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ABSTRACT

THE EFFECT OF URBANIZATION ON AGRICULTURAL PRODUCTION OF SESAME CROP: CASE OFTURKEY

This paper examines the impacts of increasingly urbanization on the production of sesame seed in turkey and a declining ratio of sesame seed to sustenance consumer. Urbanization has been increasing supported by the growth and development on the economy and in the extent of gross world item and of laborers in modern and administration endeavors. Comprehensively, Agric productions has fulfilled the needs from this growing urban populace but a huge number of populations endure under-nutrition. So, the main problem concerning agricultural production of sesame seed and urbanization is whether the changing demand of sesame seed production from expansion of urban activities can be sustained. Furthermore, the need to decrease carbon dioxide gas emission and to build resilience in agriculture and urban improvement to environmental change impacts.

Keywords: Urbanization, Food security, Malnutrition, Sustenance, Carbon dioxide, Population.

ÖZ

KENTLEŞMENİN SUSAM BİTKİSİNİN TARIMSAL ÜRETİMİNE ETKİSİ: TÜRKİYE ÖRNEĞİ

Bu tez, giderek artan kentleşmenin Türkiye'de susam bitkisi üretimi üzerindeki etkilerini ve susam tohumunun toplam tüketitim içindeki azalan oranını incelemektedir. Kentleşme, ekonomideki büyüme ve gelişme, teknoljik gelişme ve yönetsel çabalar ile gayri safi milli hasıladaki artış ve çalışan sayısındai gelişmelerden etkilenmektedir. Konu kapsamlı bir şekilde incelendiğinde, tarımın bu büyüyen kentsel nüfusun ihtiyaçlarını karşıladığını, ancak yeterli ve dengeli beslenme açısından yetersiz kaldığını görmekteyiz. Dolayısıyla, susam tohumu tarımsal üretimi ve kentleşmeyle ilgili temel sorun susam tohumu üretiminin kentsel faaliyetlerin yayılmasından artan talebinin sürdürülüp sürdürülmeyeceğidir. Ayrıca, karbondioksit gazı emisyonunu azaltma ve tarım ve kentsel gelişmede çevresel değişim etkilerine karşı dayanıklılık sağlama ihtiyacı da önemlidir.

Anahtar Sözcükler: Kentleşme, Gıda güvenliği, Yetersiz beslenme, Sürdürülebilirlik, Karbondioksit, Nüfus.

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ABBREVIATION

ALC= Agricultural Land Conversion

TCPD= Town and Country Planning Department

FOA= Food Agricultural Organization

GDP= Gross Domestic Production

EU= European Union

UN= United Nations

OLS= Ordinary Least Square

BLUE= Best Linear Unbiased Estimator

C02= Carbon Dioxide

GHG= Green House Gases

Ha= Hectare per Area

KT= Kilo Ton

CHAPTER ONE

INTRODUCTION

Food security is now a global challenge that is attracting increased attention around the world. This opposite is said when people and animals are facing insufficient food sustenance to meet the requirements of a balanced diet. In Turkey, agriculture is one of the fundamental production sectors that contributes to the country's economy. The benefits of agricultural production to the economy include giving nourishment to the population, providing raw for manufacturers, generating income for agriculturalists.

Sustenance is also defined as the situation in which people and animals have consistent access to an adequate diet and nutritious food that meets their nourishment needs to sustain a functioning and healthy life. Family sustenance security is the application of this concept to the family level, with people within families as the focal point of concern.

Food insecurity is said when individuals do not have satisfactory physical, access to food, as characterized by the above. Estimation is indirect and dependent on sustenance accounting reports, national salary appropriation and buyer consumption information.

Agriculture is the means of production of food items, feed, fiber and various other necessary items through the development of specific crops and the raising of farm animals (livestock). Farming can help raise earnings and enhance food security for 80% of the world's poor, who live in rural regions and predominantly work in cultivation. A large proportion of the Turkish population work in the agricultural

sector, in spite of the growing industrial and administrative sectors. About 35.5% of the nation's terrain is arable and 15% is comprised of woodland. According to statistics from 2015, 24 million hectares had been developed. Around 18.4% of the developed land is inundated. Vegetable items represent 76% of total agricultural production, while animal husbandry, Turkey's prolific soil, adequate atmosphere, and abundant precipitation allows the development of practically any sorts of yields. Cultivation is practiced in the majority of the areas in Turkey, although it is less prevalent in the mountainous, and in eastern districts where the primary action depends on farming, which is estimated to contribute one fifth of the overall agricultural production (Burak Sansal, 2009).

Agriculture is an imperative driver of economic development both for value-added and job creation. According to a Foreign Trade Statistics report (2011). Turkey agricultural productions accounts for about 4% of the total exports. There are other indicators verifying that agriculture makes a significant contribution in Turkey. However, the fact that agriculture is important in Turkey creates specific problems for this sector (Bozdağlıoglu 2008, Demirdöğen vd., 2012). This sector consistently only received 4% of the planned budget. This, in turn, caused the Food Security and Agricultural sector to achieve production of 4.8% below its targeted numbers resulting in subpar performance for key producers and negative implications for long term performance (Turkey Institute of Statistic, 2007)

In the 1980s, Turkey was among the top 10 most sufficient countries in term of food security. In recent years, there has been less focus on food security. The 2017 global food security index stated that Turkey is ranked 49th in the overall scoring. The reason for the deterioration in Turkey's self-sufficiency ranking is related to the social shift factor whereby technological advancement increases prosperity via urbanization. This shift was reflected in a decrease in relative agricultural production. In Turkey, the number of people within the agricultural sector is gradually reducing. The contribution of agriculture to the GDP in Turkey was estimated to be approximately 10% in 2011. This contribution has diminished over the years and the amount of industrial sector growth during the period has

increased by 9.0% (TIS, 2012 Main Economic Indicators). Turkey is very rich in fertile land, has a good climate, and a substantial labor force. Turkey is applying technological developments more effectively in farming, and the gains in the short term are likely to be significant in terms of food self-sufficiency and exports and potential improvements in agriculture might also help decrease youth joblessness. Agricultural technology will enable Turkey to meet the demands of the United Nation's 2030 agenda objectives as well as its development goals.

Sesame plants are one of the oldest plants that are planted seasonally and cultivated for oil. The plant is rich in oil that contains around 50-55 percent of oil and 26 percent of nutrients (Marco Sampaolo, 2007). The oil contains a high percentage of protein, and moreover, the oil is used for a variety of purposes including for consumption and non-consumption. Consumption uses including heating food, sweets, cooking oil, and other margarine. Non-consumption usage includes soaps, beauty care products, perfumes, and insect sprays.

Sesame seed oil is likewise utilized for pharmaceutical and nutraceutical products. The oil contains antibacterial properties that heals skin problems like athlete’s foot and the oil has general antiviral properties. Also, the plant is used to feed poultry and livestock.

This plant can grow to a height of 40-50 inches, extended and unbranched depending on the species. The plant develops best in all around rich soil with the medium surface, however it has no resistance to salt. Hot conditions deliver the most extreme yields (Ray Langham D, et al 2008).

In 2016, the world harvest of sesame seeds reached approximately 6.1 million tons, driven by Tanzania, Myanmar, India, Sudan, and Turkey. The white and other lighter-shaded sesame seeds are found in Europe, the Americas, West Asia, and the Indian subcontinent. The dark and darker-hued sesame seeds are generally produced in China and southeast Asia. Turkey, which is officially known as the Republic of Turkey and is considered both a European and an Asian nation. It is situated toward the northwest of Bulgaria, while Greece is located to the west, Armenia, Azerbaijan, and Iran toward the east, Georgia toward the

upper east, Syria toward the south; and Iraq toward the southeast. Turkey is bordered by water on three sides, with the Mediterranean in the south, the Aegean to the west and the Black Sea in the north. The Marmara Sea, in the northwest, incorporates both Istanbul and the Dardanelles Straits (Food and Agriculture Organization Statistical Databases [FAOSTAT], 2015).

Turkey has an overall land area of 76963ha and comprises agricultural space of 38327ha with a forest area of 11817.4 ha. The farming sector has been one of Turkey's largest employers and a noteworthy supporter of the nation's GDP. Turkey is among the nations around the world that is independent as far as sustenance. The nation has rich sol soil, access to adequate water, a reasonable atmosphere, and dedicated farmers, which combined generate a fruitful agricultural sector. This has enabled Turkey to become the largest producer and exporter of agricultural items in the Near East and North African regions. In terms of world rankings, Turkey is one of the top 10 producers of fruit, wheat, and cotton in the world because of this vast production base. Turkey benefits from a comparative advantage in farming items, and has a positive exchange balance in farming that contributes to alleviating the general trade deficit. The nation's key trade markets are the EU and the United States, to which Turkey delivers dried leafy foods, cotton, and tobacco. Another significant trade market is Middle East, which purchases fresh natural product, vegetables, and meats from Turkey (World Bank Report 2010).

The rapid growth of urbanization in Turkey after the 1930s and government strategies have led to a decrease in the proportion of the GDP attributed to agriculture. The contribution of the agricultural segment to the GDP was almost 50% in 1950, 25% in 1980, 15.3% in 1990, 11% in 2005, and 7.4% in 2014 (World Bank Indicator, 2016). This caused the fall of economic measures of the agriculturists and led to migration from provincial to urban regions. In the 1990s, the State urged the farmers to adopt new technological methods and has made infrastructural developments, including irrigation systems for the development of the rural areas.

In spite of farming's relative decrease over the most recent 30 years, the area still contributes a vital job in trade exchange. Turkey exports out numerous food items, for example, grains, beats, mechanical harvests, sugar, nuts, crisp and dried natural products, vegetables, olive oil, sesame, and domesticated animals' items. The principal trade markets are the European Union, the United States, and the Middle East. Around 21.5% of absolute work in Turkey in 2014 was in the farming sector Turkey Foreign trade statistic report (2017). Urbanization as the rate of occupying area per meter of land for the purpose use of activities like buildings, constructions, industrialization, that affects the process of growing food sesame seed in turkey. Urbanization alludes to the populace move from country to urban residency, the progressive increment in the extent of individuals living in urban zones, and the manners by which every general public adjusts to this change Urbanization alludes to the expanding number of individuals that live in urban territories. It transcendently results in the physical development of urban regions.

When individuals move from provincial settlement to urban communities and towns. Settlements in the urban regions get more thickly compress but urban offer more worthy changes to the migrant as like higher-paying occupations and variety of opportunities. Urbanization is a characteristic piece of producing society but it has its other side as populaces in urban communities and towns develop it then attack people from the rural region. We have to hit an offset with urbanization in the event that we need to prosper as general public. This constructive outcome of urbanization has an effect on the general environment, but it has a negative side. As more individuals move to the city and the city get populated, the guaranteed open doors start to diminish. Sooner or later, the activities in the urban communities and towns turn out to be affecting the process of cultivating the crop. Urbanization may be a characteristic societal procedure that can prompt disaster. Urbanization is inevitable as a nation's development moves from farming’s and towards industry, Individuals start to move to the urban areas for better access better opportunity to enhance their living.

A country's urban populace can expand from regular increases of births and decreases of death, net rustic- urban relocation can said as when rural individuals relocate to urban consequently increasing urban limit. Countries with high economy and generally slow rates of regular increment, for example, China in the course of recent decades have a large portion of their urban populace development from urbanization; countries with next to zero economic development and high rates of common increment like (sub-Saharan African countries as at 1990s have the majority of their urban populace development from characteristic increment (Potts 2009). Contrasts in country and urban rates of normal increment (impacted by difference in birth and death rates) also impact urbanization.

The term urbanization is also used as the expansion of urban territory and the activities on it. The conventional defining of urbanization used for this thesis entails a change or on-going land activities from agricultural activities to other activities that are non-agricultural. By way of comparison, much of the growing of urban land use is as a result of conversion of farming land to more settlement. In actuality, the term urbanization is utilized to describe to two contradicting statement, growing and development of an environment and then the effect causes on the environment for instance, degradation of land, pollution of land, and changing of land cover.

Different elements added to urbanization, individuals looking for the best chance to accommodate themselves and their families, and urban situations are regularly the appropriate response. The process of urbanization interrupts agricultural process which leads to the decline of agricultural products production.

Turkey is an extension between landmasses of Asia and Europe with a populace of 76.7 million and zone of 780 thousand square kilometers. A fast populace increment was set apart in Turkey following 1950s and in parallel with the movement from provincial regions to the urban territories, the level of urban populace rose to 44% in 1980, to 65% in 2000, and to 77% in 2012 while it was 25% in 1950 (World Population Review, 2015). It is anticipated that this rate will

have an expanding pattern in the following time frame too. Fast urbanization has formed economy, social structure and regular habitat of the urban areas.

In parallel with this fascinated urbanization process, net national production per capita in Turkey has strikingly expanded. Considering just the development since 2007 to date, it is noticed that normal yearly worth increment is 2,1% in agriculture area, 3.7% in manufacturing sector and 4% in administration part. Thinking about the portions of share in GDP, the portion of manufacturing sector in 1960 was 17.6% and the portion of administration sector was 26.4%, while the portion of manufacturing sector 2012 wound up 27%, and the portion of administration sector increases up to 61.9% (Turkey Institute of Statistic, 2014).

1.1 Statement of the problem

Sesame seeds are an important source of edible oil for production. The consumption of sesame seed is increasing due to the high demand of the product as source of raw materials to produce different products, including for traditional Turkish foods. A decrease has been observed in the annually quantity of sesame seeds produced in Turkey.

This research deals with the question in regard to how urbanization affected the agricultural production of sesame seeds in Turkey from 1986 to 2016. It uses various components of urbanization as indirect indicators to measure the rate of urbanization.

1.1.1 Agricultural Policy and Structural Reforms in Turkey

In Turkey, the agricultural industry has a particularly important share of the deve loping countries ' distinctive economy.Accordingly, latest procedures in the glo bal economy such as increasing food prices, climate change and other natural ri sk variables have improved the vital position of agricultural manufacturing and c omparatively more attention has been paid by policymakers to the sustainability issue in agriculture in government policies. According to Turkish Statistics Institution information (2004), the proportion of the agrarian industry in GDP is 11% with the jobs of 28% of the complete labour population in Turkey. The share

of the agricultural sector in the economy as a whole is declining, but it still plays a major part in Turkey's economy. Although a substantial portion of the population is involved in agricultural operations, owing to their small share of GDP, national income has been unfavorably allocated to rural regions.

According to Dr Sezai Ozan Zeybek (2014) a research fellow at the Forum Transregional Studies in Germany stated that Turkey has become reliance on food imports has increased over the last decade because problems started from wrong government policies and can be solved by incentivizing small farms, alternative and more environmentally friendly production technologies, said sociologist Dr Sezai Ozan Zeybek, Furthermore, he said small farms dominate the agriculture sector in the nation, while the Turkish government's policies are geared towards assisting larger farms said Zeybek.

Over the previous centuries, the Turkish state has attempted to enhance the agr icultural industry by setting up largescale irrigation systems, supplying farmers with inexpensive credit, and subsidizing inputs. But with farmers ' incomes and food prices, all these expensive programs have failed to balance agricultural output.

The government declared reforming the agriculture sector in 2006. They draw up a plan aimed at creating an extremely competitive and structured sustainable agriculture industry by taking into consideration the economic, social, environmental, and international development dimensions within the principle of the utilization of the resources effectively. In this framework, the agricultural support measures have been reidentified.
The Agriculture Law passed in 2006 was determined to regulate agricultural and rural development policies in accordance with growth plans and strategies. The Agriculture Law also defines the objectives, scope and subjects of the agricultural policies, the financing and administrative structure were the instruments of support for agriculture and rural development, then the legal and administrative arrangements for the main research and development programs to be implemented in the agricultural sector.

Statements on agricultural reforms was made by the Minister of Food Agriculture and Livestock;

“Now we have a young and dynamic population exceeding 75 million. We believe that as the world changes, the climate changes; the agriculture sector should adapt itself to these changes. We have changed our view to agriculture.”

(Mehmet Mehdi EKER).

The first Ministry Strategic Plan drafted concerned: Agricultural Production and Supply Security, Food Security, Plant and Animal Health, Rural Development, and Institutional Capacity. All of these were identified in his Strategic Plan as strategic fields.
Then the scheme was subsequently updated in 2012 and the Ministry of Food A griculture and Livestock's Strategic Plan for 2013 was established. Five strategi c regions were identified in the Plan's scope: Agricultural production and Security of Supply, Food Safety, provide high quality supply of food and feed, Plant and Animal Health and Welfare, Agricultural Infrastructure, Rural Development and Institutional capacity.

Other measures he included to match up together was;

- Prevention of Fragmentation for Agricultural Lands
- Land consolidation studies
- Interest Free Financing in Agriculture

1.2 Objective of this study

The objective of this study research is to assess impact of urbanization on sesame food production in Turkey from 1986 to 2016. The hypothesis for this study created is urbanization affect the production of sesame seed. Urbanization is the rate in which land is occupies for other activities not for agricultural production of sesame food crop. Occupying land per meter for the purpose use of activities like constructions, the industrialization that affect the process of

growing sesame seed. Therefore, the process of urbanization affects the production of sesame seed.

An increase or rise in urbanization will decrease the availability of land or increase other activities on land in which it affects the production of sesame food crop.

The specification objectives of the study;

1. Examine the trend of annual sesame seed production.
2. Examine the effect of urbanization on sesame crop production.
3. Examine the impact of urbanization on the production processes of sesame crop.
4. Examine the significance of some factors of urbanization on sesame crop.

1.3 Statement of hypothesis

The hypothesis to use for the study is listed below:

H_1; Consumption has an effect on sesame seed production

H_2; Temperature negatively affect the production of Sesame seed production

H_3; Industrialization negatively affect the production of Sesame seed

H_4; GDP per capita has effect on sesame seed production

H_5; Sesame harvest area has effect on sesame seed production

1.4 Significance of the study

Urban development invading farmlands creates challenges for the agricultural production of sesame food crops. Agricultural production is a series of activities or the production process that will result in a product. This activity is being affected by urbanization processes. Urbanization affects the natural environment through population growth and industrialization. People change the environment through their activities like the consumption of food, production of energy, transportation, uses of water and land, which in turn pollutes the environment and affects the health and quality of planted crops.

Gordon McGranahan et al. (2010) defined urbanization as the process of shifting from rural areas to urban settlements to seek a better quality of life. The process of urbanization causes a rapid increase in the populations in urban areas, which leads to expansion of cities and occupation of more land. Thus, this decreases the availability of land for the practices of agriculture in the rural areas. It is a basic primary for agriculture. While agricultural land is the ecosystem created by individuals to plant the crop. The agents of urbanization that affect the process of plant production are population and industrialization.

1.5 Justification of the study

The study will provide more information that will enable effective measures to improve the agricultural production of sesame food crops. It will also give evidence showing the significance of the relationship between urbanization and the agricultural production of sesame seed. This will enable us to access and analyze factors that influence the growth and production yield of sesame seeds. The study will also allow us to check the relationship between some of the factors of urbanization the sesame production and to assess which factors have more significance in the production of sesame seeds in Turkey over the period from 1986 to 2016. The outcome of this research will be beneficial for the nation, as it will serve as a policy instrument for the development of agricultural productivity. Various additional benefits that also be derived include:

1. This study will facilitate the understand of how the factors of urbanization affect the production of sesame seeds
2. The study will enable us to compare the factors of urbanization
3. The study will inform us how significant urbanization is in sesame food production
4. The research will add knowledge to the existing empirical evidence on the relationship between urbanization and agriculture
5. It will provide useful strategies to boost the economy as well as for academicians, scholars, and students

6. It will also create awareness of the problems that are associated with urbanization
7. It will also provide the implications connected to urbanization
8. It will provide policymakers with analytical tools that can address the challenges caused by urbanization on agricultural sesame food crop production
9. It will also add to the existing literature about the effect of urbanization on agricultural cereal crop production.

1.6 Scope for this study

The research theory explains the process of how sesame seed production is decreased by the way of occupying of land for other activities that prevent the cultivation of sesame crop or affect the growth health of the crop. Urbanization is the land area per kilometer that has been occupied for other activities instead of agricultural production, particularly sesame crops. The agricultural production of sesame seeds is the production process that results in a yield of sesame seed.

Additionally, sesame agricultural output refers to the amount of or estimated harvested production quantity of the product in Turkey.

1.7 Research Methodology

Some possible hypothesis that could explain the decreases in sesame seed production from 1986 to 2016 in Turkey are natural disasters, pests and disease, changes in farm input, changes in farming methods, variation of seed, and farming activities. This study is based on a research design that can verify all these possible hypotheses. To achieve this, the research is conducted using times series analysis to check how the various factors of urbanization affected the production of sesame seeds for the given period of time. The method of collecting data for this research is an unobtrusive method to prove the hypothesis. In an effort to conduct ethical research, an unobtrusive method is used.

The data of sesame seed production for a 30-year period in Turkey is obtained from a secondary source of data, namely the Food Agriculture Organization report

(2019). The data provides the following information; the quantity of sesame seed produced and the harvesting area from 1986 to 2016. Also, annually data of the factor of urbanization is acquired from secondary sources, namely the Food Agriculture Organization (FAO) 2019 report and World Bank Organization Report 2019 report. This information is utilized to check the significance of the impact on the production of sesame seeds in the period using time series analysis.

Time series analysis is conducted using the data collected for the given time period. This information is applied in a Regression Model to check the correlation between the factor of urbanization and the amount of sesame seed produced. A regression model is a model that verifies whether there is a relationship between a dependent and an independent variable. In this case, the dependent variable is sesame seed production and the independent variable is the urbanization factors. It also checks the significance of urbanization factors that affect the production of the crop.

Multiple regression analysis is a model that explains the relationship between two or more explanatory variables. The model will describe the data and explain the relationship between the dependent variable and two or more independent variables.

1.7.1 The Model of the analysis

This can be mathematically written as:

$Y= \beta_0+ \beta_1X_1+ \beta_2X_2+ \beta_3X_{35}+U_t$

$Ses\_pro=\beta_0+ \beta_1Ses\_har+ \beta_2Ind\_C0^2+ \beta_3GDP\_Cap+ \beta_4Temp\_Chng+ \beta_5Consump +U_t$

$Ses_{pro}= F (Ses\_har, Ind\_c0^2\_Liq, Gdp\_cap,Temp\_chng, Consump)$

where;

Ses_{pro}= Sesame seed production quantity

Ses_har = Sesame harvested area

Ind_c0^2_liq= Industrial carbon dioxide emission

Temp_chng= Temperature change

Gdp_work= GDP per working population

Consump= Consumption amount

CHAPTER 2

LITERATURE REVIEW

2.1 Theoretical Framework

2.1.1 Theory of Urbanization

Urbanization is defined as advancement of a region through an increased population of individuals, infrastructure and different kinds functional activities that occur at all times, which has no specific duration or season but has an action that can pull in more improvements as the number of individuals and infrastructure activities grow. Nonetheless, this definition attempts to focus on the condition of our natural environment, specifically the harmful impacts caused by man on his natural, physical environment. Urbanization has negatively impacted the production processes of sesame crops and food crops in general. It influences the process of growing plants through the factors of urbanization, which are population and industrialization. Population affects the process via the activities of people. Although urban areas have spread over a relatively small portion of the world's surface, the rapid development has fundamentally adjusted the characteristics of the land and has had huge ecological, biological, and social effects (Weber and Puissant, 2003). The unavoidable results from this procedure are the spatial extension of towns and urban communities past their juridical points of confinement and into their lands and peripheries to meet the demands of the developing urban populace (Mosammad, et at., 2016). Due the acceleration of global urbanization, there is a developing enthusiasm to understand its implications for a wide variety of ecological variables, including the loss of arable fertile land (Lopez et at., 2001), decreases in vegetation space and the rise of global temperatures (Grim et al., 2000). The spontaneous and uncontrolled

development has brought about negative impacts on the urban occupants and their conditions and it is associated with different kinds of pollution on land surface and the loss of land for agriculture practices.

2.1.2 Division of Labour Theory

Division of labour is define as a way of assigning tasks to different individuals in a system mostly applied in production. It consequently decreases the production time and increase the ability to produce more.

Adam Smith stated that “division of labour as a positive wellspring of developing productiveness of mechanical business visionary markets. In an Inquiry into the Nature and Causes of the Wealth of Nations Smith ties the division of work and the partition of skills with extended profitability. He gave a case of a stick when a laborer equipped for creating a low number of pins in multi day all alone contrasted and a more noteworthy to a greater extent some of a solitary assignment which is a piece of the methodology when dismantled to various segments".

Karl Marx agrees view on Adam Smith work on that the “division of is a central part of capitalism, but he disagrees on how favorable this process is in social terms. Marx argues that the division of labor brings about alienation, with the worker no longer feeling associated with the product of his own labor. In addition, Marx held that the result of the growing division of labor is the workers become less skilled, being able the perform only specific tasks which do not amount to a whole product, thus making them less autonomous and more dependent on their employer who gains leverage. On this ground Marx ties the division of labor with social mechanism of control”

Emile Durkheim's “theory on the division of labor is In accordance with Smith, Durkheim also views the division of labor as characteristic of industrial capitalist societies. Durkheim even saw the division of labor as a natural law that also governs other organisms. But like Marx, Durkheim pointed out, in his book Division of Labor in Society, to the negative aspect of the process which turns people more interdependent yet increasingly different from each other,

resulting in a disability to share their view of the world and form ontological solidarity".

2.1.3 Theory of Population

Thomas Malthus (1978) expressed that population increments in geometric expansion. A geometric expansion is a succession of numbers where each term after the first is found by reproducing the next one by a multiple interval number. He expressed that food production increase in arithmetic progression. A math movement is a progression of numbers with the end goal that the contrast between the arrangement of numbers is consistent. For instance, in the arrangement of 1,2,3,4,5 the distinction is 1. He decides this outcome because of the Law of Diminishing Returns.

He accepted that through safety measure checks and positive checks, the populace would be figured out how to offset the food supply with the populace level. From this, we can infer that populaces will increment rapid than the supply of food. Hence, this will prompt a shortage of food availability

His alternate suggestion was:

- Positive Checks

He expressed that normal force will address the inadequacy of sustenance supply due to increase of populace in the method for cataclysmic events, for example, floods and quakes and man-made activities, for example, wars and starvations.

- Precaution Checks

To address the imbalances, Malthus additionally prescribe utilizing protection measures to control the increments of the population. These measures can be family planning, late marriage.

As it is predicted that the future the expansion in agrarian production levels will be less than the increases of population, there is the expectation that cost will stay despite a reduction of normal food supply. This will happen will the help technology and mechanical development.

2.1.4 Theory of Industrialization

Industrialization theory was first introduced in the mid-twentieth century. It proposed that economic development is only conceivable when the industries develop along with the utilization of advanced procedures of production and the utilization of new methods of technology. According to the modern school, the view which is shared by classical economists, urbanization is beyond the realm of imagination without industrialization (Dutt, 2011).

Industrialization plays a focal, yet ambiguous role in the social theory. From the viewpoint of David Landes (1972), industrialization is frequently comprehended as the key agent in the formation of modern society. The industrialization revolution marked the most crucial period of transformation in human life. However, industrialization is sometimes referred to as one component in a series of changes, such as urbanization and rationalization which are combined in a broader evolutionary transformation (Willian H. 1982).

2.1.5 The Theory of Dutch Disease

The theory of “Dutch Disease" was stated in the Netherlands in the 1960s, at the point when the high revenue acquires by its petroleum gas revelation provoked a sharp decrease in the competitiveness of different sectors. Despite the revenue’s fortunes, the new revelation brought the Netherlands encountered an exceptional decrease in economic expansion. It can likewise be said as the economic paradox has since been perceived as the situation in which a non-booming sector adversely influences the exhibition of other sectors of the country's economy, and in explicit, the non-booming sector of the economic. Development in other segments of the economy pulls in more individuals, in this manner different practices like farmers forsake the acts of cultivating to different areas since they receive more in the sector. The Dutch disease has negative effects on the increase receive of foreign currency on the economic development that regularly influences some sector of the country. This is consequence resulted in an increase of exchange rate conversion scale could adversely influence the fare intensity of inflows of cash accepting from foreign nations and in this manner bring down the growth potential. Moreover, this It could influence the macroeconomic

steadiness, the intensity of the fare part and the outside maintainability of the nation as it changes nation assets from things that add to growth.

2.2 Conceptual Framework

2.2.1 Problem of Urbanization and Solution

Urbanization carry more advantages to the economy development like improvement of business activities, industries and so on. However, there are still some problems emerge because of the urbanization. According to Town and Country Planning Department TCPD (2006), during process of urbanization, there is many problems experienced by urban areas or towns. Some of the problem are;

Rapid rate of urbanization

The rate of urbanization is extending each year has required greater development of new zones. However, the absence of urban limit of confinement has prompted the formation of urban spread to ecological areas, mainly agrarian territories and regions which are not reasonable for development (TCPD, 2006). Plus, the extreme interest of land use at strategic territories additionally has prompted land use clashes. These circumstances have added to different urbanization issues, for example, natural contamination environment, traffic congestion, and so on.

Degradation of environmental quality

urbanization has also prompted degradation of ecological quality particularly the nature of water, air and sound. Some processing plants and houses which have a poor structure the wastes of the building diverted to the closest stream or water that turn to contaminate the water. Domestic and industries waste that were dumped to the stream have influenced the water quality. Moreover, the air contamination has additionally expanded because of outflow from engine vehicles, industries and fossil fuel sources. Also, the noise is produced from the different human activities, the growing of populace has produced a high volume of strong waste and there is strain to give a waste dump site in the urban territories.

Inefficient transportation system

The quantity of vehicles out is increase each year. Although, different sorts of open transportation are given in the urban communities but urban masses like to drive private vehicles since the public transportation isn't dependable, it has brought about the propensity for the urban populace to choose private vehicles rather than the public vehicle and in the long run prompted the intense issue of congestion in the urban communities.

2.2.1.1 Approaches to counter urbanization issues and problems

The major problem of urbanization can be classified to be social and environmental problem. Two approach have been recommended to resolve the problem; Islamic approach method and other policy approach method.

Islamic approach method

Islamic approach is said to be one of the ways to solve urbanization problems. It has been expressed in the Holy Quran and Sunnah as the source for Muslims. Since these two sources are direction for mankind, they include areas in economy, social conduct, family ties, and urban and rural way of life. Islamic methodology is one of the arrangements that can be utilized by each city in this world to defeat the urbanization issues. Those holy books suggest that the activities and practices of the people are the primary factor of good or wrong showing of a city. If the general population are practicing Islamic principles in the city, it will limit urbanization issues, for example, pollution, as well as secure and protect nature (Farid Moustapha, 2008).

furthermore, Spahic Omer (2007) explained that the occupants of the city influencing the state of the city. He stated that “If a city is well ordered, clean, efficient, corruption-free balanced, safe, free from stress and nuisance, it is all due to the right conduct, attitudes and mindset of its inhabitants”. Aside from that, the conduct of the occupants additionally reflected when a city’s amenities are satisfactory. in order words, every activities and practices of individuals decided the state of urban areas either in positive or negative condition. Subsequently,

the acting in Islamic principles incorporate each part of human lives and planning of city can contribute in the foundation of a decent environment in city, and in this way can lessen or limit the negative effects of urbanization.

Aside from that, each advancement should likewise be tranquil conjunction with ecology (Spahic Omer, 2007). The policy maker must guarantee that each developer, planner and other related follows the rules and prerequisites that have been set up so as to confine the earth intrusion. Planners for example, before they design any structure, they need to direct site investigation to get acquainted with the site and in the end will plan a structure that relate with the context. In the interim, for urban organizers, they need to design a territory or city carefully. For instance, there ought to be a space between private, business or industries region and water bodies or industries to farmland. Those regions can't be set legitimately by the water bodies on the grounds that the propensity of the structures will channel their loss into the water bodies are high or can carbon dioxide of the industries can affect the crop planted. if that circumstance happens, it will prompt natural issues, for example, water contamination and land pollution. Hence, there is a need to deliberately plan and place a structure so as to ensure the maintenance of the ecology. As such, any methodology that done based on the lessons of Islam and the Qur'an will limit the effect of urbanization.

In addition, it has been recognized that one of the roles of mankind that have been role out by Allah (SWT) is to secure nature.

"It is He who created for you all of that which is on the earth. Then He directed Himself to the heaven, [His being above all creation], and made them seven heavens, and He is Knowing of all things".

(Surah Al-Baqarah, verse 29)

This verse demonstrates that all sources on this planet are made for the mankind. In spite of the fact that mankind's can use the majority of the sources that have

been giving to them, it is not their entitlement to overexploit the majority of the sources. As Allah cautions in the Quran:

> *"And do not do mischief on the earth, after it has been set in order" (5:56)*

from this Quranic section, it certainly clarified that Allah disallows causing devilishness on the earth, particularly after it has been arranged in order. Allah has made everything on this planet in an ideal and great way, consequently, mankind should put an utmost in building up the city, not by overexploiting or pollute the sources.

In summary, Islamic methodology is one of the ways out that can be utilized by each city in the world to defeat the urbanization issues. The activities and practices of the city occupants are the fundamental factor of good healthy city. Urbanization issues can be eradicated by acting in accordance of Islamic instructing in the design of the city. In the event that the general population are practicing Islamic principles in the city, it will limit or even evade urbanization issues.

Other approach method

Khosh-Chashm (1995), stated that health city gives a unique chance for people to establish a partnership and provide strategy to solve issue. Health city is expressed as a clean and healthy environmental service (Khosh-Chashu, 1995). This health city concept resolves social and ecological problems. Healthy city concept is classified into two;

- Authority Formulation of policies
- Community Partnership with Authority

Authority Formulation of Policies prepare rules and regulation for land use transportation, traffic, housing, and so on through development planning of environment. Hence, this rules and regulation will set guidelines suitable for environment.

Community Partnership and Authority will encourage individuals to take part on programs that have been organized. Individuals taking part in activities is important to what have been design by the authority (Khosh-Chashm, 1995).

2.2.2 Price of Food Crisis in the Markets cause by Urbanization

The worldwide production of food is sufficient to sustain the whole world. The real issue is the manner in which these items are appropriated. Organizations like the United Nations, the World Food Programme, The Food and Agriculture Organization, and the World Bank have expressed the need to take measures to deal with the global food deficiencies. However, although the World trade Organization intends to develop world trade, sufficient measures have not been taken to deal with this problem (Kenfield, 2008).

Cost is a variable condition in the value of any community. The word value is defined at the rate of the cost that determines the availability and importance of items in terms of market activities of every economy. Cost may be defined as the value of items or services expressed in monetary terms. The impact of low production in agriculture resulting from insufficient farming equipment, migration and of the lack of equal distribution of technological advancement, as well as the development of other sectors have created an acute food shortage in the state. This forced the cost of food items to rise beyond their normal levels.

Rising costs signal the increase demand for energy and food items. These items consolidate through the rising demand for agrofuels and feed harvests to worsen food price inflations as the common challenge for land has the unreasonable impact of rendering each yield of plant more costly, as they similar take land previously used for crops (Myers and Kent, 2008)

As indicated by the International Food Policy Research Institute (IFPRI), agrofuel-driven inflation 'would prompt reductions in sustenance availability and calorie utilization in all locales of the world' (Holt-Giménez, 2008).

2.3 Empirical Reviews

Agricultural land conversion is a procedure by which land is transformed from agricultural land to urban uses. There is a question as to whether farmland should

be maintained or changed over to different uses. This argument can be viewed from both the pro-ruralism and pro-urbanist perspectives. According to the pro-ruralism perspective, land change has negative effects as the loss of prime farming area diminishes agricultural employment as well as agricultural output. Therefore, it could also influence food production and threaten food security (Samson Hart, 2000).

Pro-ruralists assert that farming areas should be preserved in order to maintain sustainable food production. Conversely, the pro-urbanites claim that land use change is a result of urban development. They contend that the decline in agricultural production can be resolved through technological development. Thus, according to their viewpoint, land use change should not be perceived as a threat (Angus and Irawan 2006)

Ho and Lin (2004) discovered that since 1980 in China, the exchange of rural land to non-rural land has been broad and exceptional. Higher population density, rapid financial development, and the urbanization process are thought to be the primary outcomes caused by Agricultural Land Conversion (ALC) in China.

Fir Man (1997) argued that "housing development is one of the main activities that caused ALC in the last 20 years". Housing development has intensively acquired vast amounts of land in many nations. Han and He (1999) additionally noted that real estate development stimulates the loss of farmland. Infrastructure development, such as roads, stadium and so on, adds to ALC in most nations. China has experienced development for the past two decades.

Lichtenberg and Ding (2008) stated that the majority of economic improvement strategies will generally advance industrial development and stimulate land conversion in some nations, like Indonesia, China, Vietnam, and the Philippines. Additionally, the spatial optimization approach, which determines whether land is employed for industrial or residential purposes, supports the change of farming land.

Van der Meulen and Salman (1996) underlined that 75% of the coastal dunes around the Mediterranean Basin have been negatively impacted in the previous 30 years because of broad urbanization, industrialization and travel industry-based development.

Mustapha Bolca et al. conducted a study in Turkey about the change of land use in the Balçova delta. The results showed that activities trigger the conversion of land from its original activities of farming to recreational areas. The Balçova delta and its beachfront are attractive areas. During the period between 1957 and 1976, the Balçova Delta was utilized for intensive farming activities, such as the growing of citrus-organic products, vegetables, and wheat. Today, the change to a land use type that aims to exploit the land for new residential neighborhoods constitutes a threat to the agrarian and regular habitat. Exploiting the need for national house-building, residences with no farming purpose have begun to be constructed in the Balçova Delta and its waterfront locations. Separating plots into little parcels, intensive construction has commenced and the areas on the Balçova plain known for vegetation growth have been destroyed as a result of rapid urbanization. Furthermore, the interstate highway that connects to Western Anatolia's primary touristic district, Çeşme, passes through this region.

Hubacek and Vazquez (2002) emphasized that the growing population increase the housing demands and urbanization is fundamentally changing land use around the world. It is estimated that over half of the global population lives in urban areas, and it is anticipated that the urban populace will reach 69.6% by 2050 (United Nations, 2010). The urbanization development and rural-urban relocation are two of the key factors that influence ALC and have been broadly examined. Han and He (1999) considered the dispersion example of farmland decreases in various communities and furthermore analyzed the connection between urbanization and farmland change within urban communities. They found that there was a significant relation between urban populace development (as the primary estimation of urbanization) and farming land transformation in urban communities. Some scholars argue that the urbanization and population increase in developing and undeveloped nations prompt the need for land.

Lutz et al. (2001) affirmed that total global population will increase to about 9–13 billion by 2100, with a middle projection of 8.8 billion by the year 2050. Keyzer et al. (2001) expressed that, as income rises, individuals will generally expend more calories, and the world meat demand will rise by up to 3% every year throughout the following decades. Furthermore, AS indicated by Harris and Kennedy (1999), the world food supply may even now outpace demand by 2020, and the production rate is likely to slow down in the long run.

Qadeer (2013) stated that expanding urban space is changing social economic conditions in Pakistan. Agribusiness sales have declined in terms of total national output (GDP), while the business and manufacturing areas have become key contributors to both GDP and employment. Mahmood Hassan Khan (1991) said that the investigation of problems in various regions, especially in Baluchistan, are important for two reasons: firstly, because its agricultural issues are from numerous perspectives increasingly complex and unmanageable, and secondly, there is a significant lack of data and information on these problems.

Hubacek and Vazquez (2002) said that population growth, lifestyle change and rapid urbanization have fundamentally transformed land use policies around the world. It is estimated that over half of the total global population resides in urban zones, and it is anticipated that the number of urban residences will increase to 69.6% by 2050 (United Nations, 2010). The urban population in India increased from 27.81% in 2001 to 31.16% in 2011. Among the 30 regions in Karnataka, the Bengaluru area draws in a huge population, with 9.6 m living in urban Bengaluru alone (Census, 2011). It has emerged as one of the most interesting developing urban areas in India and Asia. The number of inhabitants in Bengaluru grew from 35.09% in 2001 to 47.18% in 2011 (Census, 2011). These population changes have had a significant impact on the region, resulting in the loss of farming land (Lopez et al., 2001).

Rural movement to urban territories is clarified as the reduction of provincial individuals that have abandoned farming practices as a consequence of the Industrial Revolution. This rural movement shows parallels to the industrialization

period in developing nations. In Turkey after the 1950s, the rural population clearly started to reduce until the 1980s where an intense wave of movement to urban areas has been observed. Such moderate development occurred within a short time and was accompanied by new money-related and social issues in developing states like Turkey (Güreşci 2012, Schmidbauer et al., 2011).

Güreşci (2010) emphasized the fundamental characteristics of rural-urban development in Turkey has happened in a period that occurred in parallel to industrialization and urbanization. Today, although the rural population still remains, it is significantly less than previous years. The sharing of included worth acquired from the current farming structure with explicit populace has caused a decrease in the harvests of some crops.

Previously, a speculative methodology has been employed to explain the purposes behind provincial urban development. However, researchers contend that this theory has largely focused on European states where industrialization occurred under conventional conditions. In certain countries like Turkey, where relocation developed in a more unusual manner, this rapid development has not simply had been influenced by economic and social changes, but also by political change. In Turkey, movement from rural to urban areas can be comprehended from the perspective of agricultural issues in rural regions and changes in provincial regions. As a result, in Turkey, the provincial movements have resulted in the decline in the rural population and the expansion of the urban populace. Hence, the purposes behind relocation from provincial to urban regions can be comprehended under three headings: Repulsive elements, attracting factors, and transmitter factors. Transmitter factor can be portrayed as developments in transportation and correspondence which enable basic access to such opportunities (Gürbüz and Karabulut, 2008).

The expansion of urban areas has influenced the sustenance provision of food in different ways; for example, the traditional methods of cultivating land have been changed, the number of farmers in rural areas has decreased due to relocation to urban regions (Roca**,** 1993). The development of urban areas has influenced

the growth of food in various ways; new methods have been developed for cultivating land, the traditional methods of cultivating farmland and family farming practices have diminished because of movement to urban regions (Roca, 1993). Between 1987 and 1992, China lost near one million hectares of farmland on an annual basis to urbanization as well as the development of roads and factories (Tyler, 1994). In the USA, urban expansion has eradicated about 400,000 hectares of farmland (Feder, 1997). In India, the development of the city of Tirunelveli in Tamil Nadu state is specifically because of the loss of agrarian land (Chandrasekar et al, 2010).

Esbak. H. (2007) stated that the city of Aydin in Turkey has developed intensively since the 1970s because of migration from the eastern regions of the country and movement from rural regions to urban territories of the country. Increased urbanization has led to critical changes in the open areas in and around the city (Deniz, 2005).

Climate change and variability are concerns for the growing of crops. The worldwide surface temperature has risen during the previous century; three-quarters of this expansion happened over the most recent three decades (Hansen et al. 2006). The acceleration of global temperature and its related changes in precipitation have influenced the biological systems, biodiversity and human systems on the Earth (Kotir 2011).

Godfray et al. (2011) said that among the numerous effects of environmental change that threat to growing crops is viewed as one of the most critical. Environmental change influences crop production in various different ways. Crop yields are influenced by climatic factors, including the increased temperatures, changing precipitation patterns and growing atmospheric CO2 levels. Moreover, they are affected by biological factors, such as the duration of the reap development period and crop rotation. The yields of various crops have been impacted differently by the progressive warming of the planet since the 1980s (Lobell and Field 2007). Overall food production may need to increase by as much

as 70% by 2050 to cater for the growing demands of the anticipated 9 billion people wo will be living on the Earth (Schmidhuber and Tubiello 2007).

It is essential that the overall food security objectives are achieved faced with the problems caused by environmental change, but this will be a challenging task. This is particularly relevant for China as the world's most populated country and the third largest inland territory. China is one of the countries that is impacted the most by environmental changes (Turral et al. 2011). insignificant amounts of research in China have focused on the impact of ecological change on sustenance food production (Lin et al. 2005; Lobell et al. 2008; Piao et al. 2010); however, systematic reviews that have examined the relationship between environmental change and food security are thus far lacking, especially on the national scale. Essentially, food security needs to consider parameters including sustenance plant production in addition to food consumption.

The growing of crops is particularly sensitive to atmospheric conditions, such as inconsistent precipitation and temperature changes during a season. Studies by the Indian Rural Research Institute (IARI) and others in 2011 showed that there was a notable decrease in Rabi crop yields. Each 1°C increases temperature lessens wheat production by 4-5 Million Tons. Marginal changes in temperature and precipitation can affect the yield of vegetables, tea, coffee, fragrant and therapeutic plants, and basmati rice. Pathogens and insect populations are significantly dependent on temperature and humidity, and changes in these parameters may change their numbers. Global reports indicate that there will be a 10-40% decrease in crop harvests by 2100.

Farming is very reliant on the climate. Increments in temperature and carbon dioxide (CO2) can expand some harvest yields for certain crops. However, some factors like water condition, soil moisture, and other conditions must be met. Changes in the recurrence and severity of dry spells and floods could present difficulties for agriculturists and compromise food security. Changes in temperature, carbon dioxide (CO2), and the recurrence and force of extraordinary climate conditions could impact crop yields.

For some plants, the impact of increased temperature will depend on the crop's ideal temperature for growing. In some regions, warming may in fact be beneficial for the kinds of crops that are planted there, or could enable agriculturists to transition to crops that grow more effectively in hotter regions. On the other hand, if the temperature surpasses the plant’s ideal temperature, yields will decrease. Higher CO2 levels can influence crop yields. Some research studies have proposed that the increase in CO2 levels can stimulate plant growth. However, different components such as temperature, ozone, and water and nutrient requirements, may neutralize these potential increments in yield. For instance, if the temperature surpasses a plant’s optimal level or if adequate water and nutrients are not available, this can decrease yield quality. Progressively high temperature and precipitation can restrict the development of crops. Extraordinary events, particularly floods and droughts, can negatively impact harvests and lessen yields (Ziska 2008).

Numerous weeds, insects, and organisms flourish under hotter temperatures, wetter atmospheres, and increased CO2 levels. The extent and dispersion of weeds and pest will likely increase as a result of environmental change. This could cause new issues for agriculturists' who are currently not exposed to those species.

In spite of the fact that rising CO2 can invigorate plant development, it likewise lessens the healthy benefits of most nourishment crops. The rising level of climatic carbon dioxide decreases the proteins and basic minerals in most plant species (Taub d. 2010).

Hansen et al. (2006) stated that the world surface temperature has risen by approximately 0.81 ^{o}C from the previous century and this increase predominantly occurred over the most recent three decades. The increasing speed of global temperature increases and the associated changes in precipitation have influenced the biodiversity, biological systems, and human systems Earth (Kotir 2011). Among the numerous effects of environmental change, the threat to farming is viewed as one of the most critical.

Godfray et al. (2011) suggested that environmental change influences farming and food production from numerous different perspectives. The yield of a plant is influenced by climatic factors, such as rising temperatures, changing precipitation trends and elevated levels of CO2 in the atmosphere; it is likewise influenced by natural factors, such as the lengths of the yield development periods and the harvest cycle. A more drawn out life cycle was a standout amongst the most broadly observed natural changes in the reaction of yields to climatic warming over the Northern Hemisphere during the twentieth century.

Nakićenović and Swart (2000) advocated that the carbon dioxide levels [CO2] will have ascended from the present estimation of roughly 370 to 550 ppm. This, combined with different changes in the environment, is predicted to change the world's atmosphere, making it hotter by approximately 1.8°C (Meehl et al. 2007). This warming will evaporate the water from wet surfaces and from plants. At present, the sum and regularity of precipitation in any area must be anticipated with a lot of vulnerability. The centralization of ozone will likewise increase because of industrialization and this will negatively affect crop development and efficiency.

Steltzer and Post (2009) found that the yields of certain plants have responded negatively to the continuous warming experienced since the 1980s. At the global scale, disregarding the way that the yield responds, indications of various harvests have still been unclear (Lobell and Field 2007). Overall sustenance may need to expand by as much as 70% in 2050 to satisfy the demands of the predicted global population of 9 billion people (Schmidhuber and Tubiello 2007). It is expected that significant efforts will need to be made to satisfy the worldwide food security objective faced with the imminent threat of environmental change, especially for countries with the most crowded conditions, and those countries that have been affected by ecological environmental change (Turral et al. 2011). A significant amount of research in China has focused on the impact of ecological environmental change on the production of food. However, methodological investigations that have explicitly examined the relationship between ecological change and food security are lacking, especially on the national scale.

Fundamentally, food security needs to consider parameters including food production as well as food consumption.

Air pollution from vehicle exhausts, industrial facility outflows and different sources can create significant pollution over certain urban areas, which influences plant health. The impact of air pollution on plants develops over time and cannot be fixed. Certain plants are more vulnerable to harm from pollution than others according to Fred Davis, a physicist from Kent State University.

Synthetic substances, including sulfur dioxide, ozone, fluorides and peroxidase nitrate can harm the leaves of plants. In the event that enough leaves are harmed, the whole plant will die. Sulfur dioxide, a side-effect of the consumption of petroleum products like oil, coal and gas, causes changes in the color of leaf tissue, which may change to white, dark colored or yellow (Fred Davis, 2011).

Some sulfur dioxide changes over to sulfuric acid, which causes holes to form in the leaves. Ozone harm on leaves appears mottled spots, which can turn dark yellow. In the event that the harm caused by the ozone is sufficiently extreme, the plant will drop its leaves. Fluoride harms the edges of plants and makes them turn dark colored. Phenoxyacid nitrate causes a condition known as silver leaf, which causes the leaves turn gleaming white or bronze.

According to Dr. Kent (2000), carbon dioxide emission from vehicles or open flames can affect the growth of plants. Fortunately, precipitation changes nitrogen dioxide into nitric acid, which adds nitrogen to the soil and this is particularly advantageous for plants.

Nevertheless, carbon monoxide is not beneficial. This element of vehicle emission is poisonous and will stunt the growth of plants. Certain types of evergreens will drop their leaves completely when exposed to carbon monoxide. Air pollution debilitates plants and makes them progressively powerless to the infestation of pests. The University of Colorado reported that pine trees weakened by air pollution are becoming progressively more vulnerable to harm from pine bark bugs. A 2008 Newsweek story detailed that pine scarabs had demolished

22 million acres of land covered by pine trees in Canada and more areas of land in Colorado.

According to Jorgensen and Lau (1974), consumption and supply of labor are dependent on production decisions. Production decisions determine farm earnings, which is a component of household earnings in returns. It affects the general consumption of a nation and labor decisions, and when consumption rises, the laborers then to move to the manufacturing side.

According to Sen (1966), a farming family unit focuses their efforts on boosting the general welfare of the family. Family welfare is achieved via the net utility from the income and combined efforts of all family members working together, where every relative's utility is assigned a similar weight. In such circumstances, labor will be used up to the point where the marginal productivity of labor is the same as the cost of labor. A decrease in relative labor will consequently result in a small amount of production quantity. Sen (1966) deviated from the unemployment perspective, and advocated the "not exactly proportionate" decrease in production due to the out-movement of a family member, by pointing out the increased labor required by existing relatives. This may decrease the aggregate sum of production on the family farm, but does not significantly change the per capita welfare. He dismisses the assumption that rural migration will reduce the production because of the close to zero marginal product of farming labour. Therefore, when members of the family migrate out of the rural area, the revenue level of production can be maintained by increasing the supply of self-labor through the reduction of leisure.

Lewis (1954) and Ranis and Fei (1961) reported that highly populated nations with a significant rural will experience the side effects of unavoidable unemployment during the initial periods of development to such an extent that a vast proportion of the labor force participating in farming could be moved to different sectors, such as the industrial sector, without lessening total agricultural production. It is most likely that the marginal productivity of labor will be near zero, this disguised the unemployment in the provincial sector varies from

unemployment in the industrial and manufacturing sector given the enormous number of spatially dispersed farmers confronting low negligible item. this disguise unemployment debate guarantees that the relocation of a family member may not result in a decrease in farming output because of the fact that their marginal productivity is unimportant.

Katircioglu (2006) proposed that farming production and economic growth as estimated by the domestic production are stationary at their levels; in this manner, they are normally cointegrated in a long-run equilibrium relationship. Furthermore, there is a connection between these factors that demonstrates a bidirectional causation between them in the long term.

Katircioglu (2006) researched the causal connection between economic growth and sectoral development in North Cyprus, mainly focusing on the agricultural, industrial and business sector. The investigation revealed that agricultural production is the foundation of the economy in North Cyprus. There is a long run relation between industries and farmers that provide raw materials to industry. Nonetheless, the farming sector does not directly contribute more to the economic growth as estimated by the real Gross Domestic Product (GDP) growth rate.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Regression analysis

Regression analysis is the mathematical technique of dealing with variables to assess their relationship impact. It responds to the questions of which factors matter most, which factor should be able to disregard, how do those variables associate with each other how certain are we about all of these variables.

In regression analysis, factors are also called variables. There is dependent variable that is the main factor that is used to understand or predicted and then there is independent variables, the factors that are suspected to have an impact on the dependent variable.

3.2 The Model of Analysis

The model to be adopted is linear regression analysis, employing (OLS) ordinary least square technique. The technique is embraced due to some following reasons;

i. It is BLUE (Best linear unbiased or impartial estimator).

ii. The computational procedure of OLS is fairly uncomplicated as contrasted with differing econometric strategies (Kontsoyiannis 1997).

In this study E-views 7.3 a package program will use to analysis of the regression model and compute the regression coefficients.

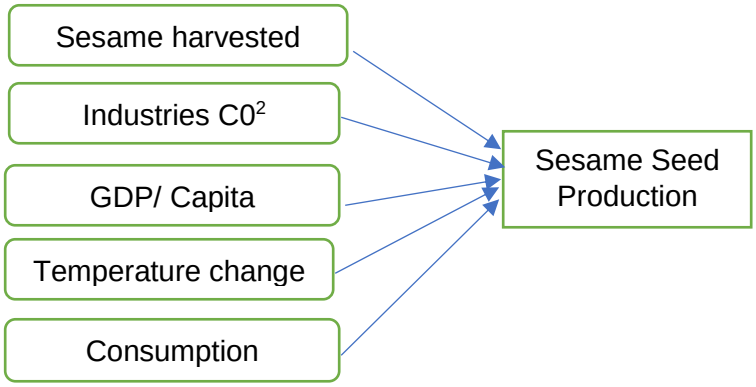
3.3 Variables of the model

This is the factors of urbanization that is the independent factors and the dependent factor sesame seed production are subject to the analysis to assert

the significant relationship. It characterizes in number that increases or decreases over time or changes different values in different situations. Two basic types of variable are Independent variable: that can take different values and can cause predicting changes in other variables, and Dependent variable: that can change different values only in response to an independent variable.

The dependent variable of this research is Sesame production while the independent variables are the factors of urbanization which are GDP per working population, consumption, industrialization, temperature and harvested area.

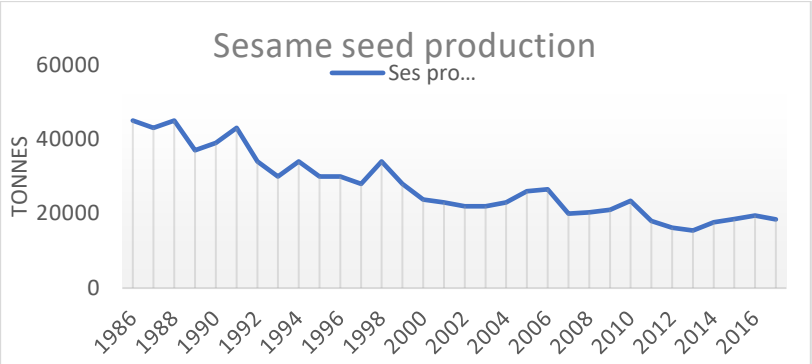
Figure3. 1 Research model of the study: Factors of Urbanization



3.3.1Sesame Seed Production

Sesame is an annual plant that is used as a source of edible oil and also so use as condiment. Production of sesame seeds is from a branch of agriculture that deals with growing of seeds for use as food and source of raw material of producing oil. This is the subject of studying basically means the harvested quantity of the seeds annually in turkey. It is a dependent variable that is affected by some factors of urbanization. The unit uses to measure or calculate the sesame production quantity is Tonnes.

Figure3. 2 Annual total Sesame produced in Turkey



Source: FAO (2017)

3.3.2 Urbanization

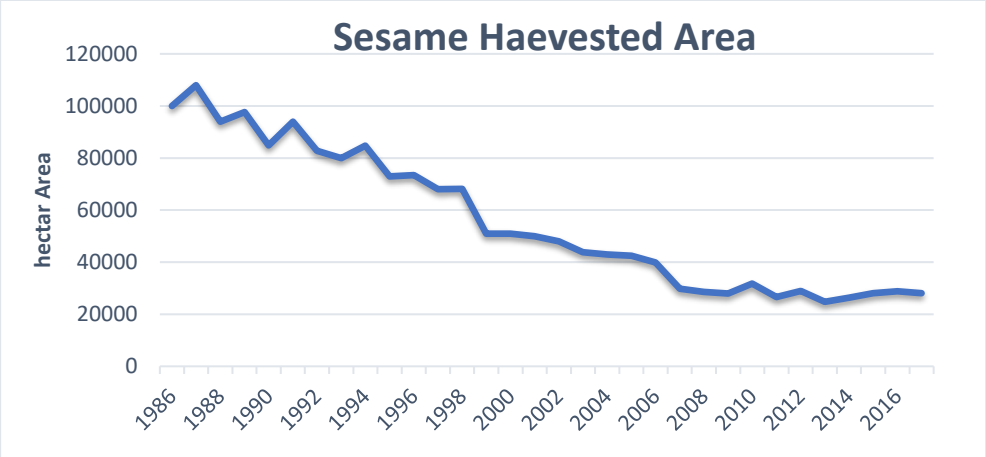
It is the rate of occupying per meter of land for the purpose use of activities not for agricultural practices that affect the process of growing sesame food seeds in turkey. This influences food and farming production quantity of an inexorably urbanized world and a deceases proportion of food production quantity produce. The main problem with respect to agriculture practices and urbanization are whether the increase development and changing demand for farming products from rises of urban populations can be supported while in the meantime supporting agrarian success with lessening country foreign demand. To add to this, the need to decrease greenhouse gas emissions and to assemble strength in farming and urban development to ecological change impacts.

In this study, urbanization is been measured indirectly through some component and they are GDP per capita, consumption, industrialization, temperature and harvested area.

3.3.3 Harvested Area

Area harvested is the total number of hectares reap for sesame crop planted in a specific production season and also a specific geographical area that is gather. This focus on the sesame gathering area in instead of the planted area for commercial activities, or to be held on ranch for seed, feeding animals or human consumption in turkey from 1986 to 2016. It in this way bars areas planted but not harvested inferable from hail harm or grazed.

Figure3. 3 Sesame Harvested Area



Source: FOA (2018)

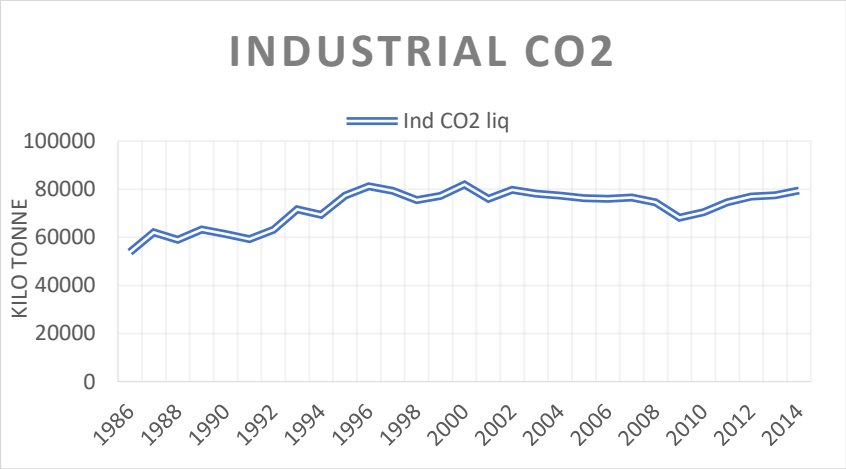
3.3.4 Industrialization

This is a component of urbanization that comprises of industries related activities. It is an independent factor that affects the healthy growing of the plant through the emission of carbon dioxide. Carbon dioxide emissions from liquid fuel consumption allude essentially to emanations from utilization of petroleum-inferred fills as an energy source. Carbon dioxide (co2) is normally occurring gas fixed by photosynthesis into natural issue.

The indicator used to measure the industrialization is carbon dioxide kt (kiloton). Carbon dioxide outflows are regularly determined and revealed as basic carbon. They were changed over to real carbon dioxide mass by multiplying by 3.667 (the proportion of the mass of carbon to carbon dioxide).

emission rate in turkey. It is a waste gas being emitted in the environment from an industry.

Figure3. 4 Industries carbon dioxide emission in Turkey



Source: World Bank (2018)

3.3.5 Consumption

Final consumption expenditure is the aggregation or sum of all household final consumption expenditure with government final spending or consumption in the Turkey. consumption is the imperative establishment for economics, just as the more extensive economy. Numerous Industries such as manufacture, marketing, and advertising are exclusively given to making sense of how to get more consumers to expend their item. Economics matters consider consumption to be the bedrock of the economic activities and is vital for lives of human being.

A British economics John Maynard Keynes innovate consumption equation, which computes consumers spending dependent on salary and the adjustments in salary – spending rises or falls in ratio to income. The consumption equation decides consumers spending dependent on three variables which are autonomous consumption, marginal propensity to consume and real disposable income. The Equation;

$$C = a + mpc\ Y_{dpi}$$

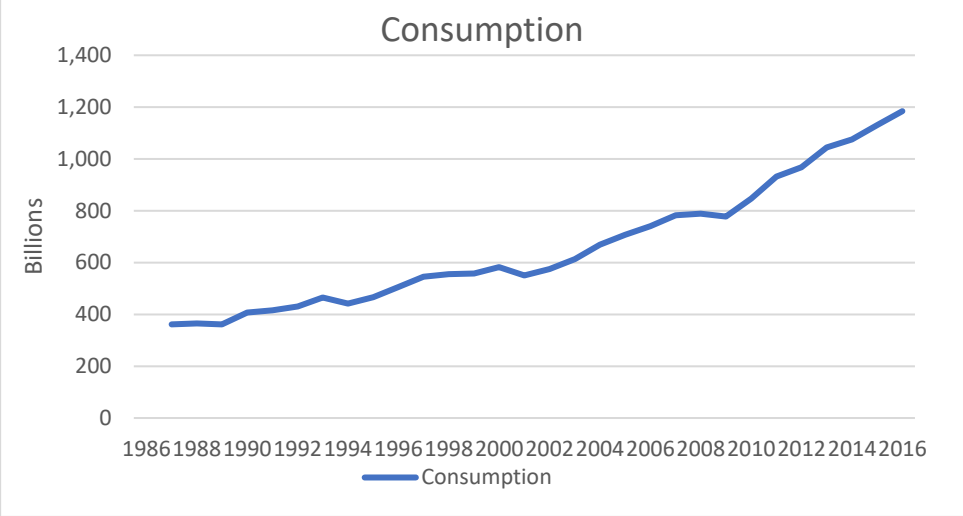
Where; C= Consumption

A= autonomous consumption expenditure

Mpc= Marginal Propensity to consume

Y_{dpi}= Disposable Income

Figure3. 5 Consumption amount in Turkey



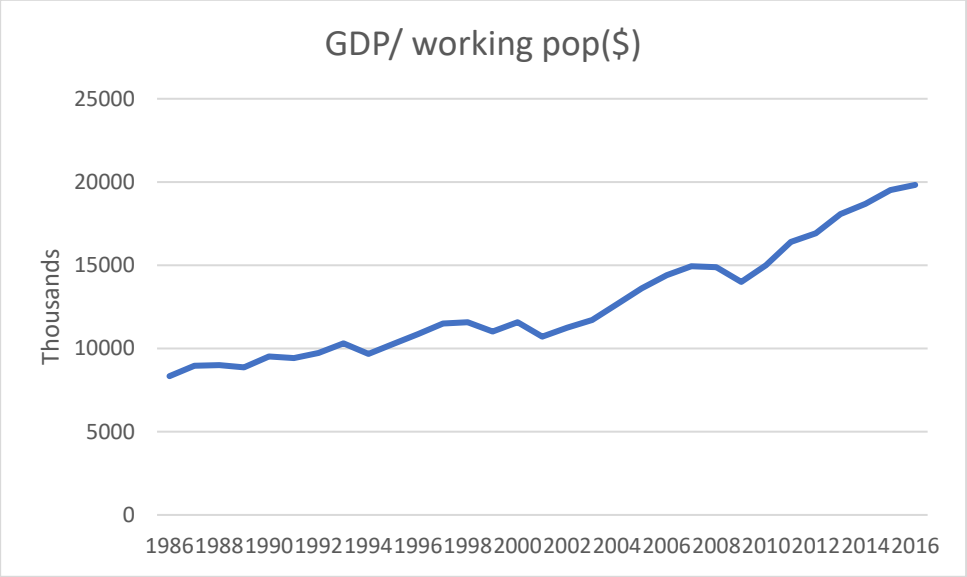
Source: World Bank (2018)

3.3.6

GDP per working Population

Gross domestic product per capita is total national output divided by working population of the nation. Gross domestic product is the sum of value added by every individual in the nation's economy in addition to any item taxes and excluding any subsidies not added in the estimation of the products item. This is determined without making deduction for deterioration of created resources or for consumption.

Figure 3. 6 GDP per working population in Turkey

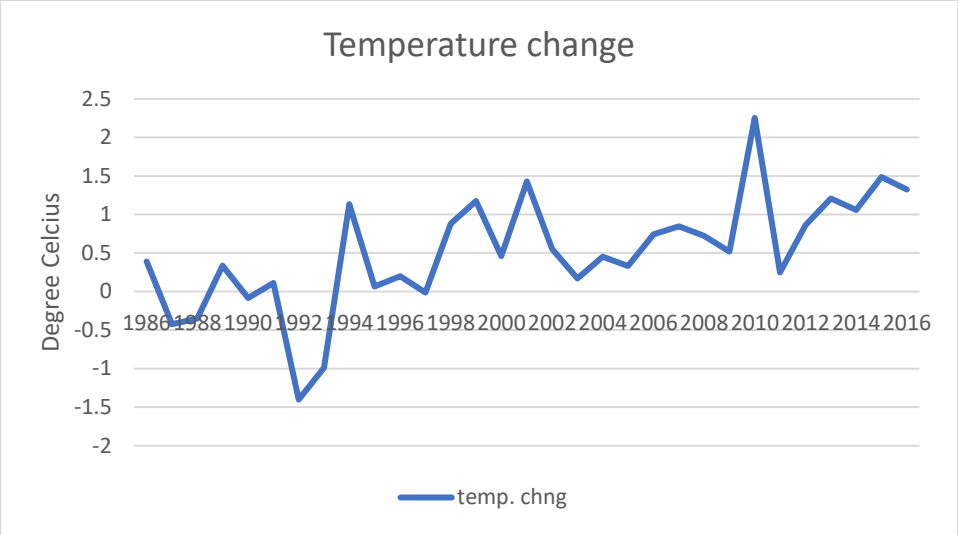


3.3.7 Temperature

Wisconsin Climate station in (2008) reported between 1950 and 2006 normal temperatures has increases by about 1.1 ºF. It rises more in winter and spring, but in summer and fall the increment is a bit. There are geographic contrasts also; winters in northwestern Wisconsin have warmed by as much as 4.5 °F. They predict rate of temperature change will increment in the next future years; normal temperature will increase by 4–9 °F by mid-century. The winter will keep on warming. Days that surpass 90 °F are required to increase. The quantity of days with below zero temperatures is relied upon to decrease by 2–4weeks.

Sesame plant is a warmth tolerant crop. Low temperature affects the crop health while higher temperature gives the optimum production yield of the Plant**.**

Figure 3. 7 Temperature change in Turkey



Source: World Bank (2018)

3.4 Structural Representation of the Model

The model used in this study is symbolically expressed as:

Ses_{pro}= f (Sses_har, ind_$C0^2$_liq, GDP_work, Temp_Chng, Consump)

Where;

Ses_{pro}= Sesame seed production quantity

Ses_har = Sesame harvested area

Ind_$c0^2$_liq= Industrial carbon dioxed emission

Temp_chng= Tempuration change

Gdp_work= Gdp per working population

Consump= Consumption amount

3.4.1 Mathematical Representation of the Model

The model mathematically can be represented as below:

$Y= \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_{35} + U_t$

$Ses\_pro=\beta_0 + \beta_1 Ses\_har + \beta_2 Ind\_C0^2 + \beta_3 GDP\_work + \beta_4 Temp\_Chng + \beta_5 Consump + U_t$

β_0= Constant term

β_1= Coefficient of Sesame seed harvested area

β_2 = Coefficient of industries carbon dioxide emission rate

β_3= Coefficient of GDP per working population

β_4=Coefficient of Temperature Change

β_5=Coefficient of Consumption

U_t= Stochastic Error Term

3.5 Method of conducting regression analysis

Ordinary Least squares (OLS) is the estimation method that can be used for the linear model. The method is generally used to estimate the parameter of a linear regression model. The estimators minimize the sum of the squared errors.

The regression analysis methodology is drawing a random sample from a population and use it to estimate the properties of that population. The coefficients in the regression equation are the estimates of the population parameters.

3.5.1 Important Assumption of OLS Estimator

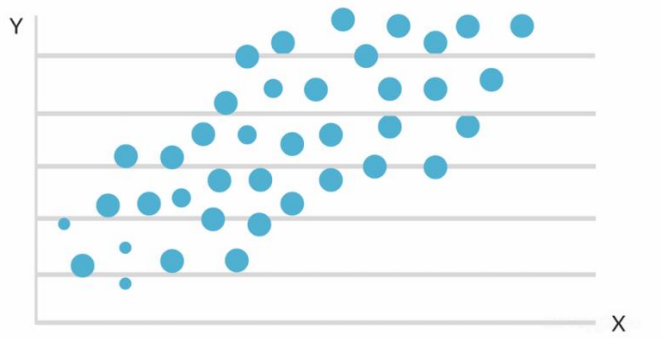
Regression can be good if it follows some certain assumption as follow;

1. The regression model is linear related in the coefficient
2. The error term has a population mean that is equal to zero
3. Some independent variables are uncorrelated with the error term
4. Observation of the error term is uncorrelated to each other
5. The error has a constant variance
6. No independent variable is a perfect linear function of other explanatory variables
7. The error term is normally distributed

To conduct a regression analysis, a dependent variable that you hypothesize is being influenced or impacted will be defined by one or more independent variables.

To start to examine whether or not there is a relationship between these two or more variables, we would begin by plotting these data points on a graph, which would resemble scatter diagram as a theoretical example.

Figure3. 8 Linear graph



Source: Eviews outcome

3.5.2 Correlation

Correlation is a statistical measure that shows the degree of two or more variables or factors responsive together. A positive correlation means variables increase or decrease together; a negative correlation indicates the extent to which one variable increases as the other decreases or changes in the opposite direction. Correlation coefficient used to measure changes of the number of dependent variables predict by the change to number of independent variables. If correlated variables are positive, the estimate increases or decreases at the same time. If correlated variables are negative, the estimate of one increase as the value of the other decreases, it expressed as figure within +1 and -1. A coefficient of +1 means a perfect positive correlation that is a change in the estimate of dependent variable will affect (predict) a change in the same direction in the independent variable. A coefficient of -1 indicates a perfect negative correlation that is a change in the estimate of one variable predicts a change in the opposite direction in the second variable.

3.5.3 Method of Analysis

The method of analysis of the research is Linear Regression. Linear regression is the way to model the relationship between two or more variables or factors.

The equation of the simple regression model is: $Y= \alpha + \beta x + \varepsilon$

Where Y= is the depended variable

α= is the intercept

β= is the slope

X= is the independent variable

ε= Error term (residuals)

3.6 Multiple linear regression is a model that check the relationship between two or more independent variables known as explanatory variables and the dependent variable known as the response variable. This is fitted as a linear equation to observed data; Every number of the independent or explanatory variable is related to a value of the dependent variable.

The equation of multiple regression model is: $Y= \alpha + \beta x_1 + \beta x_2 + \ldots + \beta x_n + \varepsilon$

Where Y= is the depended variable

α= is the intercept

β= is the slope

X= is the independent variable

ε= Error terms (residuals)

Where n=1,2,3, are the independent factors that cause the change independent variable

3.6.1 Method of Evaluation

The estimated parameters will be estimated using the following criteria for both statistical and economical;

i. Unit Root Test

ii. Cointegration Test

iii. Granger Cause causality

iv. R-Square

v. T-test

vi. F test

vii. Autocorrelation

viii. Heteroskedasticity

ix. Cusum Test

x. Probability Value

Unit Root Test

Unit root test is a test that checks for stationarity in a set of data. A stationarity time series is when move in time does not cause a change in distribution. In the unit root test, the invalid hypothesis clears up that there is a present of unit root unit in the model. it construes that the data set is not not stationary. So as to dismiss or don't dismiss the invalid, we need to take a gander at the p-value. On the off chance that the p-value is more than 5% then don't dismiss the invalid. Furthermore, if neglect to dismiss the invalid, then presuming that the arrangement has unit root in this way there are not stationary at the dimension the test was perform. Then again, if the p-value is under 5%, we dismiss the invalid which affirms that there is a unit root (the arrangement is not stationary). When we dismiss the invalid, we are stating that the arrangements are stationary. Another method for taking a gander at the unit root separated from concentrating on the p-value is the T-test. If the T-value is less that the significant level, we state that the arrangement has no unit root and it isn't stationary therefore we don't dismiss the invalid theory. Assume that the p-esteem is more noteworthy than 5%

which infers that the invalid speculation isn't dismissed hence adjusting to the way that the arrangement has unit root (that the arrangement isn't stationary), yet the T-value is more prominent than the significant level then this implies we ought to incorporate either the catch or the pattern or them two together.

What Stationary Implies

Series is said to be stationary if the mean and the variance does not change over time. If any of them change, then we have a unit root in the series.
Stationary series is preferable because if we have unit root on the series and go on to apply test on it, we will have false and incorrect results which will not be desirable in the model.

Cointegration Test

Tests for cointegration check for steady long-run association between sets of factors. Rao (2007) noted that if the test neglects to discover such a relationship, it just proposes that there is no relationship exist between them. there is three type of cointegration test:

- Engle–Granger
- Phillips–Ouliaris
- Johansen test

In this study, Engle-Granger test is used in analysis the model.

Granger causality

This is an approach to examine causality between two factors in a period arrangement. The technique is a probabilistic record of causality; it utilizes experimental informational collections to discover examples of association. A variable X is causal to variable Y if X is the reason for Y or Y is the reason for X. Be that as it may, with Granger causality, you aren't trying to find the main cause and effect relationship; What you need to know is if a specific variable precedes another in the time sequence. If econometricians state "cause," what they mean is "Granger-cause," in spite of the fact that an increasingly suitable word may be "priority" (Leamer, 1985).

The Adjusted R^2

The adjusted R^2 is a statistical measure that shows the degree of the variance for a reliant variable that's explained by an independent variable or variables in a regression model. Whereas correlation tells the association between a reliant and independent variable, R-squared discloses to what extent the variance of the independent variable explains the variance of the dependent variable. The estimation of R^2 is lying in within the range of 0 and 1 are commonly stated as percentages from 0% to 100%. An R-squared of 100% implies that the dependent variable is completely explained by the independent variable(s)

The closer it is to 1 the better to describes there is relation. For instance, if the R^2 of a model is 0.50, then approximately the model describes most of the observed variation can be explained by the model's inputs.

Formula For R-Squared is:

$$R^2 = 1 - \frac{Explained\ Variation}{Total\ Variation}$$

T-Test

T-test is a sort of inferential statistic used to understand if there is a significant between the means of sets, which might be associated in certain particular. A t-test is alluded to as hypothesis testing apparatus that permits testing of a suspicion material to a population. T-test checks at the t-distribution values, t-statistic and the degrees of freedom to decide the probability of qualification between two sets of data (information). This test is run by comparing the difference of the arrangement of data to know whether we do not reject (validated hypothesis) or reject the invalid hypothesis. The decision standard is if T decided is more noticeable than T orchestrated (T-calculation>T-table) values, reject invalid hypothesis and if else we Accept.

Numerically, the t-test takes an example from all of the two informational indexes and develop the issue explanation by accepting an invalid theory that the two techniques are identical. Certain quantities of the set are determined and thought about against the standard qualities, and the expected invalid speculation is acknowledged or dismissed appropriately. In the event that the invalid theory fits the bill to be rejected, it demonstrates that the data analysis or the relationship is of factors is strong.

Formula for calculating T-test

$$\text{T-value} = \frac{Mean1 - Mean2}{\sqrt{\frac{(n1-1) \times var1^2 + (n2-1) \times var2^2}{n1+n2-2} \times \frac{1}{n1} + \frac{1}{n2}}}$$

Where

mean1 and mean2= average values of each data sample sets

var1 and var2= variance of each of the data sample set

n1 and n2= number of records in each data sample set

degree of freedom= $(n_1+n_2)-2$

F-Statistics

Basically, it is the ratio of two variances or quantities. Variances are a measure of how the data is scattered from the mean. Larger values indicate greater dispersion. The calculation of the variance is the square of the standard deviation. Standard deviations are easier to understand than variances.

F-statistics are based on the ratio of mean squares. The term “mean squares” is an estimate of population variance that account for the degrees of freedom (DF) used to compute that estimate. This test is utilized to check for the overall regression model significance.

F-statistic construct the hypothesis as below

H_0: $\beta_1 = \beta_2 = \ldots = \beta k = 0$

H_0: $\beta_1 \neq \beta_2 \neq \ldots \neq \beta k \neq 0$

In a case that F-value determined is more prominent then F is classified (Fcal >Ftab) with the picked element of centrality with k-1 and n-K level of chance, we reject the invalid hypothesis, that is, we accept that the relapse display is huge. Yet, in the event that Fcal<Ftab, we accept the invalid hypothesis, that is we accept that the regression outcomes demonstrate not enough evidence with n-1 and n–k level of significance. F-test is the quantifiable test that estimate has an F-spread under the invalid hypothesis. It is routinely utilized when looking at models that have been fitted to an instructive list, with a definitive target to separate the model that best fits the masses from which the data were investigating. Right "F-tests" fundamental rise when the models have been fitted to the information utilizing least squares. This was composed by George W. Snedecor (1970) and paid it a tribute to Sir Ronald A. Fisher. Fisher at first built up the estimation as the difference proportion during the 1920s.

Formula of F-statistics:

$$F= \frac{\frac{SSE1-SSE2}{M}}{\frac{SSE2}{N-K}}$$

Where SSE= residual sum of squares

M= number of restrictions

K = number of independent variables

$$\text{F- statistics} = \frac{variance\ of\ the\ group}{mean\ of\ the\ within\ group\ variance}$$

Autocorrelation

Autocorrelation is a characteristic of data which demonstrate the level of similarity between the values of the same variables over progressive intervals. The auto part of autocorrelation is from the Greek word for self, and autocorrelation implies data information is connecting with itself, instead of being associated with some other information. In a progression of numbers, and there is a pattern such that values in the series can be predicted based on preceding numbers in the series, the series of numbers is said to show autocorrelation. This is also called as serial correlation or serial dependence. The existence of autocorrelation in the residuals of a model is a indicate that the model may be not too strong. Autocorrelation can be diagnosed using a correlogram and be tested using the Durbin-Watson test. There are two types of autocorrelations exists as positive or negatives autocorrelation. Positive autocorrelation indicates that observations of a variable that are one apart are correlated and positive means that the correlation between the observations is positive. When data plotted positive correlation, the residuals appear in a pattern curve. The negative correlation can be seen the points form a unpattern if curve.

The Implications of autocorrelation

At a point when autocorrelation is detected in the residuals from a model, it proposes that the model is mis specified (i.e., in some sense off-base). A reason is that some key variable or factors are absent from the model. Where the data has been gathered across space or time, and the model does not explicitly account for it, then autocorrelation is likely to say. To fix is to either incorporate the missing variables or explicitly model the autocorrelation e.g., using an ARIMA model (Barnthouse, L. W., 1992)

Durbin Watson test of Autocorrelation

Durbin Watson test is good for a small sample (n<25). This test detects autocorrelation which was built by J. Durbin and G S Watson in 1951.

The hypothesis be H_0: p=0 elements are not correlated

H_1: p≠ 0 elements are autocorrelated

Heteroskedasticity (or heteroscedasticity)

This is the standard errors of a variable, observed over a particular measure of time and are non-constant. This is error variance scattering within an independent variable within a particular sample. These variations can be used to compute the margin of error in a data sets, such as predict result and actual results, as it provides a measure of the deviation of data points or information from the mean value. This test would be conducted to assess whether the error term, μ in the regression model have a constant variance or not. The study imposed is the test for Breusch pagan, Arch and also White test of heteroskedasticity detection.

Where:

H_0**:** homoscedasticity

H_1**:** heteroskedasticity.

The presence of heteroskedasticity is a significant worry in the utilization of regression analysis, including the examination of difference, as it can invalidate accurate preliminary of centrality that recognize that the exhibiting mistakes are uncorrelated and uniform in this manner that their changes don't move with the effects being shown.

Coefficients

This refers to the estimates of the population parameters that tells the association between an independent variable and the dependent variable. In linear regression, coefficients are the values that multiply the independent

values. The sign of each coefficient indicates the direction of the relationship between an independent variable and the response variable.

A positive sign indicates that as the predictor variable increases and then the response variable also increases.

A negative sign indicates that as the predictor variable increases and then the response variable decreases.

Ramsey Test

This test check whether explanatory variables explain the dependent variable. It was innovated by James B. Ramsey (1968). The instinct behind the test is that if non-arrange mixes of the illustrative components have any power in clearing up the response factor, the model is mistakenly exhibited as in the data conveying technique likely could be higher approximated by a polynomial or another non-straight reasonable sort. Ramsey RESET test tells whether the model has a misspecification issue or not. That is if the model is actual generating procedure. In the RESET test, it centers around the p-value of the fitted square and examine the hypothesis shown below;

H_0: Y=0,

H_1: Y≠0

where Y=ɣ.

It the fitted value square greater than the significant level, we don't reject the invalid, and it is concluded there is no misspecification issue.

CUSUM Test

The CUSUM test can be comprehended as a consecutive investigation strategy; it is generally utilized for checking change discovery. It is utilized to check the steadiness of the long-run coefficient of the evaluated factors in the model; the

CUSUM tests utilized, as introduce by Brown, Durbin, and Evans (1975). The CUSUM are plotted against the plotted lines at level of significance. If the plot of the CUSUM lies within the critical bounds at level of significance, this demonstrated that the model is said to be steady.

3.7 Data required and sources

The data used are yearly data from various publications of Food agriculture organization and federal reserved data bank and statistical bulletin and it spans the period of 30 years from 1986 to 2016. There are secondary data that are time series data. These are supplemented with data and also obtained from the financial economics review and text book published to ensure that proper adequate data is presented in the course of our regression analysis.

CHAPTER 4

PRESENTATION OF THE FINDINGS

Before the estimation of sesame production was conducted, unit root tests, cointegration test, granger causality test were performed to decide the time-series properties of the information utilized in the investigations. This is line with the criteria of econometrics.

4.1 Unit root test:

The test clarifies whether the data set is stationary or not stationary. The test check for the presence of unit root in every one of the factors utilized in the estimation of sesame crop production, to be specific they are GDP per capita, Industrial carbon dioxide, sesame harvested area, temperature changes using the augmented Dickey-Fuller (ADF) (Dickey and Fuller, 1979) tests.

Table 4. 1 Unit root Test

		Level	1nd difference
Sesame crop Production	Trend	0.3375	0.000
	Trend and intercept	0.0832	0.000
Industrial Carbon dioxide	Trend	0.1318	0.000
	Trend and intercept	0.4055	0.0001
Consumption	Trend	1.000	0.0052

	Trend and intercept	0.9938	0.0013
Sesame Harvested area	Trend	0.1133	0.000
	Trend and intercept	0.5546	0.000
Temperature change	Trend	0.013	
	Trend and intercept	0.0002	
GDP per workforce	Trend	0.9976	0.0006
	Trend and intercept	0.9255	0.0009

Source: Eview 7.3 output

The result of ADF test of variables in levels and first difference indicate that the variables are non-stationary in level except temperature changes. All the variable become stationary in the first difference for both the trend and intercept at a percent level of one.

4.1.2 Cointegration test:

For two or more variables to have long run association is known as Cointegration. The cointegration among factors precludes the likelihood of the evaluated association is "spurious" (Engle and Granger, 1987). The Engle and Granger's two step procedure is the most consistently used test for cointegration. Regardless, this assessment grasps the Johansen multivariate MLE cointegration testing framework due to (Johansen 1988 and Julius 1990) for the going with reasons. In any case, not in any manner like the Engle Granger approach, the Johansen framework does not, from the prior, acknowledge the nearness of presumably a singular cointegrating vector yet rather it tests for the quantity of cointegrating associations, and second the Johansen methodology isn't sensitive to the choice of depend variable and anticipate that all elements should be endogenous, not typical for the Engle Granger procedure (Masih and Masih, 2000).

Table 4. 2 Cointegration test

Date: 08/07/19 Time: 19:35
Sample (adjusted): 1992 2014
Included observations: 23 after adjustments
Trend assumption: Linear deterministic trend
Series: SES_PRO SES_HAR IND_CO2_LIQ GDP_WORK CONSUMP TEMP__CHNG
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.891238	166.1075	95.75366	0.0000
At most 1 *	0.836494	115.0798	69.81889	0.0000
At most 2 *	0.775959	73.42894	47.85613	0.0000
At most 3 *	0.615277	39.02260	29.79707	0.0033
At most 4 *	0.416756	17.05226	15.49471	0.0289
At most 5 *	0.183111	4.651803	3.841466	0.0310

Trace test indicates 6 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.891238	51.02764	40.07757	0.0020
At most 1 *	0.836494	41.65088	33.87687	0.0049
At most 2 *	0.775959	34.40633	27.58434	0.0057
At most 3 *	0.615277	21.97034	21.13162	0.0381
At most 4	0.416756	12.40046	14.26460	0.0965
At most 5 *	0.183111	4.651803	3.841466	0.0310

Max-eigenvalue test indicates 4 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Hypothesis;

H_0=There is no cointegration among the 6 variables equation

H_1=There is cointegration among the 6 variables equation

Testing for conceivable cointegrating relationship(s) between factors. For the Johansen cointegration test and utilize the Max-eigenvalue test used. Table 4.2 reports the assessed eigenvalue and relating basic qualities due to MacKinnon

et al. (1999). Trace test indicate 6 cointegration equations at the level of 0.05 and Max-eigenvalue test indicate 4 cointegration at the level of 0.05.

The empirical outcomes displayed above demonstrate the presence of a long run association of all the variables. Now the OLS estimator of the coefficients of the cointegrating regression is consistence.

4.1.3 Granger causality

Granger causality is, where the supposition that will be that the factors information generating process in time series are independent; at that point the informational collections are dissected to check whether they are associated. The inverse is a technique which expect the procedures are not independent; the informational indexes are then broke down to check whether they are produced autonomously from one another.

Table 4. 3 Granger Causality test

Null Hypothesis:	Obs	F-Statistic	Prob.	Conclusion
SES_HAR does not Granger Cause SES_PRO	30	8.95021	0.0059	Reject H_0
SES_PRO does not Granger Cause SES_HAR		0.06927	0.7944	Do not reject H_0
GDP_CAP does not Granger Cause SES_PRO	30	1.37152	0.2518	Do not reject H_0
SES_PRO does not Granger Cause GDP_CAP		0.19096	0.6656	Do not reject H_0
IND_CO2_LIQ does not Granger Cause SES_PRO	28	6.7E-06	0.9980	Do not reject H_0
SES_PRO does not Granger Cause IND_CO2_LIQ		0.19943	0.6590	Do not reject H_0
CONSUMP does not Granger Cause SES_PRO	29	2.11524	0.1578	Do not reject H_0
SES_PRO does not Granger Cause CONSUMP		0.00202	0.9645	Do not reject H_0
TEMP_CHNG does not Granger Cause SES_PRO	30	4.95959	0.0345	Reject H_0
SES_PRO does not Granger Cause TEMP_CHNG		15.5926	0.0005	Reject H_0
GDP_CAP does not Granger Cause SES_HAR	30	0.14395	0.7074	Do not reject H_0
SES_HAR does not Granger Cause GDP_CAP		0.28865	0.5955	Do not reject H_0
IND_CO2_LIQ does not Granger Cause SES_HAR	28	1.79603	0.1922	Do not reject H_0
SES_HAR does not Granger Cause IND_CO2_LIQ		0.37386	0.5464	Do not reject H_0
CONSUMP does not Granger Cause SES_HAR	29	0.26759	0.6093	Do not reject H_0
SES_HAR does not Granger Cause CONSUMP		0.00024	0.9877	Do not reject H_0
TEMP_CHNG does not Granger Cause SES_HAR	30	3.65192	0.0667	Do not reject H_0
SES_HAR does not Granger Cause TEMP_CHNG		16.3966	0.0004	Reject H_0
IND_CO2_LIQ does not Granger Cause GDP_CAP	28	0.49211	0.4895	Do not reject H_0
GDP_CAP does not Granger Cause IND_CO2_LIQ		0.05811	0.8115	Do not reject H_0
CONSUMP does not Granger Cause GDP_CAP	29	8.45884	0.0073	Reject H_0
GDP_CAP does not Granger Cause CONSUMP		5.03369	0.0336	Reject H_0
TEMP_CHNG does not Granger Cause GDP_CAP	30	1.71698	0.2011	Do not reject H_0
GDP_CAP does not Granger Cause TEMP_CHNG		12.3071	0.0016	reject H_0
CONSUMP does not Granger Cause IND_CO2_LIQ	27	0.26311	0.6127	Do not reject H_0
IND_CO2_LIQ does not Granger Cause CONSUMP		0.58272	0.4527	Do not reject H_0
TEMP_CHNG does not Granger Cause IND_CO2_LIQ	28	2.38535	0.1350	Do not reject H_0
IND_CO2_LIQ does not Granger Cause TEMP_CHNG		8.03259	0.0090	Reject H_0
TEMP_CHNG does not Granger Cause CONSUMP	29	1.16010	0.2913	Do not reject H_0
CONSUMP does not Granger Cause TEMP_CHNG		10.3814	0.0034	Reject H_0

Source: Output of Eviews 7.3

Hypothesis;

H_0= X factor does not granger causes Y factor

H_1= X factor does granger causes Y factor

The table above tell the relationship between all the factors of this study, in others words if two factors are correlated at any period of time. The summary of result of the factors relationship is as follow;

Table 4. 4 Granger Causality Test Conclusion

Factors Relationship	Conclusion
Sesame harvest does causes sesame seed production	Conform
Temperature changes causes sesame seed production	conform
GDP per workforce causes sesame seed production	Conform
Consumption causes sesame seed production	Conform
GDP per workforce does causes Temperature change	Not conform
Consumption does causes GDP per work population	Not conform
Industrial emission of $C0^2$ does causes Temperature	conform
Denoted significant at 5% Level	

4.2 Presentation of Regression Result

This research study is analysis by the used of regression model through the application of OLS estimation method. After the analysis, the result is properly subjected to statistically and econometrical criteria to conform the significance of the model. Below is the analysis of the model can be seen as table 4.4, the variables used conduct analysis in the model are sesame harvested area, industries carbon dioxide emission, GDP per capital, Temperature changes and consumption all are for Turkey from the period of 1986 to 2016.

Table 4.4 shows is the result of the findings as below.

Table 4. 5 Regression Model

Dependent Variable: SES_PRO
Method: Least Squares
Date: 08/07/19 Time: 19:10
Sample (adjusted): 1990 2014
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	18.33410	5.790362	3.166313	0.0051
IND_CO2_LIQ	-0.443736	0.186822	-2.375181	0.0282
CONSUMP	-0.566704	0.212115	-2.671686	0.0151
GDP_WORK	0.415582	0.095509	4.351214	0.0003
TEMP__CHNG	0.066553	0.020880	3.187427	0.0048
SES_HAR	0.754804	0.120681	6.254551	0.0000

R-squared	0.957440	Mean dependent var	10.12900
Adjusted R-squared	0.946240	S.D. dependent var	0.268154
S.E. of regression	0.062175	Akaike info criterion	-2.512169
Sum squared resid	0.073449	Schwarz criterion	-2.219638
Log likelihood	37.40211	Hannan-Quinn criter.	-2.431033
F-statistic	85.48518	Durbin-Watson stat	1.873708
Prob(F-statistic)	0.000000		

The intercept is 18.33410 which imply that if all the explanatory variables assume the value of zero, SES_PRO will be 18.33410.

The coefficient of sesame harvested area (SES_HAR) is 0.754804 and P=0.0000, this implies that Sesame harvested area of Turkey is positively related to sesame crop production in Turkey. A percentage change in sesame harvested area will change the change the production amount of sesame by 0.754804 and the probability value of 0.0000 which is less than 0.05 shows that the factor is statistically significant.

The coefficient of industrial emission of carbon dioxide (IND_CO2_LIQ) is -0.443736 and P=0.0282. This implies that emission of carbon dioxide by industries is negatively related to the rely factor (SES_PRO), a percentage change in industrial carbon emission will decrease the amount of sesame production by -0.443736 and it has significant impact since P=0.0232 < 0.05 at 5% level of significant.

The coefficient of Gross domestic product per working poplation (GDP/ working population) is 0.415582 which implies a percentage change in GDP per working population will decrease the amount of sesame production by 0.415582 and the probability p=0.0003 < 0.05 which means it is statistically significant at 5% level of significance.

The coefficient of consumption is 0.566704 which means that a unit change in (CONSUMP) will change the quantity of production for sesame seed by about 0.566704 and the probability value is P=0.0151 which is less than 0.05 at 5 percent level of significance imply that it is statistically significant.

The coefficient of temperature change (LTEMP_CHNG) is 0.066553 and the P value= 0.0048. This indicate that temperature change is positively related to the production of sesame crop, a unit change in temperature will increase the amount of sesame production by 0.066553 and it also has significant impact on production quantity since probability value is less than 0.05 at 5 percent level of significance.

4.2.2 Evaluation of the Result Base on the Assumption

The results show that sesame harvested area, industrial carbon dioxide emission, GDP per capita, temperature and consumption conforms to the “a-priori” assumption, which in essence implies that increases in the above listed variables over the years from 1986 to 2016 influences the production of sesame crop in Turkey. Table 4.4.1 summarizing the result;

Table 4. 6 Evaluation base on Assumption

Variables	Expected sign	Observed sign	Conclusion
SES_HAR	Positive	Positive	Conforms
IND_C02_LIQ	Negative	Negative	Conforms
GDP_work	Positive	Positive	Conforms
LTEMP_CHNG	Positive	Positive	Conforms
CONSUMP	Negative	Negative	Conforms

4.3. Evaluation Based on Statistical Criteria

4.3.1 Coefficient of determination (R2):

In our model, R^2= 0.948129 infers that around 94.81% of the variation in the rely on factor sesame production is influenced by the factors incorporated into the model.

4.3.2 T test:

This test is computed to check for the individual significance of the factors to know whether we acknowledge or dismiss Ho (invalid theory). The decision standard is if T-cal > T-tab, dismiss invalid theory (Null Hypothesis) and if else we acknowledge. Utilizing 95% confidence interval.

Level of significance=α=0.05 at 5%.

Degree of freedom= n-k

Where; n=sample size

k= number of parameters.

30-5=25

Table 4. 7 Evaluation base on T- test Criteria

Variables	**t-value**	**t-tab**	**Decision**	**Conclusion**
SES_HAR	6.25	2.060	Reject H_0	Statistically significant
IND_C02_LIQ	-2.37	2.060	Reject H_0	Statistically significant
GDP PER WORKING POP	4.35	2.060	Reject H_0	Statistically significant
LTEMP_CHNG	3.18	2.060	Reject H_0	Statistically significant
CONSUMP	-2.67	2.060	Reject H_0	Statistically significant

From the table 4.5, it is seen that it corresponds to the initial regression table that all the factors are statistically significant. This was also shown above in the t-test table.

4.3.3 F-statistics: This test is computed to check for the jointly significance of the factors to know whether we acknowledge or dismiss Ho (invalid theory) in others words to check whether the explanatory factors are jointly explaining the dependent variable or not. The decision standard is if T-cal >T-tab, dismiss invalid theory (Null Hypothesis) and if else do not dismiss.

This is utilized to test for significance of all the evaluated parameters. Subsequently, the hypothesis is expressed as;

H_0: $\beta_1=\beta_2=\beta_3\ldots\ldots=\beta_k=0$

H_1: $\beta_1\neq\beta_2\neq\beta_3\ldots\ldots\neq\beta_k\neq0$

Level of significance= 5%

Degree of freedom: $\frac{k-1}{n-k}$

k-1=5-1=4

n-k=30-5=25

Decision rule is rejecting null hypothesis if $F_{cal}>F_{tab}$ and vice visa

Table 4. 8 Evaluation base on F-test Criteria

F calculated	F table	Decision	Conclusion
80.4856	2.76	Reject Ho	Statistically significant

Since F-statistics (80.4265) is greater than F-critical value (2.76), we therefore reject H_0 and conclude that at 5% level of significance, the regression model is statistically significant and desirable. Using from the above regression result also,

the probability (F-statistics) 0.000000<0.05 which shows it is significant at 5% level of significance.

4.4 Evaluation Based on Econometric Criteria

4.4.1 Serial correlation LM Test**:**

Serial correlation is the connection between a variable and it lagged information of itself over different time intervals. Pattern or not random variable is a serial correlated**.** We will use the LM test to know if there is autocorrelation.

$u_t = p_1^{ut-1} + p_2^{ut-2} + \ldots pqut^{-q} + v_t$

The null hypothesis is; $Ho = p_1 = \ldots pq = 0$

Alternative hypothesis is $H1 \neq p_1 \neq \ldots p_q \neq 0$

Table 4. 9 Test of Serial Correlation

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.730212	Prob. F(2,17)	0.4963
Obs*R-squared	1.977776	Prob. Chi-Square(2)	0.3720

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 08/07/19 Time: 19:16
Sample: 1990 2014
Included observations: 25
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.734715	6.377670	0.428795	0.6735
IND_CO2_LIQ	-0.008186	0.200362	-0.040854	0.9679
CONSUMP	-0.082752	0.245699	-0.336802	0.7404
GDP_WORK	0.007977	0.114570	0.069628	0.9453
TEMP__CHNG	0.002888	0.021630	0.133526	0.8953
SES_HAR	-0.043930	0.130610	-0.336346	0.7407
RESID(-1)	0.037998	0.291137	0.130516	0.8977
RESID(-2)	-0.330559	0.274167	-1.205683	0.2445

R-squared	0.079111	Mean dependent var	1.44E-16
Adjusted R-squared	-0.300079	S.D. dependent var	0.055320
S.E. of regression	0.063077	Akaike info criterion	-2.434584
Sum squared resid	0.067638	Schwarz criterion	-2.044544
Log likelihood	38.43230	Hannan-Quinn criter.	-2.326404
F-statistic	0.208632	Durbin-Watson stat	2.018346
Prob(F-statistic)	0.978732		

From Table 4.6.1, shows that there is no LM autocorrelation since the probability value of the chi square (0.4963) and F statistics (0.3720) is greater than 5% (0.05) at 5 percent level of significance

4.4.2 Heteroskedasticity**:** This test allows us to check if the residuals of a regression have changing variance**.** The test will be carried out using White test of heteroskedasticity then supporting the test by using Breusch pagan test and Arch test of heteroskedasticity.

The hypothesis is therefore stated as;

Ho: $\beta_1=\beta_2=\beta_3=\beta_4=\beta_5=0$ (Homoskedasticity)

H1: $\beta_1\neq\beta_2\neq\beta_3\neq\beta_4\neq\beta_5\neq0$ (Heteroskedasticity)

Table 4. 10 Breusch-Pagan-Godfrey Test of Heteroskedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	1.526040	Prob. F(5,19)	0.2288
Obs*R-squared	7.163109	Prob. Chi-Square(5)	0.2088
Scaled explained SS	4.182918	Prob. Chi-Square(5)	0.5234

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 08/07/19 Time: 19:19
Sample: 1990 2014
Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.701991	0.376970	-1.862190	0.0781
IND_CO2_LIQ	-0.003966	0.012163	-0.326065	0.7479
CONSUMP	0.025219	0.013809	1.826220	0.0836
GDP_WORK	-0.002614	0.006218	-0.420351	0.6789
TEMP__CHNG	-0.001134	0.001359	-0.834213	0.4145
SES_HAR	0.008356	0.007857	1.063547	0.3009

R-squared	0.286524	Mean dependent var	0.002938
Adjusted R-squared	0.098768	S.D. dependent var	0.004264
S.E. of regression	0.004048	Akaike info criterion	-7.975735
Sum squared resid	0.000311	Schwarz criterion	-7.683205
Log likelihood	105.6967	Hannan-Quinn criter.	-7.894600
F-statistic	1.526040	Durbin-Watson stat	2.642597
Prob(F-statistic)	0.228774		

The result above from Breusch Pagan Godfrey heteroskedasticity test shows that there is no existence of heteroskedasticity. As shown in the regression above, the probability F value and Chi square value are greater than 0.05 at 5% level of Significance

Table 4. 11 White Test of Heteroskedasticity

Heteroskedasticity Test: White
Null hypothesis: Homoskedasticity

F-statistic	1.590433	Prob. F(17,7)	0.2740
Obs*R-squared	19.85859	Prob. Chi-Square(17)	0.2815
Scaled explained SS	11.59648	Prob. Chi-Square(17)	0.8239

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 08/07/19 Time: 19:20
Sample: 1990 2014
Included observations: 25
Collinear test regressors dropped from specification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-10.93035	8.241153	-1.326314	0.2264
IND_CO2_LIQ^2	-0.945440	0.396632	-2.383669	0.0486
IND_CO2_LIQ*CONSUMP	1.497395	0.583689	2.565401	0.0373
IND_CO2_LIQ*GDP_WORK	-1.253918	0.484583	-2.587624	0.0361
IND_CO2_LIQ*TEMP__CHNG	0.022326	0.026227	0.851265	0.4228
IND_CO2_LIQ*SES_HAR	-0.692131	0.298495	-2.318736	0.0535
CONSUMP^2	-0.544340	0.196398	-2.771617	0.0276
CONSUMP*GDP_WORK	0.770823	0.256254	3.008040	0.0197
CONSUMP*TEMP__CHNG	0.138301	0.084532	1.636084	0.1458
CONSUMP*SES_HAR	0.495066	0.176219	2.809386	0.0262
GDP_WORK^2	-0.275563	0.091267	-3.019300	0.0194
GDP_WORK*TEMP__CHNG	-0.083131	0.031580	-2.632447	0.0338
GDP_WORK*SES_HAR	-0.351873	0.124734	-2.820990	0.0257
GDP_WORK	2.283812	1.764731	1.294142	0.2367
TEMP__CHNG^2	-0.003581	0.002222	-1.611576	0.1511
TEMP__CHNG*SES_HAR	-0.018112	0.023786	-0.761463	0.4713
TEMP__CHNG	-3.005714	2.241961	-1.340663	0.2219
SES_HAR^2	-0.103933	0.039847	-2.608299	0.0350

R-squared	0.794344	Mean dependent var	0.002938
Adjusted R-squared	0.294892	S.D. dependent var	0.004264
S.E. of regression	0.003580	Akaike info criterion	-8.259677
Sum squared resid	8.97E-05	Schwarz criterion	-7.382086
Log likelihood	121.2460	Hannan-Quinn criter.	-8.016270
F-statistic	1.590433	Durbin-Watson stat	2.481852
Prob(F-statistic)	0.274036		

Table 4.6.2 shows the regression results of white test of heteroskedasticity. Both

the probability F- value and the chi square value are greater than 0.05 at 5% level of significance which shows that there is no existence of heteroskedasticity in the model. The model is tested and proven to be desirable.

Table 4. 12 Arch Test of Heteroskedasticity

Heteroskedasticity Test: ARCH

F-statistic	0.005645	Prob. F(1,22)	0.9408
Obs*R-squared	0.006156	Prob. Chi-Square(1)	0.9375

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 08/07/19 Time: 19:21
Sample (adjusted): 1991 2014
Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.003016	0.001079	2.794777	0.0106
RESID^2(-1)	0.016177	0.215308	0.075132	0.9408

R-squared	0.000257	Mean dependent var	0.003060
Adjusted R-squared	-0.045186	S.D. dependent var	0.004310
S.E. of regression	0.004407	Akaike info criterion	-7.931701
Sum squared resid	0.000427	Schwarz criterion	-7.833529
Log likelihood	97.18041	Hannan-Quinn criter.	-7.905656
F-statistic	0.005645	Durbin-Watson stat	1.986486
Prob(F-statistic)	0.940788		

The following test shows the regression results of Arch test of heteroskedasticity, the probability F value and the chi square value are greater than 0.05 at 5% level of significance which tells that there is no existence of heteroskedasticity in the model.

4.4.3 Ramsey RESET Test**:** The (RESET) Regression Equation Specification Error Test by Ramsey helps test whether non-direct mixes of the fitted qualities help clear up the reaction variable. It helps to know if the model is correctly specified or there is a misspecification. This test focuses on the P-value of the fitted square and analysis it.

where Y=Ŷ if the fitted value square is greater than 5%, means we do not reject the null and conclude that there is no misspecification problem. Ho: Y=0 ,H1: Y≠0

Table 4. 13 Ramsey Test

Ramsey RESET Test
Equation: UNTITLED
Specification: SES_PRO C IND_CO2_LIQ CONSUMP GDP_WORK TEMP__CHNG SES_HAR
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.268027	18	0.7917
F-statistic	0.071839	(1, 18)	0.7917
Likelihood ratio	0.099577	1	0.7523

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.000292	1	0.000292
Restricted SSR	0.073449	19	0.003866
Unrestricted SSR	0.073157	18	0.004064

LR test summary:

	Value
Restricted LogL	37.40211
Unrestricted LogL	37.45189

Unrestricted Test Equation:
Dependent Variable: SES_PRO
Method: Least Squares
Date: 08/07/19 Time: 19:22
Sample: 1990 2014
Included observations: 25

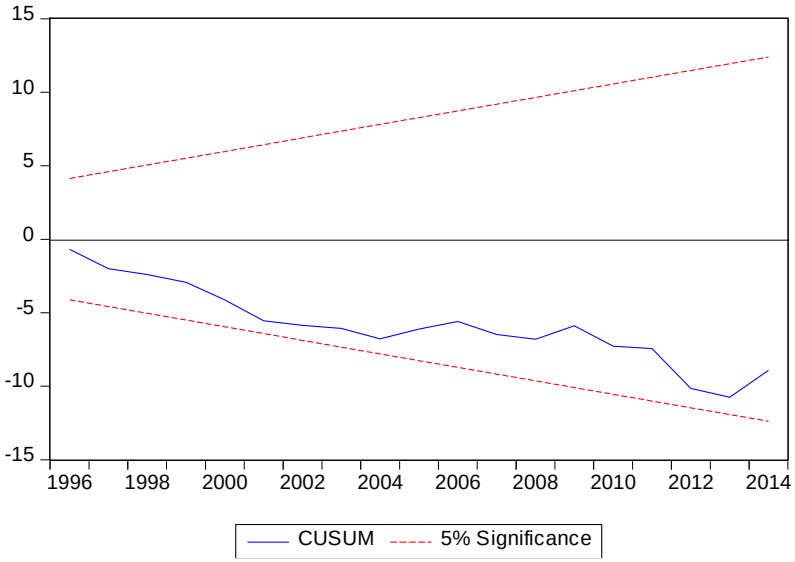
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	39.24267	78.23467	0.501602	0.6220
IND_CO2_LIQ	-1.234306	2.955798	-0.417588	0.6812
CONSUMP	-1.435607	3.249129	-0.441844	0.6639
GDP_WORK	1.078588	2.475589	0.435690	0.6682
TEMP__CHNG	0.173793	0.400681	0.433744	0.6696
SES_HAR	1.997334	4.637481	0.430694	0.6718
FITTED^2	-0.080472	0.300239	-0.268027	0.7917

R-squared	0.957609	Mean dependent var	10.12900
Adjusted R-squared	0.943479	S.D. dependent var	0.268154
S.E. of regression	0.063752	Akaike info criterion	-2.436152
Sum squared resid	0.073157	Schwarz criterion	-2.094866
Log likelihood	37.45189	Hannan-Quinn criter.	-2.341494
F-statistic	67.76962	Durbin-Watson stat	1.884765
Prob(F-statistic)	0.000000		

From the Table 4.7, the fitted value square (0.8993) > (0.05) means we do not reject the null, we conclude that there is no model misspecification in the model.

4.4.4 Cusum Test**:** This testing the stability of the specification of the models. It Cumulative aggregate test is plotted against the plotted lines at 5% dimension of noteworthiness and if the plot of the CUSUM lies inside the basic limits at 5% dimension of critical, this implies the relapse demonstrate is steady and attractive.

Figure 4. 1 Illustration of CUSUM test



The Figure 4.1 explains CUSUM test for stability, the result indicates the depended factor is stable at 5% level of significance as the CUSUM lies inside the critical bounds of 5% significance which indicate the model is stable and desirable.

4.5 Evaluation of the Research Hypothesis

H_0= Urbanization does not affect the production of sesame seed

H_1= Urbanization does affect the production of sesame seed

Based on the empirical evidence used in this research, it is observed that the urbanization activities affect the production of sesame seed both positively and negatively in Turkey from 1986 to 2016. It is observed that the assume factor of urbanization are significant in the sesame production and the factors are either enhancing the production or they decrease the production. After running a regression analysis, the model of the factors passed all the econometrics and

statistical criteria and therefore, we concluded at rejecting the null hypothesis that state urbanization does not affect the production of sesame seed. The T test and F-test both tell the factors individually and jointly are significantly explaining the variation of sesame seed production in Turkey from 1986 to 2016.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATION

5.1 Summary of Findings

This thesis study the trend of sesame seed production in Turkey from 1986 to 2016. The trend indicates there is a reduction of production quantity in that period of years. Some factors of urbanization under environmental and demand factors were assumed to be part of the reason for the decrease of the production; study carried out to investigate the significance of factors of urbanization on sesame seed production using time series data of these factors' urbanization from 1986 to 2016.

This made the use of the application of ordinary least square method (OLS) to conduct different tests, the result reveal that there is a long-time relationship between sesame seed production quantity of Turkey and the factors of urbanization which are; Industrial carbon dioxide, temperature, sesame harvested area then demand factors GDP per capita, and consumption. Also, granger causality test was done and it showed that all the independent factors causes the dependent factor production of sesame seed significance at 0.05%.

The result of the findings show environmental factors influences the production of sesame seed in Turkey. Godfray et al. (2011) said Environmental change influences farming and food production from numerous points of view. The yield of a plant is influenced by climatic factors, for example, rising temperatures, changing precipitation routines and increase of CO2 levels on the environment.

Rising of temperature positively influence sesame crop because the plant is a tolerant of heat and temperature occurred positively affect the production process of sesame crop.

Industrial carbon dioxide negatively affects the production process of sesame seed Steltzer and Post (2009) said the yields of some plants have reacted adversely to the ongoing warming since the 1980s at the world global scale, in spite of the fact that the yield reaction signs of different harvests have still been indistinct.

Sesame harvested area has a positive relation with the production of sesame seed, this is in line with Roca (2003) stated development of urban area has influenced the growth of food in various ways; age-old cultivating land has been adjusted, the local method of cultivating farm and family in practices of farming have reduce and hectare of land are loss all because of urbanization.

Negative correlation occurred between consumption and production of sesame seed. This is in line with Lau lin and yotopolous (1961) statement that when consumption when general consumption of a nation is increasing, laborers from agriculture sectors or rural people tend to migrate to urban or more to other sectors that are non-agriculture sectors like manufacturing sector and this will consequently affect agriculture production.

Ranis and Fei (1974) argued that, they stated that migrated laborers may not consequently decrease in farming output because of the fact that their marginal productivity of labour is small further they said he didn't take into consideration that machinery and technology is can be used to replace their worked.

5.2 Conclusion

The rapid increase of economy has brought about an extension in urbanization and the convergence of land from provincial to urban settlements everywhere throughout the nation. So as to satisfy the increases demand for land and city development extends to territories of agricultural grounds are accessible. This development prompts the escalated land activities changes in urban and rural

regions. Farming area change is considered as a coherent after effect of population development with economic growth and it has been disregarded avoidable result during the time spent advancement. Urbanization is a long contended as threat to farming land.

The result indicates that these factors of urbanization is related to the production of sesame seeds. This means that as urbanization increases, it will continue affect the production of sesame seeds. Basically, on the findings of this study, it can be concluded that urbanization is a thread to the production of sesame seed and also it has it positive side. Despite the importance of urbanization that increase standard of living, there is still less concern of factors of urbanization that negatively affect agricultural production processes.

5.3 Recommendation

- Developing alternative ways of energy sources should be encouraging.
  - This will reduce the reliance on fossil fuel making processing more efficiently by replacing fossil fuel with alternative energy resources to generate electricity by the use of wind wave, hydro water, solar panel, wind turbine.
  - More research on energy conversion should also be encourage like kinetic energy to electric for instance, train generate heat when it breaks, this can be converted into electric energy instead of wasting it.
  - Development of non-fossil energy should be emphases e.g. nuclear energy does not require fossil.
  - Innovation of technology that helps to clean greenhouse gases like bio-solar leaf should be encourage. Bio-solar leaf is a technology that clean pollution in air by absorbing greenhouse gases and exhaling oxygen in the environment. Hence, this technology can utilize the work of about 80 trees while using a surface area of a leaf; it is a good solution of cleaning of carbon-dioxide emission.

- Promoting of small-scale food production; Investment in small-scale Agric practices through agroecological methodologies can increasing more

production, food and income security and also the solutions are accessible to small-scale farmers and will create less burden.

- Emphasis on indigenous learning and network drove development as methods for expanding the strength of farming models.
- Take into account the essential obligation of industrial production models in the plan of atmosphere mitigation laws.
- Set up solid social and ecological protections to administer private investment in agrarian adaptation and moderation projects.
- Promoting more mechanize farming to compensate the labor lost for agriculture
- Facilitating of research on methods on how to grow genetically plant. This will enhance the production quantity of sesame seed.
- Need for rural-urban polices that strengthen rural economic and developing local communities
- Encouraging the construction of height building to minimize space of farming.
- More research in renewable energy should be encourage to eliminate the use of fossil source of energy that pollute the environment.

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APPENDIX

Appendix I: Years, Factors, and data

Years	Sesame seed (tonnes)	Ses Har (ha)	Ind CO2 liq (tonnes)	GDP/work pop (TL)	Consump (TL)	Temperature (degree cel.)
1986	45000	99980	53791.22	8336.151		0.391
1987	43000	107975	62034.64	8953.206	361,459,226,000	-0.423
1988	45000	94000	58925.02	8993.298	364,754,553,500	-0.351
1989	37000	97600	63200.75	8859.628	361,870,197,600	0.334
1990	39000	84819	61334.24	9513.742	406,858,656,400	-0.085
1991	43000	94000	59240.39	9421.72	415,994,573,000	0.11
1992	34000	82772	63112.74	9734.92	430,018,852,100	-1.402
1993	30000	79957	71543.17	10312.39	464,627,338,400	-0.991
1994	34000	84706	69280.63	9675.507	441,016,488,500	1.133
1995	30000	72914	77293.03	10273.18	466,432,313,200	0.067
1996	30000	73436	81092.04	10857.39	506,076,095,400	0.197
1997	28000	67995	79331.88	11496.47	545,713,486,100	-0.013
1998	34000	68194	75488.86	11578.28	555,664,068,000	0.879
1999	28000	50995	77091.34	11013.86	557,513,373,000	1.175
2000	23800	50900	81876.78	11568.24	582,768,913,000	0.46
2001	23000	50000	76009.58	10717.28	550,871,397,000	1.429
2002	22000	48000	79658.24	11239.8	574,463,051,000	0.553
2003	22000	43874	78114.43	11700.83	612,907,186,000	0.168
2004	23000	42990	77351.7	12652.76	668,297,054,000	0.454
2005	26000	42440	76258.93	13610.85	707,347,550,000	0.331
2006	26545	39939	75917.9	14396.22	741,041,748,000	0.741
2007	20010	29780	76464.28	14939.25	782,383,689,000	0.845
2008	20338	28589	74539.11	14885.27	789,148,850,000	0.721
2009	21036	28017	68074.19	14006.22	777,038,447,000	0.52
2010	23460	31804	70428.4	14987.46	846,555,764,000	2.253
2011	18000	26646	74524.44	16407.52	932,348,649,000	0.25
2012	16221	28949	76948.33	16925.87	967,708,342,000	0.862
2013	15457	24785	77465.38	18068.11	1,044,229,118,000	1.207
2014	17716	26315	79434.55	18694.94	1,075,605,317,000	1.058
2015	18530	28088		19518.29	1,131,065,226,000	1.484
2016	19521	28872		19825.39	1,184,234,169,000	1.322

Appendix II: Unit Root test of sesame production

Null Hypothesis: D(SES_PRO) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.738848	0.0000
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(SES_PRO,2)

Method: Least Squares

Date: 07/21/19 Time: 23:07

Sample (adjusted): 1988 2016

Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(SES_PRO(-1))	-1.256991	0.186529	-6.738848	0.0000
C	-1044.192	705.6889	-1.479677	0.1505

R-squared	0.627134	Mean dependent var	103.1379
Adjusted R-squared	0.613324	S.D. dependent var	5930.843
S.E. of regression	3687.991	Akaike info criterion	19.33002
Sum squared resid	3.67E+08	Schwarz criterion	19.42432
Log likelihood	-278.2853	Hannan-Quinn criter.	19.35956
F-statistic	45.41208	Durbin-Watson stat	2.153316
Prob(F-statistic)	0.000000		

Appendix III: Unit root test of sesame harvest

Null Hypothesis: D(SES_HAR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.64958	0.0000
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(SES_HAR,2)
Method: Least Squares
Date: 07/21/19 Time: 23:12
Sample (adjusted): 1988 2016
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(SES_HAR(-1))	-1.570956	0.147513	-10.64958	0.0000
C	-4143.110	1004.358	-4.125131	0.0003

R-squared	0.807711	Mean dependent var	-248.6552
Adjusted R-squared	0.800589	S.D. dependent var	11280.54
S.E. of regression	5037.377	Akaike info criterion	19.95363
Sum squared resid	6.85E+08	Schwarz criterion	20.04793
Log likelihood	-287.3276	Hannan-Quinn criter.	19.98316
F-statistic	113.4136	Durbin-Watson stat	1.737900
Prob(F-statistic)	0.000000		

Appendix IV: Unit root test of Industrial Carbon dioxide Emission

Null Hypothesis: D(SES_HAR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.64958	0.0000
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(SES_HAR,2)
Method: Least Squares
Date: 07/21/19 Time: 23:12
Sample (adjusted): 1988 2016
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(SES_HAR(-1))	-1.570956	0.147513	-10.64958	0.0000
C	-4143.110	1004.358	-4.125131	0.0003

R-squared	0.807711	Mean dependent var	-248.6552
Adjusted R-squared	0.800589	S.D. dependent var	11280.54
S.E. of regression	5037.377	Akaike info criterion	19.95363
Sum squared resid	6.85E+08	Schwarz criterion	20.04793
Log likelihood	-287.3276	Hannan-Quinn criter.	19.98316
F-statistic	113.4136	Durbin-Watson stat	1.737900
Prob(F-statistic)	0.000000		

Appendix V: Unit root test of GDP per working population

Null Hypothesis: D(GDP_WORK) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.714697	0.0001
Test critical values:	1% level	-3.724070	
	5% level	-2.986225	
	10% level	-2.632604	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP_WORK,2)
Method: Least Squares
Date: 08/07/19 Time: 18:01
Sample (adjusted): 1992 2016
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP_WORK(-1))	-1.174300	0.205488	-5.714697	0.0000
C	0.061983	0.037746	1.642110	0.1142

R-squared	0.586760	Mean dependent var	-0.000303
Adjusted R-squared	0.568793	S.D. dependent var	0.275165
S.E. of regression	0.180691	Akaike info criterion	-0.507439
Sum squared resid	0.750932	Schwarz criterion	-0.409929
Log likelihood	8.342989	Hannan-Quinn criter.	-0.480394
F-statistic	32.65776	Durbin-Watson stat	1.962895
Prob(F-statistic)	0.000008		

Appendix VI: Unit root test of Temperature

Null Hypothesis: D(TEMP__CHNG) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.867072	0.0000
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TEMP__CHNG,2)
Method: Least Squares
Date: 07/21/19 Time: 23:21
Sample (adjusted): 1989 2016
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TEMP__CHNG(-1))	-2.090885	0.304480	-6.867072	0.0000
D(TEMP__CHNG(-1),2)	0.423598	0.176926	2.394215	0.0245
C	0.115288	0.135638	0.849967	0.4034

R-squared	0.783873	Mean dependent var	-0.008357
Adjusted R-squared	0.766583	S.D. dependent var	1.476880
S.E. of regression	0.713530	Akaike info criterion	2.263771
Sum squared resid	12.72811	Schwarz criterion	2.406507
Log likelihood	-28.69280	Hannan-Quinn criter.	2.307407
F-statistic	45.33628	Durbin-Watson stat	2.179483
Prob(F-statistic)	0.000000		

Appendix VII: Unit root test of consumption

Null Hypothesis: D(CONSUMP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.128062	0.0035
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

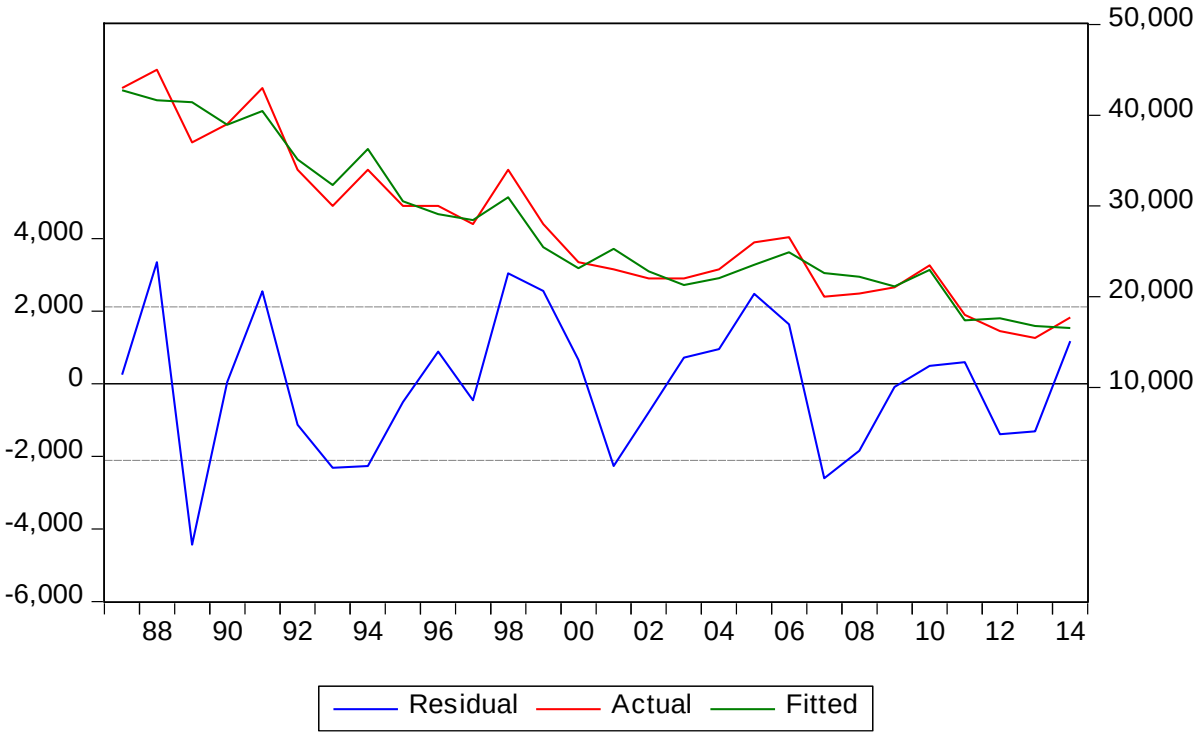
*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CONSUMP,2)
Method: Least Squares
Date: 07/21/19 Time: 23:41
Sample (adjusted): 1989 2016
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CONSUMP(-1))	-0.791511	0.191739	-4.128062	0.0003
C	2.35E+10	7.48E+09	3.145291	0.0041

R-squared	0.395923	Mean dependent var	1.78E+09
Adjusted R-squared	0.372690	S.D. dependent var	3.55E+10
S.E. of regression	2.81E+10	Akaike info criterion	51.02550
Sum squared resid	2.05E+22	Schwarz criterion	51.12066
Log likelihood	-712.3570	Hannan-Quinn criter.	51.05459
F-statistic	17.04089	Durbin-Watson stat	2.029888
Prob(F-statistic)	0.000335		

Appendix VIII: Residuals, Actual and Fitted Graph



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ETHICS COMMITTEE APPROVAL

YAKIN DOĞU ÜNİVERSİTESİ

BİLİMSEL ARAŞTIRMALAR ETİK KURULU

05.08.2019

Dear Habib L Gwamna

Your project **"Urbanization Effect on Agricultural Production of Sesame Crop in Turkey from 1986 to 2016"** has been evaluated. Since only secondary data will be used the project it does not need to go through the ethics committee. You can start your research on the condition that you will use only secondary data.

Assoc. Prof. Dr. Direnç Kanol

Rapporteur of the Scientific Research Ethics Committee

Direnc Kanol

Note: If you need to provide an official letter to an institution with the signature of the Head of NEU Scientific Research Ethics Committee, please apply to the secretariat of the ethics committee by showing this document.

NEAR EAST UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
ECONOMICS PROGRAM

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THESIS SUPERVISOR
ASST. PROF. DR. BEHİYE TÜZEL ÇAVUŞOĞLU

NICOSIA
2019

ACCEPTANCE/APPROVAL

We as the jury members certify the 'Urbanisation Effect on Agricultural Production of Sesame Seed: Case of Turkey' prepared by Habib Lawal Gwamna defended on 05/08/2019 has been found satisfactory for the award of degree of Master

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Director

DECLARATION

I HABIB LAWAL GWAMNA, hereby declare that this dissertation entitled “Urbanization Effect on Agricultural Production of Sesame Seed: Case of Turkey” has been prepared myself under the guidance and supervision of ‘Asst. Prof. Dr. Behiye Tüzel Çavuşoğlu’ in partial fulfilment of the Near East University, Graduate School of Social Sciences regulations and does not to the best of my knowledge breach and Law of Copyrights and has been tested for plagiarism and a copy of the result can be found in the Thesis.

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DEDICATION

I dedicate this research to Almighty Allah the giver of life and the protector of all that diligently seek from him. I also dedicate this thesis to my Late Father and my lovely mother, my siblings' friends and to all those that support me throughout my stay in school.