literature review method provides an in-depth understanding of the subject by synthesizing existing knowledge and forms the scientific basis of the article.

RESULTS

Although it is possible to trace the history of technology back to ancient times, the period that began under the dominance of the Industrial Revolution can be considered an important starting point for the advancement of production technologies. Previously, it was thought that technology minimally affected societies and did not change production relations much. However, starting from the late 18th century, the great transformation that started with the use of steam technology led to radical changes in the field of production and social life (Aksoy, 2017, p. 36). In this process, called the Industrial Revolution or Industry 1.0, large-scale production, unlike home and workshop production, became possible by gathering machines in factories and economic growth gained momentum. This period represented a sharp departure from previous forms of production in terms of the use of technology and the organization of production.

Other factors that determine production are, in addition to technology, division of labor, production organization and how technological tools are used. As emphasized by Dickson (1992), technology includes not only the tools and machines used, but also the relationships that arise with the use of these tools. For example, the "scientific management" approach known as Taylorism relies on detailed analysis to decompose the production process into its operations and aims to increase productivity.

Although the pioneering practices of Taylorism began in manufacturing production, it emerged in the early 20th century when Taylor focused on productivity growth. One of the basic principles of Taylorism is the despecialization and simplification of the labor process, thus fragmenting the production process. The second principle is that the thinking process is withdrawn from production, that is, planning is done at the central level and thus planning and implementation are separated. The third principle complements the second principle and means that every step the worker will take is planned by the management and given to the worker in the form of instructions. Taylor (2011, p. 40) argued that workers had previously made plans based on their personal experiences, but the new system required the worker to make such decisions according to scientific rules. According to him, it is not possible for the worker to develop the scientific aspects of production and the worker will only carry out the instructions given to him and will not be interested in other processes. According to Taylor, since humans are inherently lazy, leaving any decisions to workers limits and hinders management.

Fordism is a production organization developed by Henry Ford in the early 20th century and first implemented at the Ford Automobile Factory. This approach, which is similar to but different from Taylorism, aimed to make the production process more mechanized by deskilling workers. In Fordist production, jobs were divided into small parts, sequenced on the assembly line, and movement of workers during work was minimized. Instead, the production object moved on machines and workstations arranged according to processing requirements (Ansal, 1996a, p. 10).

The production process is systematically divided into sub-parts under detailed planning and the job description of each worker is determined. This strict division of labor and scheduling took into account every stage of the process in order to maximize efficiency (Çakmak, 2004). The use of new machines and this new organization of production enabled mass production and greatly increased

production. This sliding band system-based production organization has led to a new industrial revolution called Industry 2.0. However, the oil crisis that started in the 1970s and the subsequent economic problems led to the crisis of the Fordist production organization. During this period, profit rates decreased, economic growth slowed down, and this strengthened the idea that the system should change. In general, the crisis of the Fordist organization of production is explained as a decline in productivity, which led to profound effects in economic, political and social dimensions.

Fundamental problems such as decreased productivity and loss of time in production have led to the development of a new production model called Post-Fordist to replace the Fordist production organization (Harvey, 1999; Amin, 2003; Kumar, 2004). This new model focuses on flexibility and changeability, rather than a rigid organization based on standard production, so that production can respond quickly to changes in the market and allow input differentiation. In this period called Industry 3.0, the combination of information technologies and microelectronic technologies enabled the inclusion of programmable machines in production, the use of industrial robots and the organization of production in a flexible structure (Yentürk, 1993). Flexibility does not only mean separating production processes into parts and equipping the workforce with versatile flexibility, but also leads to the change of all structures in the production process (Belek, 1997).

Various practices can be seen in Postfordist production organization. One of these is flexible specialization, introduced by Piore and Sabel, in which small-scale production of various products is provided by skilled workers using general-purpose machines (Piore and Sabel, 1984). Kumar (2004, p. 61) emphasizes that flexible technology can quickly transform new ideas into new products and production is shaped according to customer demands in constant flow. Another flexible production organization is the lean production model. In this model, while production is made flexible in large-scale enterprises, the departments removed from the central production are transferred to small enterprises (Womack and Jones, 1996).

In recent years, it has been claimed that Industry 4.0, which is considered a new industrial revolution, has begun with the spread of the internet and the advancement of robotic technologies. During this period, a decrease in human labor in production processes and an increase in automation are observed. The term Industry 4.0 was first introduced in the USA in 2006 and then at the Hannover Fair in Germany in 2011, pointing to a new paradigm in production (Alçın, 2016). From a technological perspective, debates continue about whether Industry 4.0 is a rupture or an evolutionary development like other technological developments. This concept is used to define the "smart" production period, where objects can communicate with each other via the internet as a result of advances in fields such as artificial intelligence, three-dimensional printers, robotic systems, and nanotechnology (Aksoy, 2017).

Industry 4.0 includes many automation systems, data exchange and production technologies. With the use of chips and sensors in various areas from infrastructure to smart factories, objects gain the ability to predict jobs and operations according to changing conditions. Features such as the ability to produce in factories where people do not work and the ability of products and production machines to communicate via radio frequencies are some of the innovations brought by Industry 4.0.

A. Unemployment Phenomenon from Psycho-Social Perspective

1. Conceptual Origins of Unemployment

XVIII. With the capitalist industrial revolution that started at the end of the century, a period began in which workers faced the problem of unemployment. This situation is one of the most important economic and social problems faced by Turkey and other countries today (ANDAÇ, 1999:22; KUTAL, 1992:66). The phenomenon of unemployment is an extremely important issue for societies, and when its historical process is examined, it emerges as a problem that affects all dimensions of life. Scientific studies have been published in the unemployment literature, including the reasons for this phenomenon, its individual and social consequences, and the precautions to be taken.

2. Concept of Unemployment

It is possible for a person to live a healthy and happy life by meeting his basic needs. Meeting the needs can usually be achieved through human work. In other words, in order for a person to be happy and peaceful, he must have a job where he can work happily in line with his abilities and meet his needs in return for this work (KOCACIK, 2000:51). Work is one of the most important basic areas of life for humans. Economic and social life is unthinkable without work. While work determines the employee's lifestyle and social position, on the other hand, it enables him and his dependents to survive and develop (TINAR, 1996:3).

For this reason, today the right to work is considered among the most important social rights of individuals and is also considered an indicator of a person's value (FİŞEK, 1995: 171). It is a responsibility of societies to ensure that people have the right to work in jobs that suit their abilities (GÜNDOOAN, 1999:64). Working a job is not just for the purpose of earning income. Working improves one's self-confidence and sense of respect, and makes the individual feel the pride of creating value (ATAMAN, 2000: 1).

In today's developed societies, work contributes not only to material production but also to social and spiritual production (TOKSÖZ, 1999:55). Unemployment is defined from various perspectives. In terms of labor demand and supply, unemployment is the situation in which a society cannot meet the labor demand (ANDAÇ, 1999:67). According to the approach based on unemployment statistics, unemployment refers to the situation of people who are looking for a job and cannot find a job (LORDOOLU / TÖRÜNER, 1995:169). The situation in which an individual searches for a job and cannot find one is defined on the basis of his/her willingness to work (SAVAŞIR, 1999: 169). In terms of production, unemployment is the situation where the society cannot fully use its current production capacity (KOCACIK, 2000:44). Although there are some differences between unemployment definitions, the common point is that people looking for a job at the current wage level cannot find a job in line with their wishes (LORDOOLU / TÖRÜNER, 1995: 179).

3. The Concept of Unemployment

Definitions of unemployment have been discussed from various perspectives. In one study, unemployment was defined as a person who has the desire and ability to work but cannot find a job at the current wage level and working conditions (SAVAŞIR, 1999:

169). In another study, unemployment is defined as individuals who are able to work and want to work, but cannot find a job at valid wages and working conditions (GEDİZ, 2000: 163). In another definition, people who have the desire and ability to work but cannot find a job due to socio-economic reasons are described as unemployed (ANDAÇ, 1999: 23).

4. Types and Reasons of the Concept of Unemployment

Unemployment shows different characteristics depending on the economic structure and development level of each country. In many studies, types of unemployment have been discussed with various classifications. For example, in the classification made by Savaşir (1999), unemployment is divided into two basic categories: open and hidden unemployment. In another study (Zaim, 1990: 157), unemployment was divided into three main categories: open unemployment, hidden unemployment and permanent stagnation. Under open unemployment, there are subcategories such as cyclical unemployment, seasonal unemployment, technological unemployment, structural unemployment and temporary unemployment.

5. Numerical Dimension of Unemployment in Turkey

An important feature that makes the unemployment problem in Turkey different from other countries is that it is not just open unemployment. In addition to open unemployment, there are also problems such as underemployment and working with low income in Turkey (Ataman, 2000:97). The problem of open unemployment is serious in Turkey, and according to the 2023 Household Labor Force Survey data of the State Institute of Statistics, the unemployment rate is 9.4% and the number of unemployed is 3,264,000. However, it cannot be said that these figures fully reflect the true size of unemployment, because these data are sample-based estimates and do not cover all sectors across the country. In order to determine the real extent of unemployment, unemployment insurance coverage needs to be expanded and more comprehensive data collection methods need to be used.

6. Effects of Unemployment from a Business Perspective

The profound effects of unemployment on human life can affect not only individuals who cannot find a job or lose their job, but also working workers. The perceived danger of unemployment among employees may lead to changes in attitudes and behaviors. Especially in times of mass unemployment experiences and economic crises, the fear of being unemployed can increase performance pressure and competition among workers. In this case, solidarity between colleagues may decrease and even the treatment of health problems may be postponed (Tinar, 1996:112). It may be inevitable that the productivity of individuals who cannot meet their basic needs during the unemployment process will decrease. Kocacık (2000) states that at this point, the worker whose health deteriorates cannot provide the expected productivity if he finds a job (Kocacık, 2000:76). The contribution of a worker whose health is affected to the business where he is employed may not be at the desired level. Additionally, costs such as health expenses and production losses may arise for businesses. Therefore, unemployment is not just a problem of workers; It is a phenomenon that closely concerns businesses. Unemployment can also affect the performance of businesses, labor market dynamics and the level of social solidarity. Therefore, it should be addressed not only as an economic problem for businesses, but also as a social and humanitarian problem.

7. Psycho-Social Effects of Unemployment

The phenomenon of unemployment has been handled and examined from different economic and social perspectives in the historical process. During the periods of neo-classical economic understanding, unemployment was generally seen as a situation based on individuals' preferences. During this period, individual preferences, expectations or abilities were shown as the main reason for job seekers not finding a job and unemployment was generally considered as a voluntary choice. However, there was a radical change in the understanding of unemployment with the work of the 1929 World Economic Depression and especially John Maynard Keynes in 1936. Keynes argued that the main reason for unemployment was a total lack of demand and attributed it to macroeconomic factors. His theory emphasized that the state should take an active role in the solution of economic stagnation and unemployment problems and advocated the intervention in the markets with economic policies (Ceylan-Ataman, 61). After this period, unemployment has started to be considered not only as an individual problem, but also as a social and economic phenomenon. The psychological effects of unemployment on the individual have also started to be investigated in detail in this process. Especially in 1931 and 1932, the research conducted in the town of Marnthal near Vienna is one of the first major studies in unemployment. A group of physicians and social scientists under the direction of Lazarsfeld examined the psychological effects of unemployment on individuals and has revealed important findings in this field. This historical process has prepared the ground for understanding and investigating the social, psychological and social dimensions as well as the economic dimension of unemployment. Unemployment has enabled in -depth studies on how individuals affect their lives and how they change their role in their families and society. In this context, the phenomenon of unemployment is considered and examined not only as an economic problem, but as a complex phenomenon that affects all areas of human life.

Research on the effects of unemployment on human health and social consequences offer important clues to understand the individual and social dimensions of this phenomenon. Especially during the 1930s, the unemployment periods during the world economic crisis revealed the deep effects of unemployment on people. In Germany at that time. The study under the leadership of Julius Moses examined the effects of unemployment on public health. This study has shown that unemployment leads to various consequences such as somatic health problems, psychic problems and social costs. The main psychic consequences of unemployment include stress, depression, decrease in self-esteem and loss of social role (Tinar, 1996: 105-107). The increases in suicide rates seen in the United States during the World Economic Depression were also closely related to unemployment. During the economic depression between 1930-1932, an increase in unemployment was observed with a significant increase in suicide rates. This has been accepted as an important finding showing that unemployment increases people's despair and suicide tendency. Such studies reveal that unemployment is not only an economic phenomenon, but also creates deep and large effects on individuals'

health, psychology and social relations. Understanding these various dimensions of unemployment ensures that the policies and measures to be taken in the fight against unemployment are more effective and inclusive.

8. Psychological and Social Effects of Unemployment on an Individual's Life

Unemployment is a complex phenomenon that has profound effects on individuals' financial and psychological health. Individuals who lose their jobs are deprived of their wages and other financial rights, but they have to continue their previous consumption habits. Experiencing financial difficulties becomes inevitable during the unemployment process, and these difficulties become deeper as the unemployment period extends (Warrijackson, 1984: 78). In a study conducted in Pittsburgh and Pennsylvania, it was found that unemployed individuals facing financial difficulties experienced more psychological distress and showed depressive symptoms (Leana/Feldman, 1990: 1170). Unemployment is not limited to just financial losses; It also weakens individuals' social positions, power and economic independence (Ross/Mirowsky, 1995: 239). Ensuring employment helps individuals maintain their self-esteem by supporting their social identity and personality development (Tinar, 1996: 109). In a study conducted in South Australia, it was determined that there was a negative relationship between the duration of unemployment and individuals' self-esteem (Rowley/Feather, 1987: 328). Additionally, in another study conducted in Australia, it was observed that self-esteem decreased and depressive effects and negative mood increased as the duration of unemployment increased (Winefield/Riggemann, 1989: 330). These findings demonstrate the psychological effects of the unemployment experience on individuals and how these effects can deepen over time. Managing the unemployment process and supporting unemployed individuals is an important issue at both individual and social levels, and policy makers and society need to be sensitive in this process.

The shock, uncertainty and emotional difficulties experienced by individuals during the unemployment process can have profound effects on their psychological and social lives. Individuals who lose their jobs often experience shock and uncertainty about their future. Emotions such as sadness, fear and even shame may be felt intensely during this period (Swinburne, 1981: 47). A study comparing the self-esteem levels of employed and unemployed individuals revealed that unemployed individuals have lower self-esteem (Tiggemann/Winefield, 1984: 39). During the unemployment process, individuals' family relationships may also change significantly. While spouses can be supportive and understanding, there may be anger and arguments, especially towards the unemployed man. It has been stated that wives may be anxious and sad and may experience shame and loss of status due to their husbands' unemployment (Swinburne, 1981: 50). Significant changes are also observed in the emotional states of individuals during the unemployment process. It has been found that unemployed individuals feel more boredom, loneliness and anger towards society than those who are employed (Tiggemann/Winefield, 1984: 39). A study conducted in England stated that as the duration of unemployment increases, there are serious deteriorations in general, psychological and physical health. It has been determined that these health problems become evident after the first six months of the unemployment process (Warrijackson, 1984: 78). These findings reveal the deep and far-reaching effects of the unemployment process on individuals. It shows that in the fight against unemployment, not only economic support but also psychological and social support is important.

The effects of unemployment on health are discussed from a broad perspective. In particular, it has been determined that there is a high degree of relationship between general health and psychological health. In a study, it was stated that there was a correlation of 0.87 between general health and psychological health, and a correlation of 0.68 between general health and physical health (ULAH, 1990: 325). A study conducted in Australia found that there was a negative relationship between income and general health complaints during unemployment. In other words, it has been observed that the general health status of individuals who lose income during the unemployment process is also negatively affected (ULAH, 1990: 325). Studies on depression levels have found that unemployed individuals have higher depression levels than employees (Tiggemann/Winefield, 1984: 39). In the international literature, it has been stated that unemployed women experience more despair and have higher levels of depression than unemployed men (Leana/Feldman, 1990: 1161; Tiggemann/Winefield, 1984: 38-39). There is no specific research on whether the depression levels of individuals during unemployment in Turkey differ according to gender. However, considering the influence of traditional family structures and gender roles in Turkish society in general, it is assumed that unemployed men may show more symptoms of depression than unemployed women. Because in Turkish society, men's social and economic roles are perceived as more dominant than women. More studies are needed to understand the effects of this situation on psychological health during unemployment.

In this text, the social and economic dimensions of the unemployment process are discussed. It is emphasized that women's roles in economic and social life are different from men, and how traditional gender roles affect the unemployment process is discussed. It is stated that women generally assume the classical roles within the family and have more limited economic opportunities. It is stated that this situation increases the pressure and effects on women during the unemployment process. The effects of marital status on unemployment are also discussed. It is emphasized that married individuals have more responsibilities in case of unemployment and this may affect their depression levels. It is stated that married individuals may experience more stress under the pressure of supporting their families during unemployment. The role of education level in the unemployment process is also an important topic of discussion. It is suggested that highly educated individuals generally have a higher chance of finding a job, therefore they may be more psychologically resilient during the unemployment process. It is also emphasized that low-educated individuals experience more pain and sadness during the unemployment process. The HI hypothesis (H1 hypothesis) in this text predicts that individuals with higher education levels will have less psychological effects during the unemployment process. In other words, it is hypothesized that as the level of education increases, the negative effects of the unemployment process on the individual will decrease. In conclusion, this text discusses how the unemployment process is affected by different demographic and social factors and how these

effects differ. Factors such as male-female roles, marital status and education level play an important role in determining the effects of unemployment experience on individuals.

H1 hypothesis predicts that the psychological states of individuals experiencing financial difficulties during the unemployment period will be more negative. In other words, it can be formulated as a hypothesis that the psychological complaints of individuals who lose income during the unemployment process will increase. This hypothesis aims to examine the relationship between financial difficulties and psychological complaints, which are one of the main effects of the unemployment process. It is thought that individuals who lose income during the unemployment process are more likely to experience psychological problems such as stress, anxiety and sadness, in addition to financial difficulties. Research conducted to test this hypothesis shows that individuals who experience financial problems during unemployment generally suffer more psychologically and have lower levels of mental health. For example, in Ulah's (1990) study, it was found that the psychological complaints of those experiencing financial difficulties increased. Therefore, H1 hypothesis aims to examine and understand the negative effects of financial problems during the unemployment process on the psychological health of individuals. Such studies highlight the importance of psychological support and financial assistance programs in combating unemployment.

The H2 hypothesis predicts that depression levels of individuals experiencing financial problems during the unemployment period will be higher and that a longer period of unemployment will increase this effect. In other words, it can be formulated as a hypothesis that the depression levels of individuals experiencing financial difficulties during unemployment will increase as the duration of unemployment increases. This hypothesis aims to investigate how the psychological effects of the unemployment process on individuals change over time and whether the job search motivation of individuals who are unemployed for a long time may decrease. Prolonging the period of unemployment may cause the individual to lose hope for the future and decrease his/her hope of finding a job. This may increase the likelihood of depression and other psychological problems. As stated by Winefield and Tiggemann (1989), as the duration of unemployment extends, a person's hope of finding a job may decrease, and this may have negative effects on psychological health. In this context, it has been suggested that the depression levels of those who experience financial problems during unemployment may increase during this period and that a longer period of unemployment may strengthen this effect. Hypothesis H2 can contribute to an in-depth understanding of the effects on psychological health during the unemployment process and the development of appropriate strategies to combat unemployment. Supporting individuals who have been unemployed for a long time and keeping their hopes of finding a job alive can help prevent psychological problems such as depression.

H3 hypothesis predicts that depression levels of individuals who are hopeful about the future or hope to find a job during the unemployment period will be lower.

In the research conducted in Ankara, the economic, social and psychological effects of youth unemployment on individuals and their families were examined in the study conducted on 182 unemployed individuals. The effects of the unemployment process on individuals are summarized as follows:

Family and Community Relations:
It was determined that 46.20% of those who stated that their family's attitude became negative after unemployment, and 53.80% of those who said that their attitude did not change. It was determined that 53.80% of those who stated that the attitude of those around them became negative during the unemployment process, and 46.20% of those who said that their attitude did not change. The rate of those who stated that the peace in the family environment was disrupted was determined as 69.80%, and the rate of those who stated that they were unable to cope with the problems during the unemployment period was determined as 74.20%.

Hopelessness and Psychological State:
In the research, it was determined that 69.20% of those who had hope of finding a job were 30.80% of those who had no hope. The rate of those who stated that they were hopeful about the future was 52.20%, and those who stated that they were hopeless about the future was 47.80%. The rate of those who felt stressed during the unemployment period was 90.01%, the rate of those who felt angry towards themselves or others was 89.50%, and the rate of those who felt social pressure was 73.10%.

Health and Nutrition:
The rate of those who stated that the individual or their family had deterioration in adequate and balanced nutrition during the unemployment period was 59.30%, and the rate of those who stated that they had complaints about their general health was 34.10%. These findings show that the unemployment process not only has psychological effects on individuals, but also has negative consequences on social relations and health. These negativities experienced in family relationships, hopelessness levels and health status reflect the deep effects of the unemployment process on individuals. Such findings highlight the importance of social policies and support systems in combating unemployment.
The mean depression level of the unemployed people included in the research is 22.70 and the standard deviation (S.D.) is 9.71. While 50.50% of the unemployed had symptoms of moderate depression, 35.70% had symptoms of severe depression, 13.70% had no symptoms of depression. As can be understood from the findings, it was determined that the majority of the unemployed were depressed and a significant portion of them were at a level of depression that could be considered serious. . However, it is not possible to completely attribute the high level of depression of the unemployed to the unemployment process or explain it with

unemployment. Because, in the literature, it is not possible to find many factors determining the formation of depression and therefore it is not possible to find a connection with a single factor, in other words, pure unemployment. Additionally, in this study, it was not possible to test the effect of the pre- and post-unemployment period on the level of depression. In order for such a hypothesis to be tested statistically, it is possible to know the depression levels of the people within the scope of the research before unemployment.

In this study, factors affecting the depression level of people in the unemployment process were analyzed. Analyzes conducted to evaluate the relationship between the social and economic situations of the unemployed and the level of depression revealed the following results:

Gender:

The average depression level of unemployed women was found to be 18.96, and that of unemployed men was 24.45. The difference between these two groups is statistically significant. So gender has an impact on the level of depression. This finding confirmed the HI (a) hypothesis.

Marital status:

The effect of marital status on depression level was not found to be statistically significant. In other words, no significant difference was found in the level of depression according to marital status. Therefore, the HI (b) hypothesis was rejected.

Education Level:

The average depression level of the unemployed with primary education was found to be 24.02, for the unemployed with secondary education was 24.74, and for the unemployed with higher education was 19.24. A statistically significant difference was found between these groups. According to the Scheffe test results, a significant difference was found in terms of average depression levels between the unemployed with higher education and the unemployed with primary and secondary education. However, the difference between the unemployed with primary education and the unemployed with secondary education was not found statistically significant. This finding confirms the HI (c) hypothesis.

These analyzes show the diversity of factors affecting the depression level of individuals during the unemployment process. Factors such as gender and education level have been shown to have determining effects on the level of depression, but marital status has not been found to have this effect. These findings provide an important guide in determining and implementing support policies for individuals in the unemployment process.

According to the findings described, other factors affecting the depression level of individuals in the unemployment process were also examined:

Financial Problems:

While the average depression level of unemployed people with significant financial problems was 23.51, the average depression level of those without these problems was found to be 19.41. This result confirms the H2 hypothesis; In other words, the depression level of unemployed people who have financial problems is higher.

Job Finding Hope:

The average depression level of the unemployed who had hope of finding a job was 21.63, and that of those who had no hope of finding a job was 25.10. These findings confirm hypothesis H3 (a); In other words, the depression level of unemployed people who hope to find a job is lower.

Don't Have Hope for the Future:

The average depression level of the unemployed who had hope for the future was 21.63, and that of those who had no hope was 25.10. This is a finding that confirms the H3 (b) hypothesis; In other words, the depression level of unemployed people who have hope for the future is lower.

These findings show the diversity and importance of factors affecting the psychological states of individuals during the unemployment process. It is understood that factors such as financial problems, hope of finding a job and hope for the future have determining effects on the level of depression. This information provides important clues on how to shape support policies and interventions during the unemployment process.

The points emphasized in the research reveal the deep effects of the unemployment process on individuals and the social dimensions of this process (KARASOY, 1999:149; IRMAK, 1996:107; KOCACIK, 1995: 13). The negativities experienced by individuals during the unemployment process can leave important traces both psychologically and socially:

Psychological State:

It has been stated that a significant portion of the unemployed are stressed and angry. This psychological situation arises from factors such as failure to meet material and spiritual needs, economic uncertainties and future concerns.

Economic Situation:

It has been stated that the scope and prevalence of unemployment insurance in Turkey is insufficient and this situation increases the economic difficulties of the unemployed. The lack of unemployment insurance further aggravates the situation of the unemployed.

The Role of the Family Institution:

It has been stated that the family institution in Turkish social life provides important social support to the individual during the unemployment process. However, it has also been emphasized that during the unemployment process, individuals encounter negative attitudes in the family and society, and their relationships are negatively affected.

Deterioration of Social Relations:
It has been suggested that individuals face family and social pressure during the unemployment process, that social relations are disrupted in this process and may lead to unhealthy relationships. It has been stated that this situation may lead to social disintegration.

Health Problems:
It has been stated that individuals in the unemployment process experience significant financial problems, general health complaints and adequate nutrition problems. It has been stated that these situations show how the unemployment process affects the health status of individuals.

These findings reveal that the unemployment process has profound effects not only in economic but also in psychological and social dimensions. It is important for policy makers to take these factors into consideration in the fight against unemployment and to develop supportive measures for unemployed individuals.
The research revealed that some participants looked hopelessly to the future, thinking that they would not be able to cope with the problems. It has also been determined that the unemployed are incapable of solving the problems they face and have lost their hopes for the future. This finding is similar to the results of a previous study (ERDOGAN, 1991:81). In the research, it was observed that the level of depression, which is considered an important indicator to determine the psychological state of the unemployed, is high. It was determined that a significant portion of the participants showed serious symptoms of depression. This finding is compatible with other studies in the literature (BOLTON/OATLEY, 1987:453; PAYNE/JONES, 1987:175; WANBERG/KANFER, 1999:897). The research showed that, unlike the international literature, the depression level of unemployed men is higher than that of unemployed women. This situation can be explained by the fact that in Turkish society, men traditionally have a heavier role in the family and society, and therefore they experience more difficulties in coping with unemployment. The study also found that the depression levels of unemployed people with primary and secondary education were higher than those of unemployed people with higher education degrees. This finding also supports previous studies (LEANA/FELDMAN, 1990:1161). In the literature review, it was stated that individuals with higher education levels have higher employment prospects and opportunities.

In this study, it is emphasized how important hope is for individuals during the unemployment process. It has been observed that individuals who hope to find a job and look to the future with hope have lower levels of depression. Maintaining hope positively affects job search behaviors and mental health. When they find a job, they can have the opportunity to work because they can protect their health. The study also found that individuals who experience significant financial difficulties have higher levels of depression. It has been emphasized that having sufficient financial resources during the unemployment process is important for individuals to protect their health. For this reason, unemployment should be considered not only as a problem of individuals but also as a problem of the social state of law. It has been stated that in order to protect public health, the basic, health and education needs of unemployed individuals and their dependents must be met by the state. It has been emphasized that unemployment creates negative effects on the psychology, health and welfare of individuals and that effective social policies should be developed to minimize these effects in accordance with the social state understanding. However, considering the economic process of the last 24 years in Turkey, it has been stated that there is reluctance to develop social policies and attempts are made to weaken current practices with alternative methods. It has also been emphasized that in recent years, attempts have been made to eliminate the responsibility and necessity of the social state concept, and alternative structures have been created under the name of non-contemporary "voluntary organizations".

B. Effects of Technological Progress on Business Life

The effects of technology and changing production organizations on the quality of the workforce are generally discussed within the framework of qualification discussions. Whether the change in the workforce results in a qualified or unskilled result is at the center of these discussions. Traditionally, the concept of "qualification", which refers to having knowledge at every stage of the production process, being able to put this knowledge into practice, and being able to use discretion in work, has been especially associated with craftsmanship. Craftsmen have learned production skills through a long apprenticeship process and are knowledgeable and able to manage every stage of the production process (Giddens, 2008, p. 793). Craftsmanship, as a form of work that requires skill and mastery, also includes knowledge of the tools used and thus eliminates the distinction between mental and physical labor (Sayers, 2008, p. 53). Craftsmen take an active role in every aspect of production activities: from the supply of raw materials to the training of apprentices and journeymen, from the marketing to the sale of products (Huberman, 2009, p. 127). However, the industrialization process, which accelerated with the advancement of technology, largely eliminated craftsmanship and gave way to workers within a broader production organization.

In the early workshop type production, which showed slight changes from traditional production, craftsmen preserved their traditional knowledge and skills (Braverman, 2008, p. 83). One of the forms of manufacturing production that brings together craftsmen is the union of independent craftsmen in a workshop under the control of a single capitalist; The other is the coming together of many craftsmen doing similar work (Marx, 2011, pp. 327-328). In both forms, while the craftsmanship-based production style changed over time, the technical division of labor deepened. While the deepening division of labor and workers becoming

more and more extensions of machines separated material and mental production, workers began to lose their creative abilities and began to do the same job repetitively. Marx defines the division of labor that developed with automation and factoryization as follows: "Real manufacture not only puts the formerly independent worker under the command and discipline of capital, but also creates a hierarchical gradation among the workers themselves. (...) It combines a series of productive instincts and tendencies of the worker." By repressing him, he develops his skill in a single piece of work, as in a greenhouse, and turns him into a freak, just as in the states of La Plata a whole animal is slaughtered for its fur or fat. Not only are the particular pieces of work distributed among different individuals, but the individual himself is divided into one. the part becomes the automatic engine of the work…" (Marx, 2011, p. 348). With manufacturing production and the developing division of labor, the craftsman, who previously carried out every stage of production in this new form of labor organization, gradually moved away from his productive ability and became a performer of a specific piece of work (Buyruk, 2013). As a result, the craftsman, as a skilled worker, began to lose this feature over time, moving away from the holistic knowledge of the job.

Although there were various forms of division of labor during the manufacturing period, the skill and capacity of the worker played an important role in production, therefore the worker's hand, foot movements and speed limited the increase in productivity (Aydoğanoğlu, 2011, p. 62). For this reason, the necessity of reorganizing the production process and organizing workers' movements with Taylorist methods to ensure efficiency has emerged. In the period before "scientific management" developed by Taylor, management maintained control over employees but did not intervene in how the work was done. Taylorism, on the other hand, separates planning and implementation down to the smallest detail on how the job will be done. Therefore, with the implementation of Taylorism, workers became unskilled by being deprived of all kinds of skills, production knowledge and mental activity (Ansal, 1996a). In Taylorism, planning and standardization of work down to the smallest detail led to workers moving between machines, resulting in loss of time and low productivity. To solve this problem, Fordist production organization was put into effect, and the positioning of machines and workers was rearranged with the belt system, minimizing time loss (Buyruk, 2013, p. 36). In this process, the division of labor deepened and the distance between planning and implementation gradually increased. According to Ansal (1996a), Fordism is the embodiment of a series of mechanized steps in the labor process that eliminate the dependence on workers' skills and lead to their deskilling. With the increase in mechanization, fragmentation of work and centralization of planning, there has been a significant increase in the number of unskilled workers.

However, it cannot be said that all jobs are unskilled. Although most of the work in the production process during the Fordist period was performed by unskilled workers, the nature of the workforce was divided into hierarchical categories with clear boundaries between skilled and unskilled labor. Two different approaches stand out regarding the change in the nature of the workforce with the post-Fordist production organization. The first approach suggests that developing technology, computer and automation systems used in production will increase the quality of the workforce. According to Piore and Sabel (1984), computerization will increase the capacity of production, enable workers to use machines more effectively, and thus provide more control over work processes. Piore and Sabel (1984) interpreted this transformation as a transition from the Taylorist division of labor towards craftsmanship. Bell (1999), on the other hand, predicted that the education level of the workforce would increase and that blue-collar workers would transition towards white-collar workers, and claimed that there would be an increase in professional occupations in this process. Drucker (1993) and Toffler (2008) emphasized the increasing importance of knowledge and defined the new workforce as knowledge or service workers. Toffler (2008) also stated that an educated workforce will have more bargaining power and become indispensable for businesses. These approaches consider the effects of technological developments on the workforce in different dimensions and discuss the future outlook of the change in the nature of the workforce.

Another approach is the approach represented by Braverman (2008), which can be seen as a response to the theses of advocates of post-industrial society. According to Braverman, it is suggested that not only industrial jobs but also office jobs may be subject to Taylorist methods, as in manufacturing industries, and employees may become unskilled in this process. According to this view, white-collar jobs, like blue-collar jobs, may be susceptible to routinization, fragmentation, and deskilling. Therefore, according to Braverman's approach, increasing the share of the service sector in the economy will not bring professionalization. Braverman (2008, p. 386) argues that with the advancement of science and technology, workers' ability to understand work processes will decrease, and as machines become more complex, workers' control over the machine will also decrease. He argues that the use of less skilled, and therefore lower cost, labor will increase productivity. This situation requires technology to be advanced because, with the deskilling of jobs, workers over time transfer control and planning over the job to the management (Apple, 2006, p. 186). Marx's example of book printing in England is often used to illustrate the impact of technology on skilled labor.

Marx (2011, p. 463) emphasizes that in ancient times, in the book printing business, apprentices went through a learning process, starting from simple jobs, moving on to more complex jobs over time, until they became printing masters, and that reading and writing was a requirement for this job. However, with the advent of the printing machine, this process changed: Two types of workers began to be employed in the workplace: adult workers and young workers. While adults usually observe the operation of the machines, the only thing young workers between the ages of 11 and 17 can do is spread the sheets of paper under the machine or pull the printed papers from under the machine (Marx, 2011, p. 463). Sennett (2005, pp. 70-78) similarly addresses the loss of skills in baking due to the use of technology in a bakery. Due to the technology used in the bakery, workers are distracted from the details of the bread-making process; What is important now is how to use the bread producing machines. Although the bakery still produces bread, workers do not have the ability to solve the problems they encounter because they do not understand the entire production process. In addition, they cannot intervene when the machines break down, and they cannot make old-style bread because

they do not have the knowledge of making bread using traditional methods (Buyruk, 2013). These examples show the effects of technology on the workforce and the change in skills in work processes, especially explaining how jobs requiring knowledge and skills are transformed by technology and the change in the roles of workers.

While deskilling occurs with technological advances, reskilling processes can also occur. This approach is basically based on the thesis that the disappearance of fully skilled labor in the capitalist mode of production is undesirable. The need for skilled labor that will increase productivity for capital accumulation continues (Friedman, 1977). For example, within the framework of the lean production model, Ansal (1996b) states that workers who have production knowledge at least at the core worker level, understand the whole job, are integrated with the job, have partial control over the labor process, can use discretion and can do a wide variety of jobs are reskilled. In this context, it is stated that deskilling and reskilling may differ depending on the requirements of the capital accumulation process (Thompson and Smith, 2009). Huws (2006) emphasizes that each new technical division of labor will bring a new division of labor based on technology, and in this process, the work of one group of workers will become routine, while other groups will develop new skills to keep control of the work. According to Apple (2006, p. 186), deskilling is a complex process and this process can occur together with reskilling. With the change of technology, each new division of labor often requires a group of workers to develop new skills, while the number of unskilled workers usually increases.

Hirsch (2011) states that the workforce is being reskilled in technology-intensive sectors, while deskilling is increasing in standard production and service areas. In this case, a large group of workers is deskilled, while a smaller group is reskilled. As a result, a polarized situation emerges between a small number of skilled workforce and a large number of unskilled workforce.

Just as technological developments have effects on qualifications, they also have important effects on employment. Generally, two different views stand out on the relationship between new technologies and employment:

Positive Impact View: According to this view, the use of new technologies increases employment, information and communication technologies improve the quality of working life and support economic growth. For example, the low unemployment rate in countries that use advanced technology, such as Japan, supports the employment-increasing effects of new technologies. According to this approach, failure to adopt or lag behind new technologies may increase the risk of unemployment.

Pessimistic Impact View: According to this view, it is suggested that new technologies may lead to unemployment in the first place. Especially in developing countries, it is thought that technological changes may reduce employment and increase unemployment. However, according to this view, it is stated that in the long run, new technologies will increase productivity, create new job opportunities, and create new industries and new markets.

Both views emphasize that technological changes have complex effects on employment, and that these effects may differ depending on the country's economic structure, the rate of technology adoption, and the nature of the existing workforce. This approach, which is compatible with neoclassical economic theory, is essentially based on the idea that unemployment caused by technology is temporary and can be compensated by jobs in other sectors. According to this approach, called "compensation mechanism" in the literature, the labor-saving effect of technological progress can be compensated by market-oriented indirect effects. Therefore, it has been stated that technological changes are expected to create new jobs in the long term (Machin, 2003; Vivarelli and Pianta, 2000; Vivarelli, 2007). The second approach is of the opinion that new technologies will increase unemployment. From this perspective, replacing labor with machines could increase unemployment. According to an optimistic approach, it is stated that technological developments will increase the employment of highly skilled workforce, but may reduce the employment chances of unskilled workforce. Therefore, it is thought that there should be a change in the labor market. It is inevitable that the use of advanced technology will require highly skilled labor, but this number is expected to be limited. Therefore, technological change can widen the gap between skilled and unskilled labor and lead to polarization in the labor market (Rifkin, 1995; Autor, Levy, and Murnane, 2003). According to this approach, semi-skilled workers are expected to work in routine jobs while semi-skilled jobs are performed by machines. Since jobs that do not require skills will not be automated, it is possible for unskilled workers to continue in their routine jobs. This indicates that polarization in the labor market may decrease.

It is predicted that new automation, which has emerged as a result of advances in the field of microelectronics in recent years, will have a reducing effect on employment. Because as many standard jobs begin to be done by robots, some of the work that humans have to do will disappear. With the toughening of competitive conditions, the decrease in the cost of information technologies and the more economical use of technology, this may cause employment losses in countries where new technologies are used. For this reason, theses that advanced technology will reduce employment and create mass unemployment have become widespread recently. However, it is important to note that concerns that technological changes will reduce employment are not new. With the Industrial Revolution, an increase in unemployment was expected with the emergence of new machines, and with the use of machines in production processes, reactions such as machine-breaking movements were observed in the 18th century. Similar concerns were expressed in the 19th and 20th centuries, but with the industrialization process, while the workforce in the agricultural sector decreased, there was an increase in employment in the industrial sector. Recently, technological changes such as digitalization, the use of robots in production processes, and smart factories have brought similar fears to the agenda again. However, some analysts suggest that the service sector could absorb the vacated workforce in the industrial sector.

Rifkin (1995) argues that the service sector cannot escape automation and that technological advances may bring about an unemployed future. According to the research of Frey and Osborne (2017), it is stated that 47% of various occupational categories in the United States, from white-collar jobs to accounting, logistics, and cognitive tasks, are at high risk of automation. Although there are optimistic views that new job areas will be created, it is predicted that the number of these areas may be limited. Therefore, with the spread of smart factories, mass unemployment is likely to increase. However, global organizations constantly emphasize that qualified workforce is needed to ensure employment and that education is critical for this. While it is stated that the role of education in training a qualified workforce continues unchanged, it is pointed out that the importance of education models compatible with developing technology has increased in recent years.

C. Effects of Artificial Intelligence and Automation on Unemployment

The concern that rapid technological advances and innovations will have negative effects on employment structures is not new. In the 1930s, Keynes' theory of technological unemployment put forward the view that technological change would cause job loss. While technological inventions have created an environment in which wealth will increase with the process of creative destruction, they have also brought negativities. In 1962, Schumpeter emphasized strong social and economic tools that support technological developments, rather than the lack of creative ideas as the factor determining the limits of economic development. For example, after William Lee invented the knitting machine in 1589, his application was rejected by Queen Elizabeth due to its negative effects on workers (Frey & Osborne, 2013:6). Although the literature on the effects of artificial intelligence on unemployment has expanded, there are two important impacts of artificial intelligence that need to be addressed and focused on as part of more complex automation processes. The first is the effect of job substitution by AI; The other is the displacement effect of jobs. The substitution effect is supported by both theoretical and empirical studies. According to this interaction mechanism, the use of artificial intelligence negatively affects the labor market and creates unemployment. In this context, in the first theoretical study conducted by Leontief in 1983, it was emphasized that almost all jobs will be carried out by artificial intelligence over time and, as a result, unemployment will increase. However, states can significantly reduce this negative impact by following correct redistribution policies.

Focusing on technological innovations, Zeira (1998) argued that innovations require more capital but reduce the need for a larger workforce (Mutascu, 2021: 659). According to Petropoulos (2018: 119), technological innovations affect the employment structure within the framework of two main factors:

- Displacement effect, directly removing employees from their previous positions.

- Productivity effect, increasing labor demand in industries that emerge or develop with technological development.

When the adventure of the last two centuries is examined, it will be remembered that although the unemployment rate fluctuated cyclically as a result of issues such as automation and technological progress, the employment-population ratio and the increase in women's participation in the workforce, there was no increase in long-term unemployment. However, based on past interactions between automation and employment, it is unclear to what extent the debates about how this interaction will occur in the future will be resolved. In particular, the significant development of computing power draws attention to the possibility of artificial intelligence and robotic technology changing labor at an unprecedented level and brings the concern of automation back to the agenda (Autor, 2015: 4).

When the adventure of technological progress from past to present is examined, we see that the employment composition has shifted greatly from agriculture and craftsmanship to manufacturing, service and management professions. This situation can be considered as evidence that technological unemployment does not occur. The increase in productivity in production leads to an increase in real incomes and thus an increase in the demand for other goods. While the destructive effect that occurs when technology replaces labor requires the reorganization of labor supply, on the other hand, there will be an increase in employment in these sectors with the emergence of new jobs in sectors with high productivity (Frey & Osborne, 2013: 13). The rapid development of automation and its displacement effect have not caused a decrease in demand in the labor market, historical developments show this; Automation has generally led to increased demand for labor and wages. The source of these effects can be expressed as follows (Acemoglu & Restrepo, 2018: 6-8):

- Productivity effect: Automation reduces the prices of goods and services by automating production processes as capital replaces labor and increases the demand for all goods and services with its enrichment effect.

- Capital accumulation effect: Automation indicates an increase in capital-intensive production. High capital demand increases labor demand by encouraging more capital accumulation. For example, the mechanization of agriculture in England and the USA in the first half of the 20th century can be cited as an example.

- Effect of deepening automation: Comprehensive automation will lead to the expansion of tasks in capital-intensive production. Moreover, although technological advances increase capital productivity in automated tasks, they do not create a displacement effect because labor has already been replaced by capital in such tasks. Therefore, these productivity effects will subsequently increase labor demand.

There are both optimistic and pessimistic views about the impact of artificial intelligence applications on jobs and tasks in the economy. In the optimistic view, artificial intelligence can increase the demand for skilled workers by increasing human capabilities. The pessimistic view argues that artificial intelligence will replace workers and jobs will be taken over by machines, because the use of artificial intelligence requires less labor input (Huang et al., 2019: 45).

According to a joint study by Nesta and Oxford University academics, the business groups that will be least affected by computerization in the USA are:

- Translators and interpreters (5.8%)

- Performing artists (7%)

- Radio broadcasters (7.7%)

- Film and TV producers (8%)

- R&D in natural sciences (10.9%)

According to the research, the business groups most open to computerization are:

- Office managers

- Call center employees

- Librarians

- Cattle breeders

- Tree cutters

- Miners

- Car dealers and hotel staff (Dirican, 2015: 569).

Stiglitz, on the other hand, argued that unemployment would increase due to increased productivity and innovation in human resources managers.

Purchasing power decreases with inflation, and those whose wages decrease or lose their jobs cannot save and spend less, leading to deflation. This situation creates a paradox, leading to investor reluctance and a decrease in customer demand. With the decrease in demand, more efficiency is required on the supply side, and central banks encourage companies to innovate more by reducing the money supply and lowering interest rates (Stiglitz, 2014: 16-17). This process may lead to the replacement of low-skilled labor with high-skilled labor as innovation increases. Throughout history, there have been resistances to innovations and innovations in societies. Especially in the early 19th century, "Luddites" argued that advanced machines led to unemployment and impoverishment. Increases in productivity have reduced the demand for unskilled workers and led to an increase in the wages of skilled workers.

Within the framework of skill-biased innovations, increased wages for skilled workers have generally compensated for the losses of unskilled workers. However, in this process, especially in the United States and many other advanced industrial countries, the losers have generally been individuals at the bottom of the income distribution. This shows that innovations cause inequality to increase. Therefore, increasing or decreasing social welfare depends on how the benefits provided to the rich are measured compared to the losses of the poor (Stiglitz, 2014: 2). Research from the University of Oxford and Deloitte suggests that 35% of jobs could be at risk in the next 20 years, with 47% in the US and 54% in Europe to be done by machines. According to McKinsey, 700 million jobs could be lost by 2030. Additionally, it is stated that 30% of jobs in the United Kingdom, 38% in the USA, 21% in Japan and 77% in China can be automated (Wang & Siau, 2019: 69). Frey and Osborne (2013) used machine learning techniques to predict occupations at risk due to automation and estimated that 47% of total employment in the USA could be at risk in the next twenty years. Similarly, 40% of total employment in Australia, 77% in China and 69% in India may be at risk of automation. Frey and Osborne emphasized that automation faces three main obstacles: They stated that computers still face significant challenges in professions that require complex perception skills, professions that require creativity, and professions that require social intelligence (Walsh, 2018: 637).

There is no conclusive evidence of the AI threat due to skill disparities in service employment. In the case of the United Kingdom, Haldane (2015) stated that 95% of accounting positions, 33% of hairdressers and 10% of economists are vulnerable to the threat of

robotics and artificial intelligence. However, a sudden decline or radical decline in service employment is not expected, although certain service positions, including non-routine and professional occupations, are vulnerable (Boyd & Holton, 2017: 337). The Future of Work Forum, within the framework of the G7 summit in 2018, showed that high levels of automation, polarization of labor markets in risky jobs and increasing inequalities could lead to future concerns. In the same year, the OECD Automation Policy Brief highlighted that 14% of jobs could be automated and 32% could be significantly affected.

It is stated that as artificial intelligence and machine learning advance, new workers will have difficulty entering the labor market, and especially those working in the manufacturing and agricultural sectors will face great automation risks. It is emphasized that these risks are especially concentrated in low-skilled routine jobs and that such jobs cannot be closed with training. Therefore, it is suggested that the negative pressure on working hours and wages will not be equally effective across the population (Peters et al., 2019: 2).

Computerization of production causes wages to fall in an environment where the elasticity of substitution between labor is high. The shift of low-skilled workers (workers performing routine tasks) from goods production to the service sector, while the skilled workforce continues to remain in the production sector, increases the polarization in employment. In addition, factors such as the inability of low-skilled workers in service occupations to store and trade production products may also deepen the polarization effect. Other factors that increase employment polarization include: computerization's exclusion of labor-intensive occupations, redirection of low-skilled labor to the service sector, polarization of wages, concentration of labor market demand for the production of goods and services, and the need for both a very highly and very low-educated workforce (Autor & Dorn, 2013: 1560). In recent years, it has been observed that the increase in innovation in artificial intelligence and robotic technologies has created related effects in many areas. In this context, discussions continue on social impacts such as growth, productivity, employment, income distribution and inequality. While classical economic theory argues that economic growth is based on technological change and innovation, new skills-based theories suggest that technological innovations can lead to an increase in the demand for skilled workers and potential job losses through the automation of tasks (Giacomo et al., 2021: 3).

The effects emphasized by those who argue that artificial intelligence is unlikely to cause major job losses and pessimistic scenarios to occur are as follows:

- Potential job losses are based on assumptions: Job loss scenarios are based on assumptions made over existing technology and business processes. However, since technological development and economic dynamics are constantly changing, it is not certain that these scenarios will be fully realized.

- Heterogeneous automation risk across sectors: Automation potential varies between sectors. It may mean that jobs are more open to automation in some sectors and that new job opportunities are created in other sectors. Thus, the cross-sector impact of automation is heterogeneous and overall job losses may be difficult to predict directly.

- Automation affects tasks, not business potentials: Automation generally affects specific tasks and changes or eliminates some job functions. However, this usually does not mean that the entire job is automated. The content and nature of jobs may change, but there may be no situation that will lead to complete unemployment.

- The rate of spread of developments in artificial intelligence is variable: The spread of artificial intelligence and automation technologies may be slower or faster than anticipated. The continuity and speed of diffusion of technological developments directly affects their impact on the labor market. Slow expansion can provide time for the workforce to adapt and create new jobs.

In addition to these points, as the use of automation and artificial intelligence reduces labor costs, the possibility of production returning to these economies may increase, especially considering the decrease in production costs and logistic advantages in western economies where labor costs are high. This means that automation can change economic dynamics by creating new production opportunities and jobs, rather than just causing job losses (Webster & Ivanov, 2020: 133).

D. Fighting Unemployment and Innovation Strategies in Turkey

1. Unemployment Problem in Turkey

Türkiye under the influence of the global crisis in 2008. The Turkish economy showed significant growth during the recovery period after the 2001 crisis. Growth rates of 5.3%, 9.4%, 8.4% and 6.9% were achieved in 2003, 2004, 2005 and 2006, respectively. In 2007, growth was 4.7%. However, after the crisis, the unemployment rate increased to 10% in 2002 and did not decrease steadily despite high growth rates. Türkiye increased employment during this period.

The economy grew by 0.7% and shrank by 4.8% in 2009. The decrease in capital inflow to Turkey due to the global crisis had a negative impact on growth, and companies experienced financing problems due to the decrease in domestic credit opportunities. This uncertain environment has negatively affected the markets' future expectations, damaged the environment of confidence, and led to the postponement of consumption and investment decisions. Due to the impact of global economic conditions, economic activities in Turkey have slowed down, a period of contraction has occurred and unemployment has increased (Erdoğdu, 2014:75).

With the developments in the world and in Turkey towards the end of the 1980s, there was a gradual divergence between the concepts of economic growth and employment. During this period, the Turkish economy grew, but employment could not be created in sufficient numbers and quality. The reasons for this situation, called growth without employment, were as follows:

- High interest rates in world markets and the resulting overvaluation of the Turkish Lira have led industrial production to a capital-intensive structure.

- The increasing exchange rate has substituted domestic production with imported products.

- Increasing global competition has highlighted qualified labor and production efficiency.

- There has been a shrinkage of the agricultural sector and a decrease in agricultural employment.

- The industrial sector's low employment flexibility is also an important factor.

- In the service sector, employment could not be created at a level that would support the labor market due to the above reasons (Erdoğdu, 2014:77).

The facts listed in detail above that cause employmentless growth in Turkey are as follows:

- High Interest-Low Exchange Rate Policy: The economic policies implemented towards the end of the 2000s, especially with the high real interest rates and the liberalization of capital movements, caused the value of the foreign currency to decrease. This situation has led to high use of imported inputs in the industrial sector and especially in export-oriented industrial products, and thus foreign dependency. It has caused production to shift abroad, especially in sectors that provide intense employment, such as textiles, and thus an increase in unemployment.

- Decrease in Inflation and Growth: Thanks to policy implementations, inflation decreased and high growth was achieved in the economy. However, this growth was not sufficient to increase employment and led to a growth process without employment.

- Imported Input Dependence of the Industrial Sector: With the cheapening of foreign currency, the industrial sector had to use high amounts of imported inputs. This situation increased the costs of industrial products and negatively affected competitiveness.

- Loss of Production in Export-Oriented Sectors: Due to high costs and foreign dependency, unemployment has increased with the decrease in production in sectors with high employment, such as textile.

The combination of these factors encouraged employmentless growth in the Turkish economy and a sustainable improvement in the employment market could not be achieved (Erdoğdu, 2014:77).

The fact that Turkey's economic policies focus on reducing inflation and preferring production based on foreign capital and imported inputs instead of production based on high value-added local resources has led to employment problems arising from many aspects. In particular, the failure to implement structural reforms in a timely manner delayed the creation of the necessary conditions for economic growth and employment increase. The decrease in demand and short-term fluctuations in international capital movements following the global crisis caused the investment environment to become unstable, and economic growth could not provide the amount of employment needed by the labor market (Mortan and Tiryaki, 2013). The dissolution in the agricultural sector and migration from rural areas to cities is an important socio-economic problem. Factors such as changes in agricultural activities, decrease in subsidies, increase in mechanization and low wages have reduced livelihoods in rural areas and directed individuals to cities. Although agricultural sector employment in Turkey is above the EU average, the share of sector income in GNP is low. This situation was effective in the migration of individuals from rural areas to cities. However, most of the individuals who migrated from rural to urban areas had difficulty finding jobs suitable for their qualifications and began to withdraw from the labor market in the long term. This situation has deepened the problems of unemployment and employmentless growth in Turkey.

If the labor force increased by the agricultural disintegration cannot be employed, an increase in unemployment rates is expected. Features such as unqualified labor force in the agricultural sector, low education level, limited adaptable occupational options and spatial opportunity inequalities make it difficult for this labor force to transition to other sectors (Çakır, 2014).

Incomplete Fixed Capital Investments: Fixed capital investments can expand production capacity and employment by increasing a country's capital accumulation. However, the insufficient level of investments in Turkey is one of the obstacles to the creation of new employment areas. High real interest rates, the fragile structure of the banking sector, volatility in exchange rates, high inflation and uncertainties created by short-term capital movements prevented investments from increasing at the required level. High loan interest rates in Turkish lira caused domestic capital to be directed to borrowing from abroad. This situation has led to an increase in the financing and production costs of the private sector and therefore a decrease in its job creation capacity. Recently, the ratio of fixed capital investments to gross national product in Turkey has decreased due to high real interest rates. When these factors come

together, we see that obstacles to the expansion of employment and the sustainability of economic growth in Turkey emerge. As a result of this process, a decrease in employment and an increase in the current account deficit and external debts were observed (Mortan and Tiryaki, 2013; Teyyare and Sayaner, 2018).

Spread of Labor-Saving Methods: The spread of labor-saving methods around the world and in Turkey is an important factor in the failure of economic growth to increase employment capacity. In particular, the acceleration of technological developments and the increase in automation in production processes have a reducing effect on labor use. This situation increased productivity and contributed to growth in Turkey, as in the world, but employment growth could not occur in parallel with this growth. It is also noteworthy that the growth rates of labor-intensive sectors in Turkey remain lower than those of capital-intensive sectors. High growth rates were observed in capital-intensive sectors. This shows that labor-intensive sectors shrink in periods of high growth in the overall economy. In developed and developing economies, the increase in capital-intensive investments, the development of labor-saving methods and the spread of flexible working conditions, technological developments and automation processes have caused employment to increase less than the workforce. In this context, Turkey needs to keep up with these global trends and strengthen its employment creation strategies (Mortan and Tiryaki, 2013).

Firm Behaviors: Another reason why growth cannot create employment in Turkey is the sequential occurrence of the last two important economic crises and the changes in the behavior of companies after the crisis. During crisis periods, consumers restrict their spending and increase their individual savings in order to take precautions against uncertainties. This situation causes a contraction in demand in the market and causes companies to reduce their investments in this uncertainty environment. According to Carpenter and Ulusoy (2010), uncertainties that occur during crisis periods cause companies to postpone or not hire new workers. Companies that avoid investing tend to protect their existing workforce and minimize costs. This situation causes unemployment rates to rise and employment not to increase at the desired level. As a result, it is seen that the frequent recurrence of economic crises in Turkey and the environment of uncertainty created after the crisis negatively affect the employment policies of companies and prevent employment growth. This situation emerges as an important problem for economic policy makers.

Labor Market Rigidities: Labor market rigidities are an important factor that makes it difficult for growth to turn into employment, and there are many factors behind this situation at the global and national level. Especially in the late 1980s and 1990s, the differences in unemployment rates between EU countries and the USA were explained by the effects of the degree of flexibility of labor markets. While low unemployment rates in the USA are associated with the flexible labor market structure, the high labor market rigidities in EU countries have been shown as a reason for the increase in unemployment rates. Theoretically, it is stated that in classical and neo-classical economic approaches, minimum wage practices and union activities prevent employment growth by creating wage levels above the supply and demand balance in competitive markets. The Keynesian view, on the other hand, explains unemployment and employment through the level of production and argues that in case of insufficient demand, an inflexible labor market or low wage levels may increase unemployment by causing a decrease in expenditures and thus a further decrease in demand. The fact that unemployment rates, along with the effects of economic crises, do not return to previous levels even when the effects of the crisis subside (unemployment hysteria effect) may deepen the unemployment problem. In Turkey, factors such as the high non-wage cost of labor, the size of the informal economy, limited job search opportunities and ineffective working prevent the labor supply from being compatible with the labor demand and cause problems in the employment market (Saydar and Aydın, 2017).

Rapid Increase in the Working Age Population: Due to Turkey's young population, the growth rate of the working age population is higher than the growth rate of employment. This situation causes the labor market to remain inadequate and unemployment rates to rise due to the lack of agricultural transformation. Approximately one million people enter the workforce every year. Especially the increase in the number of young people is an important factor that deepens the problem of youth unemployment. This process pushes the limits of employment creation capacity. We can list other reasons for youth unemployment related to rapid population growth as follows: Young people not knowing the labor market and joining the market for the first time, the education system being inadequate in providing qualifications suitable for the knowledge economy, the lack of work experience of newly joined young people and employers finding the process of gaining experience costly, young people leaving their jobs quickly. (Özsağır, 2000; Ata, 2007).

Illegal Labor Migration: Nowadays, illegal workers, especially from Africa, the Balkans and the Middle East, are employed in various sectors and regions in Turkey. This situation can be considered as a factor restricting employment in Turkey. The term illegal labor refers to people who enter the country illegally, not legally, or who have entered the country legally and work permanently instead of on temporary leave. The lack of strict legal regulations in developing countries and the tendency of employers to prefer cheap labor without social security increase illegal labor migration. In this context, illegal immigrants earn more income by working for lower wages in Turkey compared to other countries and can easily find work in the informal economy. This situation is seen as an opportunity by employers and encourages illegal labor migration. Illegal immigrants operate without social security by working in labor-intensive, low-skilled, long working hours and heavy jobs that the local workforce is reluctant to do, which deepens the employment problems in Turkey (İçduygu, 2004).

Unregistered Employment: Unregistered employment is one of the important problems of the Turkish economy. It covers income-generating activities that cannot be tracked in GNP calculations and are not included in official statistics. While the informal economy describes all unregistered economic activities, unregistered employment refers to unregistered work situations in the labor

market. The causes of this problem include high labor costs, lack of supervision, low education levels, high unemployment rates, poverty, income inequality and the majority of small-medium-sized businesses. Different methods can be applied across countries to reduce unregistered employment. In Turkey, these methods include strengthening control mechanisms, reducing tax rates, easing social security obligations, increasing the level of education and encouraging institutionalization. The increase in unregistered employment creates a structural problem in the labor market and prevents the creation of new employment areas. This situation leads to an increase in unemployment rates and a further expansion of informality (Kalaycı and Kalan, 2017).

Technological Change: An important factor in the relationship between economic growth and employment is the effect of technological changes on employment. Advances in technology significantly affect the workforce by changing ways of doing business, production processes and marketing methods. Especially the workforce with low education levels is more affected by these technological changes. Technological changes can replace the human workforce or make it impossible for humans to perform jobs, such as integrating automation into production processes or providing services through machines or information technologies. The adaptation of the workforce to such changes varies depending on age and education level. In order to prevent employment losses and keep unemployment rates under control, the workforce must adapt to technological changes. These processes should include education and training processes so that the workforce can adapt to technology. In addition, it is necessary to create encouraging policies and programs for the workforce to adapt to new technologies. In this way, the negative effects of technological advances on employment can be minimized, the workforce can be encouraged to adapt to these changes and even the creation of new job areas can be encouraged.

Other Reasons: Division of labor and specialization in the world economy are factors that directly affect the growth and employment dynamics of developing countries. This relationship can also provide important explanations for the Turkish economy. The opening-up processes of developing countries depend on financial liberalization and liberalization of capital and trade. However, free trade, financial liberalization and capital mobility can make growth drivers externally dependent and expose economies to high uncertainties.
Economies that follow an export-based growth strategy have had to specialize in the sectors in which they can compete. This process has made productivity growth dependent on external variables through the effects of competitive conditions and free trade. Foreign direct investments entering the country with the liberalization of capital movements also have a significant impact on employment.

An important factor in the failure of growth in the Turkish economy to create sufficient employment and the high unemployment rates is the lack of planned national employment policies. The economic policies implemented in Turkey have not been effective enough in increasing employment and combating unemployment; This situation has fallen behind the goals and objectives in the economy. In addition, another reason why economic growth in Turkey cannot create employment is the differences in economic growth between regions (Mortan and Tiryaki, 2013). Considering Turkey's young population and workforce potential, it is one of the rare countries that can benefit from the demographic opportunity window until 2030. In order to realize this potential, it is necessary to increase activities based on industry and education cooperation, develop policies for the creation of qualified labor, and work to increase women's participation in the workforce. With these measures, Turkey has the potential to benefit from the demographic opportunity window at the highest level (Ministry of Development, Tenth Development Plan: 11). In order to effectively benefit from the demographic window of opportunity, the population structure must be directed to contribute to economic growth and the necessary policies must be created. Workforce management plays a critical role in this process. According to classical economic theory, the basis of economic growth is technological progress and the increase in production factors. Labor is one of these factors, and increasing the quality or quantity of labor can positively contribute to economic growth. Qualitative or quantitative increases in the labor market potentially allow labor supply to increase and contribute to economic growth when appropriate conditions are met. However, if this process is not supported by employment policies, the increase in labor supply may not translate into labor force participation and may even cause unemployment rates to rise rapidly. In order for Turkey to utilize the demographic opportunity window efficiently, it is necessary to create new employment areas, implement policies to reduce unemployment and ensure the integration of the increasing workforce into the labor market. Education is also extremely important in this process. In the theory of demographic transformation, great importance is given to education; Accepting information as a production factor in the transition to the information society emphasizes the importance of education and access to information (Can and Özer, 2012).

The fact that the unemployment rates of university graduates in Turkey are higher than in other European Union countries supports the view that education cannot prevent unemployment. The main reasons why being a university graduate cannot reduce the risk of unemployment include the rapid increase in labor supply caused by rural-urban migration and population growth and the lack of sufficient employment opportunities to meet this increase. In addition, it is an important factor that the working age population between the ages of 15-65 in Turkey does not have the qualifications required by the labor market. Turkey's young population and the rapid increase in the working age population lead to approximately one million new workforce joining the market every year (Yahşi, 2007: 57). This situation reveals the importance of effective employment policies and efforts to improve the qualifications of the workforce in order to meet the demands of the labor market. The transition to industrial society has significantly transformed the population structure because the workforce to be employed in the industrial sector must have higher qualifications compared to the agricultural sector. The quality of the workforce increases with education and knowledge, and this naturally increases the importance of education. The extension of individuals' education period, women's education and participation in the workforce have contributed to the decrease in birth rates. Declining birth rates allow more quality and intensive education to be provided to fewer children. Generations raised in this way will contribute to the formation of a better equipped workforce and economic growth in the

future. Education level is an extremely important factor in terms of demographic transformation theory and plays a critical role in the efficient evaluation of the demographic window of opportunity process that Turkey has been in since the 2000s and will continue until 2040. Therefore, policies that will increase the quality of education need to be implemented urgently because this process is quite limited. In addition, savings are one of the important factors that will contribute positively to economic growth during the demographic window of opportunity period. Increases in production factors will also support economic growth according to classical economic theory.

Savings play an extremely important role in terms of capital accumulation, especially during the demographic window of opportunity period. In this process, the decrease in dependency rates means that the active working population in the economy is higher than the passive population. Therefore, economic resources can be directed to savings rather than financing the inactive population.

Contribution of population structure to economic growth may have positive results in terms of savings. However, increasing savings alone is not enough. Policies such as regulating income distribution in the economy, encouraging savings, increasing the education level of the workforce and encouraging participation in the workforce are also important for evaluating the demographic window of opportunity process. In order for Turkey to have a successful development process, it is necessary to ensure high growth rates, increase savings, ensure sustainable growth, and use local savings rather than external sources in financing growth and investments. It appears that Turkey has low savings rates compared to other developing countries. Therefore, it is critical to increase savings rates in order for Turkey to use its potential at the maximum level (Ministry of Development, Tenth Development Plan: 7). As a result, in order for countries like Turkey to catch up with the "information age" in terms of employment, savings rates must be increased and economic policies must be shaped in this direction. This is a step of critical importance for economic growth and sustainable development (Ekin, 2003: 127).

2. Innovation Policies in Turkey

The goal emphasized in the report published by TÜBİTAK in 2010 highlighted Turkey's efforts to transform the information it produces and the technologies it develops into innovative products, processes and services for the benefit of the country and humanity. In this context, it was stated that studies in the fields of science, technology and innovation are accelerated with inter-institutional cooperation and strategic perspective; It has been stated that R&D studies have accelerated in this way. It was emphasized that Turkey is among the countries that make progress in R&D and innovation; It has been stated that the way to increase sustainable competitiveness is through strengthening R&D and innovation activities. The critical importance of R&D and innovation in achieving 2023 targets was emphasized. "National Science, Technology and Innovation System" (UBTYS) includes institutions and organizations that contribute to the development of the "Turkish Research Area" (TARAL). "Supreme Council of Science and Technology" (BTYK) plays an important role in determining science and technology policies in Turkey. Among the aims of the board are; The state's contribution to the creation of long-term science and technology policies, determining R&D areas, carrying out studies in a planned manner, preparing the legal basis for creating a more effective science and technology system, and increasing private sector and public cooperation.

"Turkey Research Area" (TARAL) aims to improve the quality of life of the Turkish society, increase the competitiveness of the Turkish economy, produce solutions to social problems and disseminate the science-technology culture in its activities.

The "National Science Technology and Innovation System" (UBTYS) aims to prioritize R&D and innovation, encourage entrepreneurship, support market formation, develop and mobilize resources, and produce and disseminate knowledge. The division of labor between institutions collaborating to achieve these goals of UBTYS is as follows:

- Technology and Innovation Support Programs Directorate (TEYDEB): Provides R&D and innovation support to the private sector.

- Scientist Support Department (BİDEB) and Research Support Programs Directorate (ARDEB): Supports human resources with R&D and innovation networks.

-T.R. Ministry of Treasury and Finance: Provides tax deductions and incentives for R&D studies to encourage entrepreneurship.

-T.R. Ministry of Industry and Trade and Small and Medium Enterprises Development and Support Administration (KOSGEB): Supports the competitiveness of the private sector.

Institutions responsible for areas such as the importance given to R&D and innovation, the production and dissemination of knowledge, and market formation are: higher education institutions, technology centers, technoparks, non-governmental organizations, State Planning Organization (DPT), Turkish Standards Institute (TSE), Turkish Patent Institute. (TPE) and technology platforms.

Institutions such as the Undersecretariat of Treasury, the Council of Higher Education and the Ministry of National Education also make significant contributions to the process of mobilizing and developing resources (Işık and Kılınç, 2011, 186). Science and technology are among the most effective strategic tools for Turkey to achieve its long-term economic goals. In addition to having these values, it is necessary to establish leadership in this field and ensure that they are transformed into economic growth and social

benefit. Monitoring the advances in science and technology and the capacity to develop new products, business methods, services, systems, production methods and distribution routes based on these advances are guiding. In order to use limited economic resources effectively and efficiently, technology foresight studies are carried out and a strategy of focusing on determined areas is adopted. Technology foresight studies may vary depending on the country's current technology level, economy structure, competitiveness and areas of superiority. However, in general, it directs the process of the economy reaching its target from the current situation by using technology and investing in strategic areas.

The issues that Turkey should focus on can be listed as follows (TÜBİTAK, 2004: 29):

- Directing public resources to the strategic areas determined in research and development activities and the scientific studies that these areas will require.

- Encouraging universities, research institutions and research personnel to work in determined strategic areas.

- The industrial sector establishes collaborations with companies in these fields and carries out joint studies with universities.

- Development of production systems and methods in accordance with these strategic areas.

- Prioritizing relevant areas in planning for the development of brain power.

- Increasing research scholarships in higher education in determined strategic areas.

- Although projects and studies have been carried out to increase innovation and R&D studies, the obstacles faced by companies in Turkey should also be taken into account.

According to the data discussed in the study "Innovation Research 2012" published by TÜİK, these obstacles are as follows:

- Strong price competition

- Competition on product quality, recognition and brand

- Lack of demand

- Innovation activities of competitors

- Competitors have dominant market shares

- Lack of qualified personnel

- Lack of sufficient financial resources

- Cost of government regulations or legal requirements

- High cost of entering new markets

Considering these obstacles reveals the importance of strategic direction in efforts to strengthen Turkey's innovation and R&D capacity.

Within the framework of the Medium Term Program and the 10th Development Plan covering the years 2018-2020, policies have been determined for the growth and employment problems of the Turkish economy. The main purpose of the program is to maintain macroeconomic stability, increase human capital and workforce quality, expand high value-added production, increase institutional quality in public institutions, improve the business and investment environment and thereby accelerate growth, improve income distribution and increase employment. The economic structure targeted within the scope of the program is an investment and export-based growth model that creates qualified employment, does not create inflation and current account deficit, is financed primarily by domestic savings and foreign direct investments. In order to ensure continuity of growth, a balanced and high growth structure is also targeted, as well as increased productivity and qualified workforce. It is envisaged that the productivity increase expected to be achieved through private sector investments and structural reforms will strengthen growth by being supported by investments in productive areas. It is expected that participation in the labor market will increase and the dynamism of the labor market will be maintained during the program period. In this context, it is aimed to positively affect economic indicators by implementing policies planned for economic growth and employment increase.

In TÜBİTAK's internal strategic plan covering the years 2018-2020, PESTS analysis plays an important role in strategic planning by evaluating factors such as technological environment and economic structure. PESTS analysis examines Political, Economic, Social, Technological and Sectoral environmental factors to evaluate the environment in which an organization operates. Within the framework of this analysis, increasing the quality of the workforce in Turkey and providing the workforce needed by the market are among the important goals for the 2018-2020 period. As the targeted transformation in employment is achieved in the medium term, production with high added value is expected to increase. In this process, it is aimed to create a labor market that can compete with global markets and take advantage of the opportunities brought by technological change and digitalization. Particularly among the years mentioned, the following objectives stand out:

- Increasing teacher qualifications and strengthening vocational education.

- Training a workforce that can adapt to technological and digital transformation.

- Reducing the inequalities of opportunity among students.

- Specialization of universities according to fields and strengthening cooperation with the business world.

In order to increase the efficiency of the labor market, strategic goals have been determined, such as adapting to digital transformation and technological change, increasing the harmony between jobs and the workforce, combating unregistered employment and increasing the employment of groups in need of special policy practices. In line with these goals, it is important to constantly review and analyze factors such as technological environment and economic structure with PESTS analysis.

The technological environment refers to the environment in which new information is revealed and the effects of technological changes are evaluated, allowing an organization to improve its services, products and processes. In TÜBİTAK's PESTS analysis, this technological environment is evaluated through "key trends or driving forces". This assessment examines the impact of specific trends or forces on the organization across three “low, normal and high” probabilities of occurrence and six impact levels: very high negative impact, negative impact, low negative impact, low positive impact, positive impact, very high positive impact. This evaluation is an important tool for understanding the impact of technological developments on the strategic goals of the organization and making strategic plans accordingly. Analyzing the technological environment in this way helps organizations better evaluate their potential to be innovative and gain competitive advantage.

According to the technological environment analysis, the following situations are observed:

The rate of increase in the number of qualified and experienced researchers and technical personnel may lag behind the rate of technological development, and this may have a negative impact. The probability of the number of SMEs operating in the field of high technology increasing is normal and this has the potential to create a positive impact. There is a high probability that Turkey's high technology exports will be insufficient, and this situation has a negative impact. It is unlikely that the Industry 4.0 issue will be less on the Turkish agenda, and this could have a positive effect. The likelihood of technology transfer offices becoming widespread is normal and this has the potential for a positive impact. The probability of increasing technology intensity in all sectors of the economy is normal and this can have a positive effect. The development and use of alternative and renewable energy sources is likely to increase and has the potential to create a positive impact. Large organizations in the process of developing advanced technology are likely to increase their R&D spending, and this can have a very positive impact. The tendency to purchase technological products instead of R&D processes is likely to continue and this negative impact is expected.

It is likely that the number and activities of technoparks or technoparks are insufficient, and this may have a major negative impact. There is a high probability that dependence on imports will continue in intermediate goods containing advanced technology, and this situation is expected to have a huge negative impact. There is a high probability that the production of high-tech materials and production technologies will not reach the desired level, and this has the potential for a huge negative impact. The possibility of nuclear technology studies entering Türkiye's agenda is considered normal and this could create a huge positive impact. When the variables in the technological environment analysis are examined, the areas that Turkey should focus on in technological development and innovation processes emerge. In the process of increasing Turkey's international competitiveness and creating an information society, it is important to determine the basic trends regarding macroeconomic policies and technological infrastructure and to transform these trends in the desired way.

CONCLUSION

In the context of economic policies, unemployment is one of the issues with the most severe social consequences and the strongest social reflection. Throughout the world and especially in Turkey, unemployment stands out among the important socio-economic problems and remains constantly on the agenda. Every country, regardless of its development level, struggles with unemployment and the social and economic problems caused by this situation. Economic growth is considered the most effective and common way to combat unemployment. However, despite the increase in production, especially in the manufacturing industry, in recent years, employment has not increased, which has initiated a period of "employment-free growth" throughout the world. Productivity increase stands out as the main source of growth in this process. By the 1990s, it was understood that economic growth was

insufficient to solve the unemployment problem and the relationship between growth and employment had weakened. Although economic growth has been achieved in developed countries with the advancement of technology, increase in capital-intensive investments and changes in production methods, unemployment has not decreased. When the effects of technological change on economic growth and unemployment are examined, it is concluded that technology affects growth in a decisive way, and its effects on unemployment may vary depending on the quality of the workforce. In this context, it is important that economic policies also take into account the effects of technological change in the fight against unemployment.

Technological change has effects that will transform the workforce structure around the world. While it causes the unqualified workforce to become unemployed, it creates new employment opportunities for the workforce that can adapt to technology and receive the necessary training. Despite the knowledge economy and the emergence of new jobs and professions, the increase in technology-based production may cause declines in industrial employment. Shifting the workforce that cannot be employed in industry to the service sector has become a critical issue for all countries. It was seen in the indices examined in the study that the countries that anticipated and planned this process benefited from this transformation today. The issue has now become about producing information and making it usable in economic activities, rather than just producing products. While information is considered a production factor in itself, the transition to the information society and technological advances have increased the importance of education and human capital. In the knowledge economy shaped by technological change, the workforce is expected to consist of individuals who have the ability to make comparisons, are researchers and can easily adapt to changing conditions, have strong human relations, are creative, have high persuasion skills, are open to learning, can think analytically, are responsible, are prone to teamwork and can take initiative. With the change in business environments and understandings, the spread of flexible working conditions, the shift of the world economy to Asian countries, increasing world population, decreasing natural resources, deteriorating ecosystem and changing climate conditions, geopolitical uncertainties, changing expectations of conscious consumers, prolongation of life expectancy, increase in the elderly population in developed economies. Demographic and socio-economic factors such as rapid growth of the young population in developing countries, increased participation of women in the workforce, and rapid urbanization in underdeveloped and developing countries are among the factors affecting the structure of professions. Looking at the innovation indices, it is seen that countries with high income are also ahead in innovation.

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Looking at the innovation indices, it is seen that countries with high income are also ahead in innovation. While some countries such as Switzerland, Sweden, England and the USA stand out in the index rankings, this can be considered an important indicator of global competition and innovation. In an environment where economic relations are diversifying and technology and information are becoming widespread and accelerating during the globalization process, adapting to technology and the global economic structure has a critical importance in the adaptation process of the workforce. Technological developments that are expected to affect the labor market in the future include mobile internet and cloud technologies, increasing processing power of computers and big data formation, renewable energy sources, development of remote control systems in automation systems, increase in mass-based studies, advances in robotic technology, artificial intelligence applications, three-dimensional printing. There are advances in technologies, materials science and life sciences. Considering that the development of these technologies is shaped by leading countries, it is critical for developing countries to adapt to this process and strengthen their technological infrastructure.

Turkey's workforce potential and its young population make it one of the rare countries that can benefit from the demographic opportunity window until 2030. However, in the transition to the fourth phase of the industrial revolution, there are also negative factors for the country's skill level and labor market. These factors include factors such as not fully understanding the process, the existence of actors with a short-term perspective, limited resources, and the incompatibility of the workforce strategy with the innovation strategy. In this context, the following can be listed as short-term action suggestions for Turkey to meet its future labor

market needs: identifying the factors affecting skill change, improving existing skills with innovative practices, determining future change trends of occupational groups with data analytics methods, flexible working conditions to adapt to changing conditions. to organise. Long-term action suggestions can be shaped as providing multi-functional skills by aligning education processes with technological changes, and encouraging lifelong learning by strengthening public-private sector cooperation. Turkey needs to increase its activities based on industry and technology cooperation, develop policies that support qualified workforce, and work to increase women's participation in the workforce.

It is critical for Turkey to use science and technology effectively to achieve its long-term economic goals. To achieve these goals, some strategic tools and policies should be determined:

Investment in Advanced Technology and Trained Manpower: Turkey needs to invest in advanced technology and increase the number of qualified researchers and technical personnel. In order to keep up with the pace of technological developments, incentives and supports should be provided for scientists and technical personnel.
Industry 4.0 and Technology Transfer: It is important to put the Industry 4.0 concept on Turkey's agenda and initiate activities in this field. Incentives and regulations should be made to popularize digitalization and automation in industry.

Reducing Technology Dependency: Policies that encourage domestic production should be developed to reduce dependence on imports of intermediate goods containing advanced technology. In this regard, R&D processes should be supported and domestic production technologies should be developed.

Strengthening Technoparks and Technoparks: Increasing the number of technoparks and technoparks and increasing their effectiveness will ensure the creation of suitable environments for innovative entrepreneurs.

Strengthening the National Science, Technology and Innovation System: It is important to strengthen and make effective the National Science, Technology and Innovation System, which will enable Turkey to rise to the top in the innovation rankings. It is of great importance to increase education, research and industry cooperation within this system.

Investment in the Education System: Turkey needs to produce radical solutions in the field of education in the process of economic transformation based on science and technology. It is critical to restructure educational processes and implement policies that encourage lifelong learning to develop scientific and technical skills.

Innovation and Commercialization Focused Policies: Innovation-focused policies need to be supported to ensure that the information produced and developed technologies turn into commercial and social benefit. These policies should include regulations that encourage commercialization of the results of R&D processes.

Turkey's potential has the capacity to take important steps in the innovation process with the right strategies and policies. However, in this process, strategic decisions must be made and these decisions must be put into practice in order to keep up with the pace of technological developments. The moves that Turkey will make during the transition to the fourth phase of the industrial revolution will be decisive for future economic success.

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