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A REVIEW OF MALTHUSIAN THEORY OF POPULATION UNDER THE SCOPE OF HUMAN CAPITAL

Ebru Unat*

ABSTRACT

Although studies on population date back, the economic and sociological consequences of this phenomenon have still been the subject of many studies today. One of the most important studies on this issue is the pessimistic view of Malthus which purports that the food supply will remain at a limited level due to the fixed amount of agricultural land in the world, and the world population will increase faster than food production, and those situations such as hunger, poverty and death will occur in the society. However, with retrospect to our previous experiences in the current period, it is apparent that the views claim that the population increase will drag humanity into disaster due to factors such as technological progress and human capital are invalid. In this study, first of all, the validity of Malthus' views on population will be examined in terms of the developments in the historical process, and then, Malthusian Theory of Population will be reevaluated within the scope of human capital forasmuch as the population is considered only with the quantitative dimension in the model.

KEY WORDS: Malthus, theory of population, human capital.

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1. INTRODUCTION

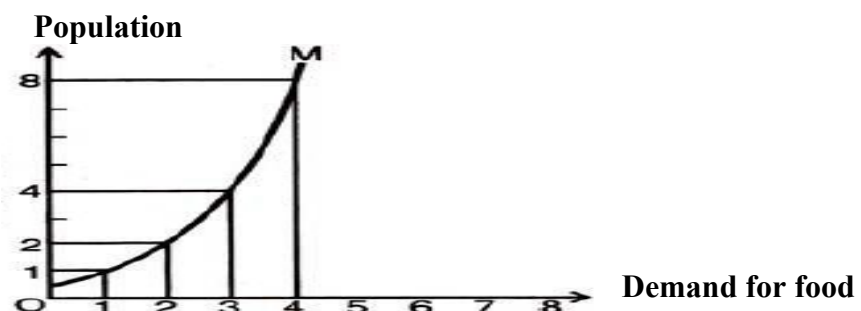
The concept of scarcity, which forms the basis of Economics, has brought many studies on this subject. The scarce resources within the scope of supplying the needs have led to the problem of distribution with the increase of the world

population, and this situation caused both policy makers and economists to focus on the issue of population. While politicians have been seeking answers to questions such as “what the population growth rate should be in a country?”, “the economic and social effects of population increase or decrease”, researchers have brought optimistic and pessimistic perspectives on the economic effects of population growth. One of the most controversial issue of study, which forms the basis of the views offering a pessimistic perspective by drawing attention to the negative aspects of population growth, is the approach of Malthus. It suggests that population increases will exceed the supply of food, and cause a damage to both society and economy.

1.1. Malthusian theory of population

Thomas R. Malthus, who became popular with his article "An Essay on the Principle of Population", wrote this work in 1798 to warn the citizens of the country about the disasters that would occur due to the increasing population in England. According to Malthus, as a result of the Law of Reducing Yields, the amount of food per capita tends to decrease as the population increases (Chowdhury & Hossain, 2018, p. 2-3). Malthus stated that the food production in the world will increase at an arithmetic sequence, and the population will increase at a geometric rate, and thus, the population will be doubled every twenty-five years if it is not controlled once (Malthus, 1798, p. 6-7). Assuming that a country's population requires 1 million metric tons of rice per day, according to Malthus's theory, after five years, the demand for food will double when the country's population increases as much as itself. However, according to this theory, it is not possible to produce more food in response to the increasing population (Rahman, 2018, p. 15). In Figure 1, geometric and arithmetic increase rates for food production and population are expressed.

Figure 1. Malthusian theory of population



Source: (Malthus, 1798, p. 8)

In Figure 1, the vertical axis expresses population whereas the horizontal axis expresses the food supply, and OM represents the balance between food supply and population growth. According to the theory of Malthus, it is seen that the food supply increases arithmetically in the form of 1, 2, 3, 4, 5, 6, 7, 8, while the food production increases in the form of 1, 2, 4, 8, and that is, geometrically.

The model introduced by Thomas R. Malthus, which is the first systematic attempt in terms of economic growth and determination of personal income (Ehrlich & Kim, 2005, p.1), is based on micro bases, since it includes factors such as fertility, death and the production side of the economy despite its strict conditions, and it consists of two basic elements. First, the existence of certain production factors, such as agricultural land, which has a fixed amount in the world, means decreasing return as to the scale for other production factors. Secondly, the increase in living standards positively affects the increase of the population. According to this model, if there is no change in technology or the availability of agricultural land, the population will balance itself. Additionally, even if available resources increase, the level of per capita income will not change in the long run. Because, technological advances or wider farmland will lead to the creation of a numerically larger but poorer population (Galor & Weil, 1999, p.150). That is, according to this view, even if there are technological developments that contribute to the increase of agricultural yield, and a temporary increase in living standards, this temporary improvement will disappear with the increasing population in the long term (Abramitzky & Braggion, 2003, p. 2).

In the 1900s, technological developments in the field of agriculture caused the supply of food products to increase rapidly, and hunger started to be no longer a problem in the world (Aysan, 2014, p.69). However, after the World War II, the increasing number of births and the increase in the ratio of the unproductive population to the general population caused the relationship between the population and the food supply to come to the fore (Turanlı, 1977, p. 83). In this context, some researchers in the field of Social Sciences, also known as Neo-Malthusian, who see population growth as a problem for social welfare, reevaluated Malthus' model. This group, which had great contributions to demography after

World War II, and played an important role in the decisions of various international organizations such as the United Nations, focused on the damage to the environment by population growth rather than the problems of food supply in the world, and, unlike Malthus, they supported modern birth control methods such as abortion (Aysan, 2014, p. 69).

1.2. Criticisms against the Malthusian theory of population

As an explanation of population-income interactions, the Malthusian model had a long period of success, covering most of human history in many parts of the world until the beginning of the industrial revolution (Weil & Wilde, 2009, p. 255). However, it was seen that Malthus was wrong about human reproductive behavior, and with “the Law of Declining Yields” he put forward in his model. With the Industrial Revolution in England, a period of continuous improvement in technology started, and while earnings exceeding the effects of decreasing returns in labor productivity were obtained, per capita income also increased. At the end of the 19th century, couples consciously placed emphasis on contraception, resulting in smaller family size. At the beginning of the 20th century, domestic economic and demographic characteristics such as stable but slow population growth, low fertility, continuous productivity growth and increasing consumption began to be established in modern industrial economies (Birdsall, 1989, p. 26).

Malthus' claim regarding the relationship between population growth and productive capacity has received harsh criticisms. Malthus stated that with a fixed amount of farmland and a growing population, marginal productivity decline would cause people to live at a constant subsistence level. A common criticism is that technological advances and capital accumulation are strong enough to ease population pressure, and even in the presence of a growing population, the possibility that the condition of individuals could improve is overlooked. One type of criticism is that the potential positive consequences of Malthus' population growth in the long run are ignored. Simon (1977), on the other hand, emphasizes the long-term benefits of population growth, and claims that population growth has a negative effect on living conditions in the short term due to reduced yields and temporary burden on society, but the population, which increased due to

developments and economies of scale, would have positive effects on living standards in the long run. Another criticism is that the fertility decisions of the parents are not emphasized in Malthus' model. This criticism has been addressed from three different points of view. The first is that in the modern era, the population of poor countries is growing faster than rich countries. Second, fertility rates are negatively associated with per capita income, and third, life expectancy at birth is much higher in countries with higher per capita income (Abramitzky & Braggion, 2003, p. 8-10). Moreover, in the model, it is emphasized that the growth rate of the population depends only on the economic growth rate, and the effect of other economic factors is ignored. In addition, other factors such as cultural structure and education level may affect population growth (Üzümcü, 2018, p.115).

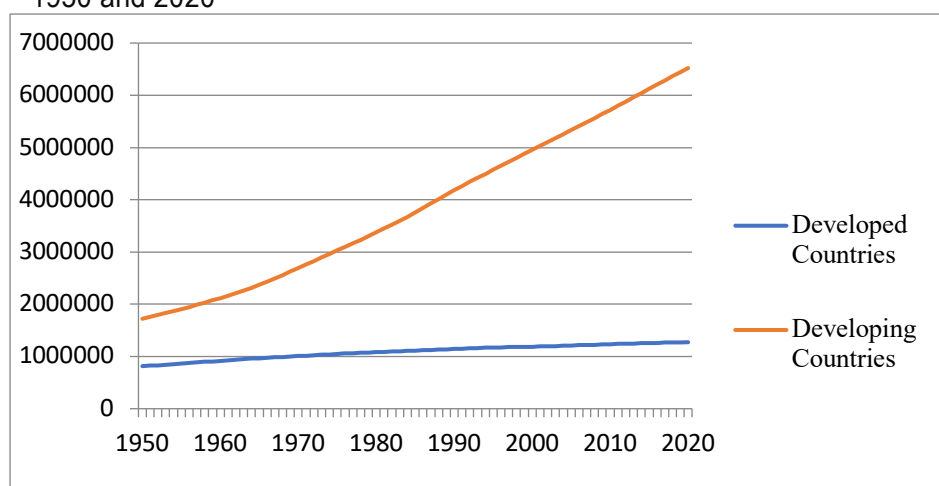
When considered in terms of recent developments, Malthus' views that food production increases arithmetically, and the population increases geometrically do not reflect the truth. Because, with the development of science in the 19th century, it was seen that production increased significantly with new production techniques together with the mechanization in agriculture. In addition, it has been observed that the population decreases as the quality of life increases. As an example of this situation, many of the developed countries of the western world have been facing a decreasing population problem. It is stated in the model that population growth is a bad situation, but population growth is an important factor in increasing the production of countries. Finally, Malthus dealt only with the numerical aspect of the population in his theory, and neglected the quality of the human factor, which would become a source of wealth for the country if the population was educated, and became productive and hardworking (Rahman, 2018, p. 19-20). Cooper and Block (2019, p. 36-37), in line with these criticisms, drew attention to the importance of the human capital factor in response to Malthus' model, drawing attention to the negative aspects of the excess population, and stated that technological developments increased exponentially in a much shorter time compared to population growth in recent years.

1.3. Validity of the Malthusian theory of population in history

Today, the phenomenon of population is regarded as a driving force for the countries' economies, but it is known that it affects economic performance depending on factors such as age, and quality of the country's population. With the effect of technological developments in the field of health, the world population has continuously been increasing from past to present.

The world population has been growing since 1950, albeit at a slower rate than ever. The world population reached 7.7 billion in mid-2019, with one billion people since 2007 and two billion since 1994. The growth rate of the population peaked in the period of 1965-1970 with an average increase of 2.1%. Since then, the global population growth rate has slowed down to less than 1.1% per year in the 2015-2020 period, and it is predicted that it will continue to slow down until the end of this century (United Nations, 2019, p.5). Although it is known that the world population is constantly increasing, this increase varies from one country to another. At this point, it is seen that the majority of the world population is composed of underdeveloped and developing countries. In Figure 2, the course of the population of developed and developing countries in the period between 1950 and 2020 is elaborated:

Figure 2. The course of the population of developed and developing countries between 1950 and 2020

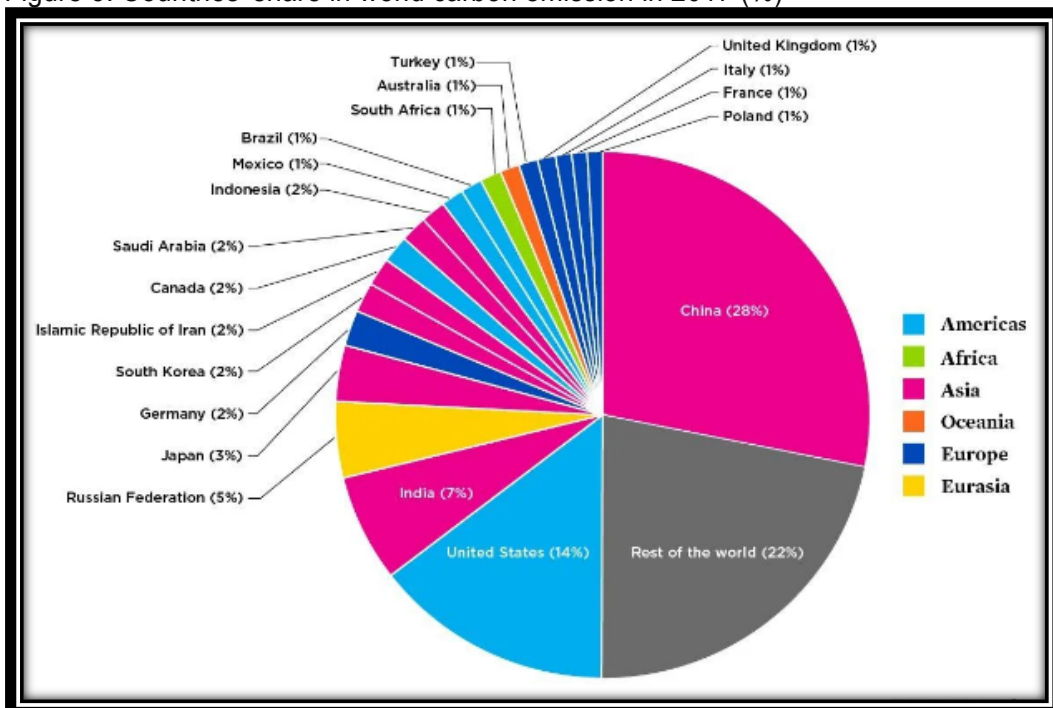


Resource: (United Nations, 2020)

In Figure 2, it is apparent that developing countries constitute the majority of the world population compared to the developed countries, and the difference between

them has increased significantly since 1950. It is known that especially China and India, which are among the developing countries, constitute the majority of the world population. By all means, it seems that this overpopulation also causes serious problems for our planet. With the industrial revolution, countries entering into an intense competition environment have caused a serious increase in the use of fossil fuels in the world. With the excessive use of fossil fuels, there has been a serious increase in world carbon emissions, and eventually problems such as global warming, environmental pollution and climate change have emerged. Figure 3 shows the share of countries in the world carbon emission for the year 2017.

Figure 3. Countries' share in world carbon emission in 2017 (%)

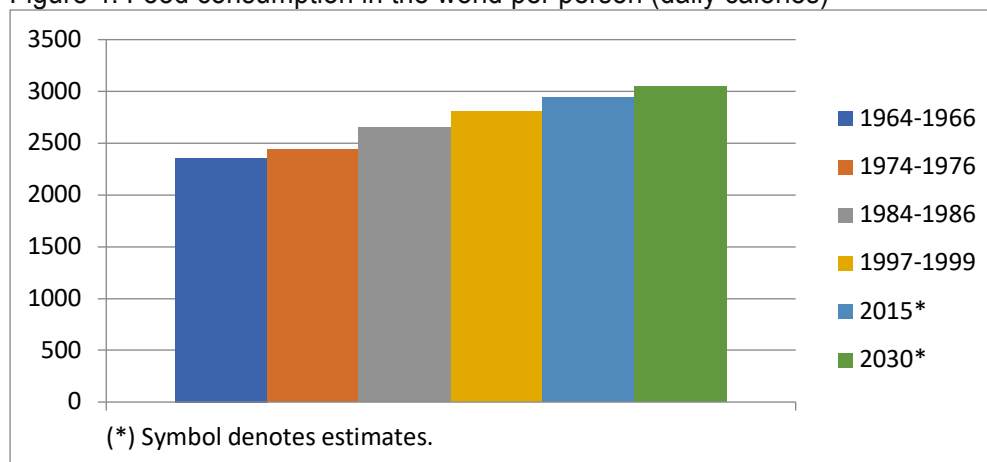


Source: (Union of Concerned Scientists, 2020)

In Figure 3, it can be seen that China, which is one of the countries with the largest population in the world, plays an important role in global carbon emissions with a share of 28%, which is followed by the USA 14%, and India 7% respectively. Notably, considering that carbon emissions originate from countries with large populations, it supports the claims of the Neo-Malthus view that population growth will cause global destruction.

Another proposition of the Malthusian view is the pessimistic view that the increase in the world population due to the limited amount of agricultural land will expose humanity to famine and hunger. In this context, considering today's world where we have much larger population, it will be useful to see how the world food consumption follows. In Figure 4, daily calorie values per person, which is an important variable used to measure and evaluate the development of food status at global level, are expressed over the years.

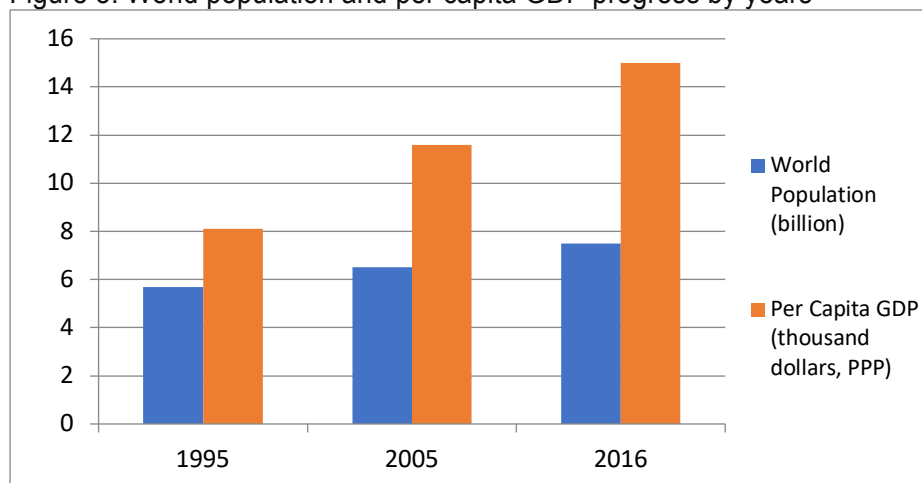
Figure 4. Food consumption in the world per person (daily calories)



Source: (WHO, 2009)

When Figure 4 is elaborated, it is a crystal clear fact that food consumption per capita in the world has continuously increased over the years. When today's world is evaluated with these developments, it is seen that the terrible scenario Malthus put forward for humanity in his theory has not materialized thanks to factors such as the improvement of unproductive lands, the transition from manpower to mechanization in agriculture, and the efficiency in the production of food products with the developments in technology. In addition to this, there is a claim in the model that world output is constant, and thus population increases will only cause people to earn less income. However, considering the recent developments, it has been observed that this is not the case at all. In Figure 5, developments in the world population and per capita GDP in the historical process are expressed.

Figure 5. World population and per capita GDP progress by years

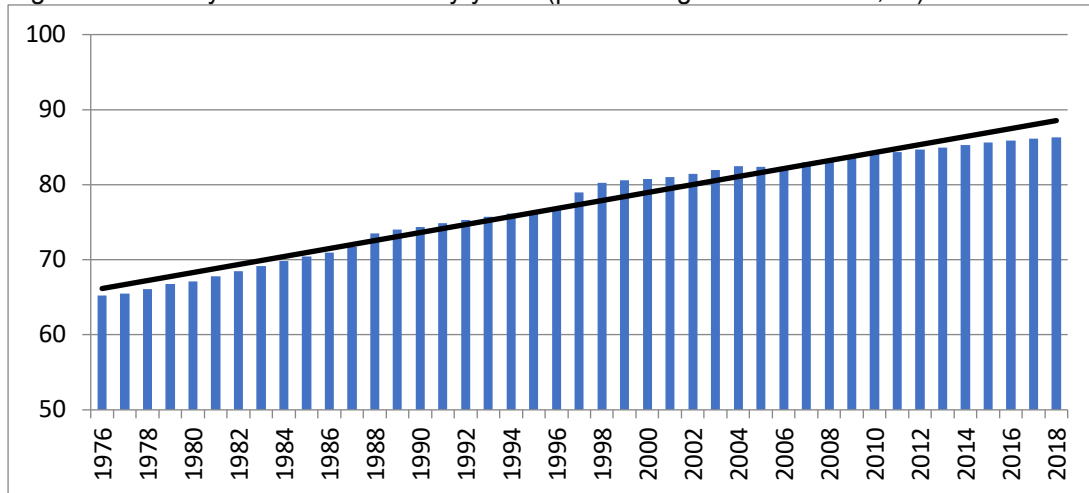


Source: (FAO, 2018)

In Figure 5, it is observed that GDP per capita increases in response to the continuous increase in the world population. The per capita GDP value, which was approximately 8 thousand dollars in 1995, increased to approximately 15 thousand dollars by 2016. The fact that the value in question has an increasing tendency in the historical process shows that the view that the world output is constant, which is put forward in Malthus' model, is invalid. Therefore, contrary to Malthus' model, while the world population is increasing, positive developments in income bring the concept of "human capital", which increases the efficiency of physical capital, and is an indicator of development.

Human capital, which expresses a set of knowledge and skills that have educational and economic value, is viewed as an important factor in contributing to economic growth, and the impact of education on human capital appears to be an important issue (Islam et al., 2016, p. 1723). In this context, it is necessary to examine the development of human capital at a global level, which is ignored in Malthus' theory. Education, which is accepted as a human capital indicator in Figure 6, is discussed with the literacy rate dimension.

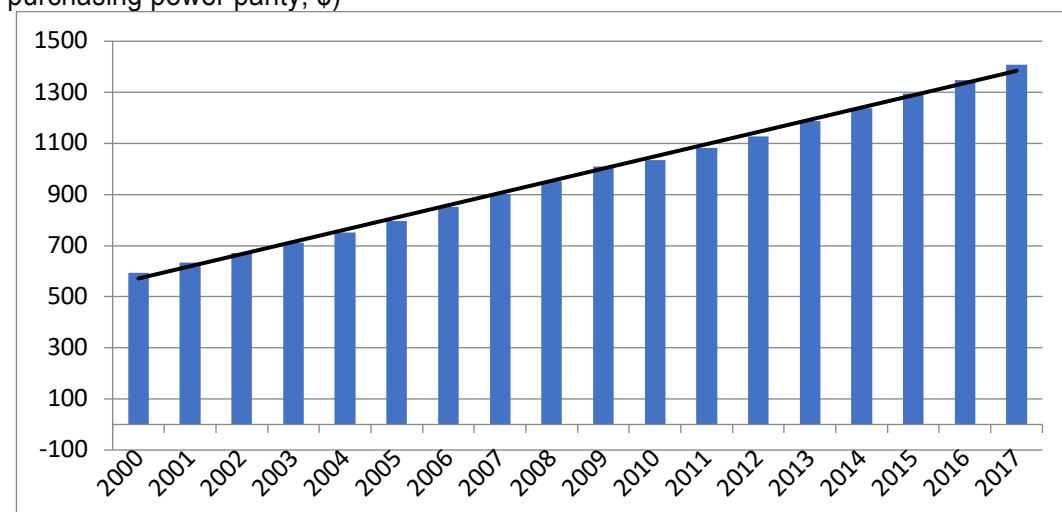
Figure 6. Literacy rate in the world by years (persons aged 15 and over, %)



Source: (World Bank, 2020)

Figure 6 shows that the literacy rate, which was 65% in 1976, increased to 86% in 2018. Therefore, it would not be misleading to say that the importance given to human capital, which has a high return for society and economy, has increased from past to present. One of the indicators to monitor the development of human capital is health. Since the health of a society will contribute to the development of this capital. In Figure 7, health expenditures in the world per capita between 2000 and 2017 are expressed.

Figure 7. Current health expenditures per capita in the world by years (according to purchasing power parity, \$)



Source: (World Bank, 2020)

When Figure 7 is clarified, it is seen that health expenditures per capita have constantly been increasing, and therefore, the economies of the country are

increasingly attaching more importance to human capital for development and growth. In today's world, human capital is regarded as the keystone of a country's main wealth, and a society's social and economic development. For this reason, the concept of human development regards the human factor, which is at the center of the progress of civilization, as the main purpose of socio-political and socio-economic processes rather than merely as a tool. Undoubtedly, this importance given to human capital has an important role in increasing the growth rate of economies when compared to physical capital (Yakunina & Bychkov, 2015, p. 766-767).

2. RELATED LITERATURE

Malthus' pessimistic views on the population issue have been the focus of attention for researchers from past to present, and have been criticized from many perspectives. Today, although the effects of population growth on economic growth and development are still carried out in the axis of Malthus' model, it is seen that there is no consensus on this issue due to the reasons such as the economic structure of the country that is taken as basis, or the period under consideration. In this part of the study, the studies carried out within the scope of Malthusian population theory, and the studies accessible in the literature will be briefly mentioned.

Madsen et al. (2019) tested the Malthusian model by means of panel data analysis for 17 OECD countries using income and population variables in the period between 900 and 1870. In the study, income variable was represented by real wages and GDP per capita. The results revealed that fertility and demographic factors were important sources of economic recession during the period before the industrial revolution. Therefore, it is stated that overcoming the population problem put forward by Malthus in his theory is a key component in understanding the sources of modern growth and underdevelopment.

Chowdhury and Hossain (2018) examined the relationship by means of data covering the period between 1960 and 2017 in Bangladesh, and the GDP per capita per capita together with population growth rate by simple linear regression analysis.

According to the findings of the study, it was determined that there was a negative and statistically significant relationship between these variables, and when there was a 1% increase in population growth, there was a 1.95% decrease in GDP per capita. Therefore, the population growth negatively affected the economic development of Bangladesh, and this supported Malthus' theory. In addition, the study also noted that Malthus made a mistake by addressing only farmland and food production in examining the population issue, and that in addition, it was emphasized that the variables such as natural resources, human capital development, skilled labor exports, factories, industries, machinery, mines and other specialized industries should be also taken into account. Oladimeji and Hassan (2017) examined the relationship between population and rice production in Nigeria with data covering the period between 1960-2015 to test the validity of Malthus' population theory. The findings of the study showed that in contrast to the study conducted by Chowdhury and Hossain (2018) in Bangladesh, parallel to Malthus' views on population and food production, the population in Nigeria increased at a geometric rate, and rice production at an arithmetic rate.

In his study, Ozturk (2012) examined the relationship between fertility and poverty on a provincial basis for the economy of Turkey with the cross-sectional estimates made with data entailing the years between 1990-2000. According to the results of the study, a negative and significant relationship was found between the fertility rate and income of the provinces. Findings also showed that having more children caused poverty in provinces. In other words, while the income level was low in provinces with high total fertility rate, it was concluded that the income level was high in provinces with the total fertility rate at the lowest.

In a study carried out for the period between 1968-2006 in relation with the Turkey's economy, Telatar and Terzi (2010) examined the relationship between economic growth, population and education with the help of Granger causality test together with VAR analysis. According to the results of the study, contrary to the belief that the increase in living standards suggested by Malthus in his model had a positive effect on the increase of the population, the growth rate of population growth led to a reduction in per capita income in Turkey.

Eren (2020) analyzed the relationship between population growth and development in sub-Saharan African countries, which were among the lowest developed countries in the world, with data covering the period between 1990-2017 by means of panel data analysis. In the study, the Human Development Index (HDI) was used as an indicator of development, and the population growth rate as the variable of population. According to the findings obtained, it was found that there was a bidirectional causality relationship between population growth and development, and therefore, as well as population growth was important for development in this country group, development was also important for population growth.

3. CONCLUSION

Malthus' views on population issue have been the subject of many studies, and discussed for many years. Considering that Malthus evaluated his views on this issue for the period in 1798, it might not be possible to state that his pessimistic views on the subject of population were unfair. However, considering the world experiences in the historical process and especially the developments in today's age of technology, it has been apparent that Malthus' views that population increase will cause situations such as famine, hunger and misery in the world are invalid. Since the second half of the 20th century, the world population has continued to increase, and on the other hand, technical developments in the field of agriculture have increased the productivity of food products, and led to a further increase in food supply. Despite the fact that there are people dying of hunger although there is an in food supply in the world, and this view does not justify the views of Malthus. However, it is possible to confirm that this is due to the unfair distribution of income. As of the period examined, it has been observed that the population increase has stemmed from developing countries compared to developed countries. Considering that the majority of global environmental problems are caused by such countries with a high population, the Neo-Malthus view is justified by the claims that the increased population will mushroom negative effects for the goodness of the environment. In addition, it is observed that the population has increased at a low rate in developed countries with high per capita income, which is also contrary to the views of Malthus.

Another view of Malthus is that population increases will push people into poverty, considering that the world output is constant. However, considering the recent

developments, it is seen that the situation is quite the opposite. The reason for this situation is that Malthus' model handles the world population only numerically, and neglects the quality of the population. Today, the human capital factor, which expresses the quality of the population, is the basic building block for countries in both economic growth and development processes. Increases in human capital investments in recent years have indicated the importance of this factor, and showed that population is an important source of wealth for countries, which is also in contradiction with the views of Malthus.

DISCLOSURE OF CONFLICT

The author declares that she has no conflicts of interest.

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