

CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Economics and Management



**Impact of Climate Changes on the Economy of the Rural areas in the selected regions of
Iran**

Samira Janghorban

MASTER'S THESIS

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CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Economics and Management

DIPLOMA THESIS ASSIGNMENT

Samira Janghorban

Economics and Management

Thesis title

Impact of Climate Changes on the Economy of the Rural areas in the selected regions of Iran

Objectives of thesis:

The objective of the thesis is to focus on the impact of climate change on different economic sectors of Iran, like agriculture, industry, tourism, and natural resources, which will be investigated. Also, solutions to adapt to climate change and reduce its negative effects on Iran's economy will be presented and suggested.

Methodology:

Primary data will be collected directly from the Agrarian region, where the basic indicator of climate change will be water, specifically water resources: Climate change can cause changes in precipitation patterns, leading to droughts or floods. With rising temperatures, glaciers and snowpacks are melting, which can impact the availability of water resources in the long term.

Agricultural Resources: Changes in temperature and precipitation patterns can impact crop yields and reduce food security. Climate change can also lead to an increase in pests and diseases that can harm crops. Forest resources: Climate change can lead to changes in the frequency and intensity of logging, which can have a significant impact on forest resources. It can also impact the distribution of tree species and lead to deforestation.

Field observations: Field observations can be conducted to study the impact of climate change on soil, vegetation, and water resources. Secondary data: The information and data will be collected from Google Scholar, and internet databases from the Web of Sciences, FAO, UNEP, UNWMO, NASA, etc. In addition, relevant and published information from Iran and the statistical center of Iran will be selected and treated. Using relevant sources, information related to climate change in Iran and its impact on the country's economy will be collected. The sources used will include scientific articles, reports of relevant organizations, and available statistics. Conducting a comprehensive assessment of climate change changes in selected rural areas, considering the factors of temperature change, precipitation pattern, water, and extreme weather events. Analysis of economic effects: collected data, will be analyzed by the economic evaluation, statistical, and econometric methods.

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Declaration

I declare that I have worked on my master's thesis titled " **Impact of Climate Changes on the Economy of the Rural areas in the selected regions of Iran** " by myself and I have used only the sources mentioned at the end of the thesis. As the author of the master's thesis, I declare that the thesis does not break any copyrights.

In Prague on 31 March 2024

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Impact of Climate Changes on the Economy of the Rural areas in the selected regions of Iran

Abstract

The purpose of this research is the Impact of Climate Changes on the Economy of the Rural areas in the selected regions of Iran (The city of Isfahan), which we have studied and investigated. In conducting this research, according to the descriptive-correlation research method and the library information collection method, the statistical analysis method has been used. To analyze the data, we use descriptive statistical methods such as frequency distribution table, mean and standard deviation and inferential statistics methods to investigate the relationship between the effective factors and Kolmogorov Smirnov to determine the normality of the data. Regression test is used to confirm and reject research hypotheses and Eviews and Excel software are used for data analysis .

The results of the research showed that all research hypotheses based on the effects of climate change (temperature, precipitation, water consumption and extreme weather events) on the economy of rural areas in selected areas of Iran are confirmed due to having a significance level of less than 0.05. Therefore, it can be said that the hypotheses of the research are confirmed.

Key word: Climate Changes, Economy of the Rural areas, Isfahan city in Iran

Dopady klimatických změn na ekonomiku venkovských oblastí ve vybraných regionech Íránu

Abstraktní

Účelem tohoto výzkumu je Dopad klimatických změn na ekonomiku venkovských oblastí ve vybraných regionech Íránu (město Isfahán), které jsme studovali a zkoumali. Při provádění tohoto výzkumu byla podle metody deskriptivního korelačního výzkumu a metody sběru knihovních informací použita metoda statistické analýzy. K analýze dat používáme deskriptivní statistické metody, jako je tabulka rozdělení četností, průměr a směrodatná odchylka a metody inferenční statistiky, abychom prozkoumali vztah mezi efektivními faktory a Kolmogorovem Smirnovem ke stanovení normality dat. Regresní test se používá k potvrzení a zamítnutí výzkumných hypotéz a k analýze dat se používá software Eviews a Excel.

Výsledky výzkumu ukázaly, že všechny výzkumné hypotézy založené na dopadech klimatických změn (teploty, srážky, spotřeba vody a extrémní povětrnostní jevy) na ekonomiku venkovských oblastí ve vybraných oblastech Íránu jsou potvrzeny, protože mají nižší hladinu významnosti než 0,05. Lze tedy říci, že se hypotézy výzkumu potvrdily.

Klíčové slovo: Klimatické změny, Ekonomika venkovských oblastí, město Isfahán v Íránu

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1. Introduction

The rapid growth of the human population and human activities, particularly in the industrial and factory sectors, since the beginning of the industrial revolution, has led to an increase in the consumption of fossil fuels and the destruction of forests and land-use changes. These factors have contributed to the rise of greenhouse gases, especially carbon dioxide, in the past few decades. This increase has disrupted the stability of climate change and particularly the temperature of the Earth, as referred to in scientific writings. Failure to address the changing climate conditions can result in economic and social collapse in human societies, and the continuation of the current trend can lead to reduced outputs, economic decline, and instability in the overall financial systems of countries. The negative impact of this phenomenon on the global economy and the economies of countries, as well as their sub-systems such as the environment, industry, health, and welfare, has led to the recognition of this phenomenon as the most dangerous problem of the 21st century (Abounaga, 2019 & Elwan).

Climate change, as one of the major global challenges, has had significant impacts on societies and the global economy. These changes can directly and indirectly affect the economies of rural areas, which are highly dependent on natural resources and local activities, and are therefore of great importance. Climate variations, including temperature increases, changes in precipitation patterns, and the occurrence of droughts and floods, impact production and livelihoods in rural areas (IPCC, 2021).

Rural areas play a crucial role in the economic infrastructure of countries, contributing to sustainable development and maintaining economic and social balance. Therefore, examining the impact of climate change on these areas is of great importance (World Bank, 2022). Climate change can alter agricultural patterns, agricultural diversity, and access to sufficient water resources for agriculture in rural areas. These changes can affect agricultural production and ultimately impact food security and people's incomes (FAO, 2021). In addition to agriculture, climate change can also affect other sectors of the rural economy. For example, in certain rural areas, such as tourism and local industries, climate change can lead to a decrease in demand and subsequently result in reduced income and employment (UNDP, 2022). Climate change can also affect the economic infrastructure of rural areas. For instance, increased frequency of droughts can lead to a decline in agricultural and livestock activities, resulting in reduced production, decreased investment, and increased unemployment (World Economic Forum, 2023). Another impact of climate change on the rural economy is the

reduction of biodiversity and the depletion of natural resources. These changes can endanger the resilience and stability of ecosystems and gradually deplete the natural resources utilized in local and indigenous economic activities (IISD, 2023). Research indicates that rural areas are more vulnerable to severe climate changes. These conditions may increase economic and social vulnerability in these areas and negatively affect the ability of people to cope with climate change and ensure sustainable income (UNESCAP, 2023). Therefore, in line with the existing research gap, this study examines the impact of climate change on the rural economy in selected regions of Iran. In the following chapter, the issue, the significance of the study, the hypothesis, and the objectives that this research aims to address are discussed.

1-1 Statement of the Problem

Although industrial civilization has brought progress, prosperity, comfort, and convenience to humanity in many aspects, it has not been beneficial for the global environment. Instead, it has become a factor in disrupting and destabilizing the Earth's systems. The increase in population and socio-economic growth necessitates energy consumption. The available energy resources are predominantly fossil fuels, and their consumption, along with changes in land use practices, has led to the emission of greenhouse gases (GHGs), which in turn have disrupted the Earth's natural climate patterns. It is widely accepted that human activities are the primary driver of climate change, resulting in the accumulation of long-lasting GHGs in the atmosphere. The Earth's surface temperature has increased by 0.3 to 0.6 degrees Celsius over the past century due to the release of greenhouse gases, and it is projected to rise by 1.5 to 3 degrees Celsius by 2100 (IPCC, 2014). The key manifestations of these changes include:

- Global warming (Tsigaris & Wood, 2016)
- Changes in precipitation patterns (Askarizadeh et al., 2017)
- Decreased agricultural production and yield (Challinor et al., 2016)
- Increase in pests and diseases (Mohammadkhani & Jamali, 2015)
- Increased frequency and intensity of extreme weather events (Horton et al., 2016)

Each of these events has an impact on food resources, water availability, human settlements, ecosystems, and biodiversity. Most of these impacts are likely to be adverse and constrain social and economic growth.

Climate change and its persistence are recognized as a serious issue worldwide. The most significant consequence of this phenomenon is the alteration of precipitation levels and

patterns. Although various sectors of the economy are affected by climate change, agriculture is largely dependent on climate as the primary determinant of location and production factors. As water and temperature are the two main factors in physiological processes and plant growth, changes in temperature and precipitation patterns directly affect agricultural activities (Raza et al., 2019; Hatfield & Prueger, 2015). The agricultural sector is recognized as the primary source of food supply and food security (Pawlak & Kolodziejczak, 2020; Hatfield & Prueger, 2015).

Therefore, climate variables have an impact on both agricultural production and the accessibility to food, as well as human and physical capital. This is particularly significant in dry and semi-arid countries like Iran, which are geographically situated in a unique climatic position. Over 80% of the country is located in dry and semi-arid regions. The average annual precipitation in Iran is approximately 250 millimeters, which is less than one-third of the global average annual precipitation (Ministry of Agriculture - Iran Jihad, 2020). According to the projections of the Intergovernmental Panel on Climate Change (IPCC), the temperature is expected to increase by 1.5 to 4 degrees Celsius by the year 2100, and precipitation is anticipated to decrease by 10 to 40 percent depending on different regions of Iran. IPCC has identified this as a serious challenge for the production of strategic crops, which are expected to experience a decline in their performance (Javadi et al., 2023).

Various studies on climate change, water, and agriculture provide insights into key aspects of this discussion. Firstly, the impacts of climate pattern changes on agriculture will not be evenly distributed worldwide, with adverse effects mainly observed in tropical and subtropical regions, which predominantly involve developing countries. Secondly, regardless of the approach, there is still a limited amount of research focused on climate change, water, and agriculture, specifically taking into account the most vulnerable developing countries (Chalise et al., 2017). Thirdly, computable general equilibrium models have been widely used in such studies due to their capacity to address the economy as a complete and interdependent system. Fourthly, there is even less literature dedicated to a general equilibrium approach in analyzing specific country implications of the relationship between climate change, water, and agriculture, particularly for developing countries (Elshennawy et al., 2016; Chalise and Naranpanawa, 2016; Chalise et al., 2017).

Furthermore, climate change can lead to changes in migration patterns from rural to urban areas. Climate change impacts not only vegetation cover, agricultural production, and hydrological cycles but also accessible water resources and the occurrence of droughts and

floods. Agricultural crop production will increase under the influence of climate change (rising temperatures and increased carbon dioxide concentrations), but negative effects on water availability and precipitation will have a detrimental impact. Understanding the spatiotemporal fluctuations of climatic parameters (such as temperature, precipitation, humidity, etc.) and their influence is not only crucial for managing water resources and agriculture but also holds significant value in terms of economic, agricultural, and hydrological planning (Mohammadkhoshdoust et al., 2017).

Various methods exist for simulating and predicting climate variables in future periods under the influence of climate change, with the most credible being the use of General Circulation Models (GCM) data. While these models provide meaningful results at the atmospheric and continental scales, incorporating a significant portion of the Earth's complexity, they are unable to capture local climate changes. Therefore, this study aims to examine the impact of climate change on the economies of rural regions in selected areas of Iran, delving into their analysis.

1-2 Hypotheses

1-2-1 Main hypothesis:

Climate change has an impact on the economy of rural regions in selected areas of Iran.

1-2-2 Sub-hypotheses:

1. Temperature variations affect gross domestic product (GDP).
2. Precipitation affects gross domestic product (GDP).
3. Water consumption affects gross domestic product (GDP).
4. Extreme weather events affect gross domestic product (GDP).

1-3 Importance of study

It is highly likely that climate change will have different effects on various regions. The production in many climate-affected areas is decreasing, leading to job losses, migration, and displacement. Since agriculture is the primary source of employment in many developing countries, climate change results in increased deprivation, migration, and displacement. Agriculture is more susceptible to climate change impacts than other economic sectors, and

agricultural production and livelihood practices are affected by global warming. Furthermore, there is scientific consensus that climate change will continue to occur in the future regardless of the effectiveness of mitigation measures, causing significant changes in ecosystems. Understanding and envisioning the risks associated with climate change is challenging for many people, and given that present-day changes affect the future, awareness of these issues and preparedness to address them is crucial. For example, if agricultural fields are to be effectively managed for adaptation to climate change, decision-makers and farmers play crucial roles in this regard (Abdollahzadeh et al., 2018).

Climate change, as one of the major global challenges, has significant impacts on the environment, economy, and society. Rural areas, as part of a country's economic infrastructure, are highly vulnerable to these changes. Rural areas constitute a significant portion of a country's economy and are essential for maintaining economic and social balance. Therefore, examining the impact of climate change on these regions is of great importance (Nazari et al., 2022). Climate change may involve factors such as reduced suitable weather conditions for agricultural activities, increased droughts and associated natural disasters, decreased tourism demand, and a decline in industrial production. These changes can directly and indirectly affect the economy of rural areas. Research in this field can help us better understand the consequences of climate change on the economy of rural areas. This knowledge can assist decision-makers and policymakers in implementing appropriate plans and policies to manage the effects of these changes on the rural economy. Research on the impact of climate change on the economy of rural areas can contribute to a better understanding of the strengths and weaknesses of these regions. This understanding enables optimal utilization of local resources and assets across different economic sectors. Examining the impact of climate change on the rural economy can support sustainable development and economic resilience in these areas (Karami & Hersami, 2023).

Based on the review of applied and academic research conducted on climate change, it can be observed that no comprehensive study has been conducted on the impact of climate change on the economy of rural regions in Iran or even outside the country. Therefore, the proposed research contributes to enriching the existing literature in this field. Additionally, by evaluating the impact of climate change on the economy of rural regions, it provides guidelines and necessary recommendations for implementing more effective measures in selected areas of Iran. Consequently, the theoretical importance of this research can be highlighted. Firstly, it should be noted that no study has been conducted on the impact of

climate change on the economy of rural regions in selected areas of Iran. The present study aims to bridge the knowledge and perceptual gap regarding the relationship between the research components and the ambiguous understanding of unique applications of climate change impacts on the economy. By conceptualizing research variables, it provides new theoretical perspectives for future studies. Therefore, as practical concepts, climate change impacts on the economy of rural regions are essential. However, the precise effects on these variables have not been fully examined yet. Hence, this research intends to investigate the impact of climate change on the economy of rural regions in selected areas of Iran.

2. Objectives

2-1 Main Objective

To assess the impact of climate change on the rural economy in selected regions of Iran.

2-2 Sub-objectives

1. To examine the influence of temperature changes on gross domestic product (GDP) production.
2. To analyze the impact of precipitation levels on gross domestic product (GDP) production.
3. To assess the effect of water consumption on gross domestic product (GDP) production.
4. To investigate the impact of the frequency of extreme weather events on gross domestic product (GDP) production.

3. Literature Review

Today, various studies have shown that the carbon dioxide emitted from the burning of fossil fuels, along with other greenhouse gas emissions caused by human activities, leads to a higher temperature of the earth's surface and global climate change. The average global temperature will increase by 2 to 3 degrees Celsius in the next 50 years. Among the most important consequences of climate change, we can mention the melting of natural glaciers, the reduction of crop yields, the rise of sea levels and the consequent increase in annual floods, more severe droughts, and the loss of biodiversity. The range of consequences and impact on different parts of human life and well-being makes climate change a special phenomenon and makes it beyond an environmental issue. On the other hand, the economic aspect of this phenomenon is very prominent due to its effects on development, growth and poverty. According to studies and reports conducted in recent years, climate change has the greatest impact on poor and developing countries and their ability to grow, and hot countries tend to be poor with a decrease in national income by 8.5 percent per degree. Celsius have global warming. Since the current poor and developing countries are mostly located in hot and water-scarce regions of the world, they are more exposed to climate shocks and are more affected by it due to poor infrastructure and lack of adaptation. It is known that sustainable economic growth and climate change are not compatible with each other. With this account, conventional business expenses are only an illusion; So the choice we face is not between "business as usual costs" and climate action, but between paths to growth: one that exacerbates climate risk and the other that reduces it. Evidence shows that a low-carbon growth path can provide as much prosperity as a high-carbon growth path, especially when other benefits such as clean air and improved health are taken into account. Since climate change is a global phenomenon, Iran is not immune from its effects. Low economic growth has always been one of the problems faced by governments, on the other hand, in this study, we show the effect of climate change on the economy and gross domestic product in Isfahan province, which can have a negative effect on it. The impact of climate change on the country's low economic growth can cause more problems for the country's economy. What is important is to consider issues such as increasing temperature and decreasing precipitation and water resources. which are tied with the production sector of the country and it is necessary to consider them in the development plans of the country.

3-1 Conceptual Issues

3-1-1 Consequences of climate change

The consequences of climate change include:

✓ Sea level rise (SLR): Sea level rise is directly related to the degree of warming and proximity to the equator. Considering current carbon emissions, 50 cm SLR is expected by 2050. This could reach 70 cm with 2 degrees of global warming (the central goal of the Paris Agreement) and more than 1 meter if the Earth warms by 4 degrees. SLR increases the risk of wave storms, tropical cyclones and tsunamis as well as continuous floods (Golabifar, 2023).

✓ Melting glaciers will increase the risk of floods in rainy seasons and reduce water reserves for dry seasons for one-sixth of the world's population, mainly in the lower regions of India and parts of China.

✓ Declining crop yields, especially in Africa, will leave hundreds of millions of people without the power to produce enough food. From middle to high latitudes, crop yield will increase with an average increase in temperature (2 to 3) degrees, but it will decrease as the temperature rises above this average.

✓ Climate change will increase deaths from malnutrition and heat stress worldwide. If effective controls are not carried out, diseases such as malaria will become common. In higher latitudes, deaths due to cold will decrease (Golabifar, 2023).

✓ The ecosystem is mainly vulnerable to climate change. About 15 to 40 percent of animal species will become extinct with only 2 degrees of global warming. The most biodiverse Amazon forests on Earth will dry up. Also, ocean acidification, which is a direct result of increasing carbon dioxide levels, will have important effects on the marine ecosystem.

✓ SLR water crisis can cause salinization of healthy aquifers. Access to water for drinking and crop irrigation decreases. Using alternative waters with less hygiene causes the risk of water-borne diseases. With more variability in precipitation as a result of climate change, droughts also pose threats to water supplies (IMF, 2016; Stern, 2006).

3-1-2 Climate change and natural hazards

Climate change worsens natural hazards in most regions of the world. Large-scale temperature changes, heavy precipitation and other meteorological variables that are considered in the models as a result of climate change and major events that are dependent on these variables (such as droughts, floods, heat waves and cold periods), are affected. In short, we mention some of these changes in natural hazards.

Heat waves and cold spells: Cold spells have serious implications, yet it is almost certain that heat waves will become more frequent and more severe in most parts of the world in the future. For example, the heat wave in Europe in the summer of 2003 caused the death of more than 70,000 people, which can happen until the end of this century based on the scenario of high greenhouse gas emissions of this heat wave in a normal and not very hot summer. This means that until the year 2100, all summers will be hotter than the summer of 2003. In most parts of the world, such major changes will threaten daily living conditions. Like being able to work outside or in places with no air conditioning during the summer. It should be noted that the effect of climate change on the frequency and intensity of heat waves can be recognized in advance and grows over time (Pegahi and Sheikh, 2022).

Drought: Access to water does not depend only on rainfall. Seasonal cycles, snowpack and evaporation rates are also important. Variation in climate as well as changes in drought are different in different places. In general, drought will occur more frequently due to climate change and will worsen in most places where drought is already an issue. Under the scenario of high emission of greenhouse gases, it is estimated that the number of people exposed to drought can increase from 9-17% by 2030 to 50-90% by 2080.

Storms in tropical and extratropical areas: with higher temperatures, atmospheric currents change and affect winds and storms globally; But tropical storms (which exist in the tropics, the strongest of which are North Atlantic hurricanes and Pacific hurricanes) and extratropical storms (located in high or middle latitudes) may be affected differently. For tropical storms, the best guess today is that they may decrease in number, but the most intense storms will become more intermittent, especially in the North Atlantic. Additionally, tropical cyclones begin to affect new areas that are likely to be less prepared and more vulnerable.

Flooding of coastal areas: As mentioned, climate change causes the sea level to rise, which has wide consequences in threatening coastal areas. Rising seas - changes in water currents - damage to the land due to erosion, salinization of waters and the risk of flooding through storm waves will increase in coastal areas. In this situation, the risk of flooding in

coastal areas is more than before and they will spread over time. An increase in the sea level can increase the probability of very destructive coastal floods (Pegahi and Sheikh, 2022).

Heavy rains and floods: As the rain changes, the river overflows and has great consequences for the risk of flooding. Climate change intensifies precipitation events. According to the scenario of high emission of greenhouse gases, the number of people who are exposed to this risk can increase from 4 to 15 percent by 2030 and 12 to 29 percent by 2080. According to the latest predictions of climate change, population and GDP based on the existing level of vulnerability, the number of deaths will double by 2080. The economic damage of river floods can increase from 7 to 124 percent by 2040 (Bangalore et al. 2016).

3-1-3 Climate change and the state of economic growth

Climate change, like other environmental issues, involves externalities: emitting greenhouse gases at no cost to the emitting firm harms everyone. The theory of externalities under certainty, perfect competition and a single government refers to the imposition of a tax on greenhouse gas emitters as much as a tracking tax, the allocation of COAS property rights, and direct regulation.

So far, climate change economics has focused on modeling the consequences of emissions on growth, testing and economic modeling of technological options, calculating the "social costs of carbon" and market and other structures. From the point of view of the issue of international cooperation between countries, we must now focus on the fact that each country alone needs to evaluate its political situations and in cooperation with others, there is a need to analyze how to create a strong international action. . If this analysis and understanding is shared and confirmed, international agreement is very likely (Bahrami, 2021).

Governments have a special focus on growth in their economy, health, environment and lifestyle of their population. Growth and climate change are strongly interdependent. For example, how does resource growth stimulate greenhouse gas emissions? How does climate change affect growth in the long and short term? How does it include and affect people's growth processes in different conditions? And how does discounting in greenhouse gases affect growth? (Stern, 2006).

Over time, there is a serious risk of negative effects of climate change on economic growth. If climate change results in less production and lower growth, then there will be consequences on poverty; But it affects income levels as well as health and mortality rates.

The output of the economy depends on the labor force, the quality of the environment and the available capital in a given year. All three of these can be affected by climate change and there will be damage to the health and productivity of the workforce, losses in the agricultural sector and infrastructure, and lower quality in investment and capital. As the product and production factors of the economy are affected many times, so the growth perspective also changes. This can be particularly significant for poorer economies with a greater focus on agriculture and less ability to diversify their economies. The effects of climate change show that the potential effect of changing climate can be on growth and yield. Changes in the water cycle can be especially damaging. For example, excessive rain can submerge transportation and limit trade and communication potential. It is estimated that 2000 floods in West Bengal destroyed 450 km of railway and 30 bridges and waterways. 1739 km of local roads, 1173 km of state highways and 328 km of national highways have been affected. Low rainfall affects crop production and also reduces the flow of surface water that provides irrigation and hydropower generation.

According to the preliminary scenario of climate change, the average cost of climate change in India and Southeast Asia will be 25% reduction in GDP and in Africa and the Middle East 1.9% reduction in GDP. According to the above climate change scenario, these reductions will increase to 3.5% and 2.7%, respectively. There are good reasons to place more emphasis on the more severe effects predicted in these scenarios:

- ✓ The poorest people are the hardest hit by climate change.
- ✓ There are certain effects, such as the damage of the Nile waters and the cumulative effects of extreme weather events, which.
- ✓ the unified global and regional models do not take into account.

This is a long story. If emissions continue unabated, temperatures will reach much higher levels in the next century, creating much larger impacts for these regions, including mass migration and violence.

Strong Correlation Between Growth and Poverty Reduction A reduction in GDP due to climate change will increase the number of people living below the \$2-a-day poverty line by 2100 and raise child mortality rates compared to conditions without climate change. (Bahrami, 2021; Stern, 2006).

3-1-4 The impact of climate change on well-being

The potential consequences of climate change include an increase in average temperature, an increase in the frequency of high temperature events, changes in precipitation patterns, and sea level rise. These biophysical changes affect human well-being. Economists divide welfare effects (mostly negative) into two main groups: market and non-market damages.

As the title indicates, market damages are welfare effects caused by changes in the prices and quantities of market goods. Changes in productivity typically underlie these effects. Most researchers use climate-dependent production functions to model these changes. For example, wheat production is determined as a function of climatic variables such as temperature and precipitation. In addition to agriculture, this approach is applied in other industries as well, including forestry, energy services, water and flood facilities in coastal areas due to sea level rise.

The production function approach tends to ignore the possibilities for substitutability among products, which follows the substitution and hedonic approach. Applying this method to agriculture, the Hedonic approach aims to accommodate a wide range of alternatives, for example cross-sectional data to examine how geographic, physical, and climatic variables affect farmland prices. They put it he uses it. The effect of climate variables on land prices is an indicator of the effects on productivity.

Non-market damage, non-market damage includes the direct lost utility caused by a less receptive climate, as well as welfare costs related to the lost ecosystem or biodiversity. For these damages, the preferred methods face more important challenges because the non-market effects of the changes in prices and quantities do not leave a "behavioral trail" that determines welfare changes. can be used Biodiversity loss, for example, has no obvious relationship to changes in observable prices or demands (Lawrence, 2006).

3-1-5 Vulnerability of developing countries to climate change

Developing countries are highly vulnerable to the physical effects of climate due to their exposure to the fragile environment of the economic structure.

The effects of climate change on economies and societies around the world will vary widely. The conditions of each country - its local climate, socio-economic conditions and growth aspects shape the scale of social, economic and environmental effects of climate change. Vulnerability to climate change can be classified as follows: being exposed to climate

change, being sensitive - the degree to which the system reacts to climate stimuli and adaptive capacity - the ability to prepare, respond and deal with the effects Climate change (Firouzjaei et al., 2020).

Geographical location plays an important role in determining the country's growth and development aspects. Many developing countries are located in tropical regions. As a result, they have already experienced climate change (such as those associated with monsoons and the El Niño and La Niña cycles), through changes in precipitation and temperature increases. Low growth has been identified in developing countries. If rainfall does not occur, for example, in only one season in many tropical regions, the country faces serious consequences in the agricultural sector for the entire year. Latest Analysis Nordhaus led him to the conclusion that “tropical geography has a significantly negative effect on the amount of output and output per capita compared to temperate regions.” Sacks similarly argues that poor soil, the presence of pests and parasites and water access problems explain many of the losses in agriculture in tropical regions. Climate change is expected to make these conditions more challenging. Even a small change in climate can have huge costs in countries in developing countries, in other words, climate change has a disproportionate distribution of harmful effects on developing countries, due to their location in low latitudes, the amount and variety of rainfall and the fact that they They were already very hot, it comes from (Firouzjaei et al., 2020).

Sensitivity: Developing economies are very sensitive to the direct effects of climate change due to their high dependence on agriculture and ecosystems, rapid population growth, millions of people living in slums and towns, and low levels of health.

Adaptive capacity: people adapt to climate change as far as their resources and knowledge allow; But developing countries lack infrastructure (especially in the field of water supply and management), financial intermediaries and access to public services that can help in adapting to climate change (Stern, 2006).

Available evidence of the effects of climate change through its most important economic channels include: agricultural productivity, water crisis, changes in labor productivity due to climate, health and energy effects, and damage to land and infrastructure. It is caused by the rise of the sea level. These effects vary greatly among regions and origin of the effect. According to their preliminary estimates, at the global level, the most serious effect of climate change will be the change in labor productivity, which will cause about 84% of global losses in 2050 and 76% in 2100. The most serious regions affected by climate change

until 2100 are the Middle East and North Africa as well as East Asia. The effects of climate change on agriculture in the medium term, i.e. around 2050, are not severe, but as the temperature rises, the negative effects of climate change start to work and these effects are serious over time (causing losses in potential GDP). , will be more than 2% in Brazil, the Middle East and North Africa. Also, climate change affects tourism. Since climate change affects the choice of tourist destinations, this is a different pattern at the global level for flows. It creates tourism, but it has potentially serious consequences at the regional level. In general, climate change is expected to worsen the distribution of tourism, with more losses for developing countries, but also some benefits for developed regions. which are located in higher latitudes will have (Rason and Mansbrogueh, 2012).

3-2 Empirical Review

International organizations such as the United Nations, the International Labor Organization, the World Food Organization, Stern Review and experienced experts have conducted climate change studies in all parts of the world, and in Iran in this field, especially in recent years, there have been researches on the subject. Investigating climate change (on a domestic scale, including: Alijani et al, 2015, and Sarafroozeh et al, 2014) are being pursued in the field of academic studies and even by the Meteorological Organization, however, in the field of climate change effects, especially economic effects There are very few researches (mostly in the field of agricultural studies) and some examples of the most important works are mentioned.

The study of Kalhor and Mahmoudi (2019) in Kangavar, Kayani Salmi and Amini Faskhudi (2017) in Isfahan and Zarei et al. (2021) in Bijar using the survey method in the field of social consequences of drought showed that drought causes conflict and decrease in social capital, decrease health and quality of life and increased unemployment, poverty and migration. Jamshidi (2014) in Ilam with quantitative and qualitative method and Ghanbari and Biyad (2015) in Jiroft using survey method, studied the socio-economic consequences of drought and showed that drought leads to a decrease in capital, social, income, crop, livestock and Food security and increased poverty, financial dependence, migration and isolation have resulted. The study of Namdar and Bozarjamehri (2016) in Zarin Dasht, Ainali and Shafiei (2014) in Isfahan and Bahrami and Sepri (2015) in Kurdistan using the survey method found the socio-economic and environmental consequences of drought. Drought has consequences such as destroying the environment and its resources, increasing pests and diseases, reducing

plant diversity, reducing production, income, savings and social capital, as well as increasing unemployment, mental stress, migration and service jobs.

also (Jafari et al, 2014) conducted a research entitled "Evaluation of the economic effects of climate change in the agricultural sector" using the meta-analysis method and came to the conclusion that the economic effects of climate change in the form of changes in the performance, production and supply of agricultural products and influence which has on food security and also long-term changes in climatic parameters that affect the profitability and income of farmers are revealed. .." came to the conclusion that climate change, in addition to leaving the labor force from the agriculture, horticulture and animal husbandry sector, has caused temporary and permanent migrations from the villages and the income of most households from the agriculture and horticulture sector shows a significant decrease and even the amount Production and investment in them are declining. (Esmaeli & Vaseghi, 2008) in a research entitled "Investigation of the economic effect of climate change on the agricultural sector of Iran: (wheat)" have come to the conclusion that climatic variables have significant effects and They are non-linear on the net income per hectare of wheat cultivation, so that the increase in temperature and decrease in rainfall in the next 100 years will cause a 41% decrease in the yield of wheat cultivation in the country.

The current study, while paying attention to environmental factors, deals in detail with the state of economy and gross domestic product in the studied villages, which has not been investigated in previous studies.

Unlike domestic studies, in the field of foreign studies there are many researches about the economic effects of climate change that have studied the economic effects of climate change in different dimensions, although there are various problems for research in this field and even in some dimensions of the effects Economically, measuring and evaluating the economic effects of work is considered very difficult and requires extensive studies, and even in some fields, it can be said that there is still no research to measure and evaluate the economic effects of climate changes in rural areas. In the field of foreign studies, for example, one of the most important existing researches is (Nicholas Stern, 2007) report entitled "Stern Review: Economics of Climate Change", the results of this report show that human societies are still unable to avoid the effects Irreversible climate changes have an opportunity; Although climate changes have significant economic costs, the above costs are still recoverable and this issue requires the cooperation and collective efforts of all human societies. (IPCC, 2007) in its report entitled "Climate Change: Effects, Adaptation and

Vulnerability" and also in its other report 2014 entitled "Integrated Report on Climate Change" examined the issue of climate change in detail and in different dimensions on the effects. The economy emphasizes climate changes in the lives of human societies.

In addition to these studies, Anderson and Werner (2010) studied the social consequences of climate change using a documentary method in Chile and Domano and Abang (2016) used a survey method in Ghana and showed that climate change causes a decrease in life expectancy and an increase in inequality in income and It has been sanitized. The studies of Wilson et al. (2020) in Canada using the survey method of Mishra (2017) in India and Gerjilas et al (2021) in Greece using a documentary method in the field of socio-economic consequences of climate change have determined that climate change causes increased poverty, reduced production, migration and It has been a struggle. Ahmed et al (2013) in examining the socio-economic and environmental consequences of climate change in Bangladesh, quantitatively and qualitatively, came to the conclusion that climate change has caused salinity, increased water temperature, increased sea level, and drought, which results in reduced income. Food has caused health problems and drinking water crisis. Ali et al (2022) studied the socio-economic consequences of drought in Pakistan using a survey method and showed that the drought caused an increase in the disease of loan migration and the loss of livestock and crops. Alem Mera's (2018) study using a documentary method in Ethiopia and Kamboi et al. (2017) using a survey method in Kenya in the field of socio-economic and environmental consequences of drought, the construction of drought causes damage to environmental resources, reduction of biodiversity, reduction of wetlands, reduction The quality of pastures has increased, damage to the ecosystem, poverty, disease, migration conflict and food insecurity have increased.

The studied studies show that the climate changes caused by the decrease in precipitation and increase in temperature have changed the available water resources and agricultural production in different regions of the world. Therefore, it is very important to investigate the effects of climate change on the amount of agricultural production and water resources available to farmers in order to adopt appropriate programs in the field of advancing economic goals in the sub-sectors of agriculture and water resources management.

4. Methodology

Achieving the goals of science or scientific knowledge will not be possible unless it is done with the correct methodology. Adopting the appropriate research method, in addition to helping the researcher in reaching solid and reliable results, facilitates the progress of the research. Therefore, in order to obtain the correct results from a research, it is necessary to use a suitable scientific research method that is suitable for the subject in order to obtain the desired result with less cost and more speed and accuracy. The choice of the research method depends on the goals and the nature of the research subject and its implementation possibilities. In this chapter, the type of method used in this research is explained in detail.

4-1 Study area

With an area of 106,179 square kilometers, Isfahan province occupies about 25.6% of the total area of the country. This province is located between 30 degrees and 42 minutes to 34 degrees and 30 minutes of north latitude and 49 degrees and 36 minutes to 55 degrees and 32 minutes of east longitude in central Iran, while the city of Isfahan has a longitude of 51 degrees and 39 minutes and 40 seconds east and latitude 32 degrees 38 minutes and 30 seconds north is the third largest city in Iran after Tehran and Mashhad. Isfahan province is neighboring with 10 provinces, from the north to Central and Semnan provinces, from the south to Fars, Kohkiluyeh and Boyer-Ahmad provinces, from the east to Yazd and Khorasan provinces, and from the west to Khuzestan, Chaharmahal and Bakhtiari provinces. And Lorestan is limited. In terms of size, Isfahan province ranks fifth after Khorasan, Kerman, Sistan and Baluchistan and Fars provinces. From the point of view of country divisions, Isfahan province has been continuously changing and evolving, so that since 1316, which is the date of legalization of country divisions, it was the 10th province and was formed from the two cities of Isfahan and Yazd. During this period, there have been many changes in the country's divisions. According to the latest national divisions of Isfahan province in 1375, it was divided into 18 cities, which include 67 cities, 38 districts and 117 villages. The historical city of Isfahan is the capital of Isfahan province and now has the third place in terms of population in the country. The distance between Isfahan and Tehran is 425 km and it is located in the south. This city is located in the heart of the Iranian plateau due to its very convenient geographical location. Isfahan is about 1580 meters above sea level and is located in the east of the Zagros mountain range. This city is located at the crossroads of North-South and East-West of the country, and during the history it has been a place where different tribes

and cultures have come and gone. The large area of Isfahan is limited to the desert in the northern and eastern parts, and its western and southern parts lead to the Zagros highlands. The reason for the existence and arrangement of this city should be attributed to the waters that originated from the high Zagros mountains called Zardkoh Bakhtiari and created the Zayandeh River, and as a result, the beautiful city of Isfahan is located on both sides of the Zayandeh River. The city of Isfahan is located on a relatively flat plain. It has been built with a slope of about 2% and towards the northeast. The development of the city has been towards the southwest during many centuries, because in this area there is more water and less pollution.



figure 1 :Geographical map of Isfahan province

The climate of Isfahan province is generally dry, but due to the influence of winds and the distance and proximity to the mountainous region in the west and the desert plain in the east and southeast, its climate can be divided into 3 distinct parts;

1- desert climate; which covers the north of Nain city, Biabank and Anark areas to the north of Ardestan. Its special characteristic is the sharp and rapid temperature change, little rain and strong winds throughout the year.

2- Semi-desert climate; which covers the city of Isfahan and dry air and little rainfall are the characteristics of this type of climate. Zayandeh Rood river has a positive effect on the climate of this area and moderates it.

3- cold semi-humid climate; which includes the western and southwestern territory of Isfahan. As the altitude increases, the amount of rainfall increases and the temperature of the air decreases. The City of Four Seasons, in terms of order and education of the four seasons of the year, none of the cities in Iran is equal to Isfahan. The first day of April, the first day of July, the first day of Mehr, and the first day of December, announce the beginning of the four seasons of spring, summer, autumn, and winter, and exceptional changes have rarely been seen.

In the middle of Mizan (the month of Mehr), the weather tends to get a little cold. The night of the 17th of Mehr is called Raa or Jalband from the olden days, and it is possible that from that night onwards some of the fruits, whether they have reached the tree or not, will be damaged by the cold. The end of Mizan to the middle of Aqrab (Aban) is the beginning of autumn and the leafless season of Isfahan, and at that time they no longer put fruit on the trees or in the fields, and they pick and store everything. It usually starts raining in the beginning of Aban, and in the first month of Aban, all the leaves of the trees fall and the trees become dry like wood. At the end of Azar, the weather becomes completely cold and the possibility of snow falls, from the first of Jedi (D) to the tenth of Aquarius (Bahman) is the peak of cold and snow and frost, and it is called Big Cheleh, and from the tenth of Aquarius to the first of Pisces (Esfand). the coldness of the air is invalid except in exceptional years when it is very cold and it is called Cheleh Kokh. From the beginning of March, the weather becomes hotter, and on the first day of Thor (Ordibehesht), the weather is warm and moderate, and on the first day of Gemini, (Khordad), the temperature increases, but it is not overwhelming, and this month is the beginning of the fruits of Isfahan. Sarsan (Tir) when the weather reaches its peak heat.

As mentioned, in Isfahan, extreme weather changes and atmospheric revolutions are usually seen less frequently, and if an atmospheric revolution occurs exceptionally in a year, it is also very noticeable and significant, as from the end of Aban to the end of the first half of Azar 1333 for a period of It rained for twenty days in a row, which was certainly unprecedented in the history of this city in the last five hundred years, and it caused a lot of damage to the residential houses and buildings of the city and the ancient buildings that were not prepared to withstand such unprecedented rains. People were surprised. The mentioned rains reached the amount of 167.5 mm in 20 days and the poor people and the residents of the old parts of the city, whose mud houses were covered by the rain water and were destroyed, took shelter in the sheds of the big and historical mosques and followed the fall. These rains

caused an unprecedented flood on the 16th and 17th of Azar 1333 and the city of Isfahan was threatened.



figure 2: Iran flood, Isfahan province

Zayandeh Rood, the most important river located in the center of Iran, is Zayandeh Rood, which originates from the heights of Zardkoh Bakhtiari and from a stream called Kohrang and flows from the west to the east to the Gaukhoni swamp. The length of this river with its twists and turns is written as 400 to 480 km, but this distance in a straight line is 270 km, the width of the river bed varies up to 200 meters. The top of 40 springs and Kohrang in Bakhtiari soil is the source of this river and it is covered by snow most days of the year. The bed of this river gives birth to water from its source to its mouth, and that is why it is called Zayandeh Rood. The initial part of the channel of Zayandeh River has many twists and turns, but the lower it goes, the twists and turns become less until it reaches Qala Bezi Mountain, which flows in a curve for a distance of 12 kilometers and unlike the main channel, it flows from east to west. From the Flowerjan Bridge to the city of Isfahan, it travels 24 kilometers in the form of a snake from the west to the east, and in the middle of this distance is Mount Ateshgah, from the top of which you can see the bends of the river, which twists in the shape

of a snake, and perhaps this is the reason why this The mountain is called Marbin and for this occasion the villages around this mountain are called Marbin and it is also called Marbin and it is the most important block of Isfahan in terms of abundance of fruit, greenness and cleanliness.

The results of a study on the inflow to the Zayandeh Rood dam show that although the amount of precipitation has increased in the region, the increase in temperature has a greater effect and has caused a decrease in the amount of water flowing in the Zayandeh Rood basin.

Climate change, which is mostly caused by human activities as a result of the consumption of fossil fuels and illegal interventions in forests and natural resources, can have severe destructive effects on the structure of the watershed in addition to the negative effect on the functioning of the watershed from the economic, social and environmental point of view. have natural ecosystems.

According to the fifth report of the International Conference on Climate Change, the temperature of the earth's surface in the 21st century will probably increase by more than 1.5 degrees Celsius compared to the period of 1850-2005, and it can be said that it is one of the most important drivers of the loss of biodiversity and a serious threat. Climate change is for human health in the coming decades.



figure 3: Drought, Isfahan Province (Zayandeh Rood), Iran



figure 4: Drought, Isfahan Province (Zayandeh Rood), Iran

4-2 Research Design

The current research was conducted by investigating the role of climate change on the economy of rural areas in selected areas of Iran. This research is considered as an applied research in terms of its objective, because the results can be used in the decisions of rural areas. In terms of data collection method, the current research is a descriptive-correlation type of research.

4-3 Research hypotheses

(H1): Climate change has an impact on the economy of rural regions in selected areas of Iran.

(H2): Temperature variations affect gross domestic product (GDP).

(H3): Precipitation affects gross domestic product (GDP).

(H4): Water consumption affects gross domestic product (GDP).

(H5): Extreme weather events affect gross domestic product (GDP).

4-4 Regression model for hypothesis testing

independent variables

- climate change (changes in temperature, precipitation, water consumption, extreme weather events)

The meaning of climate change includes previous long-term changes in the earth's climate. The current increase in average global temperature is faster than previous changes and is mainly caused by the burning of fossil fuels by humans. The purpose of this research is to investigate climate changes on the economy of rural areas of Isfahan city. For this purpose, these changes, which include changes in temperature, precipitation, water consumption, extreme weather events, are partially investigated with regression models, and the impact of each of them on the economic status of these regions is done.

Dependent variable

- Gross Domestic Product (GDP)

shows the monetary value of all goods and services produced and supplied in a given period of time (usually one year) in a country. It is the most important variable that is used in macroeconomic analyzes and evaluations, and in Iran it is equal to: the total Rial value of final products produced by economic units residing in the country in a certain period of time (annual or seasonal). The purpose of this research is the effect of climate change on the economy of rural areas in selected areas of Iran. According to the identification of independent and dependent variables of this research, data processing is done quantitatively and by identifying the reports of the Meteorological Organization. After that, the analysis and review of the economy and the GDP rate are discussed. In line with the fact that this research is descriptive-correlational, the stages of further data analysis and the regression model of this research are as follows.

$$\gamma = \beta_0 + \beta_1\kappa_1 + \beta_2\kappa_2 + \beta_3\kappa_3 + \beta_4\kappa_4 + \varepsilon$$

γ : GDP rate

κ_1 : temperature

κ_2 : Precipitation

κ_3 : Water consumption

κ_4 : Number of extreme weather events

4-5 Population of the study

Society is the largest collection of beings that is desirable to us at one time and must have at least one characteristic. In this research, among the regions and cities of Iran, the city of Isfahan is considered as the studied region in this research. For this purpose, a number of rural areas of Isfahan city have been selected by purposeful sampling. The investigated areas, in accordance with the classification of Central Bank, Kodal site, Meteorological Organization and based on access to their data, have been investigated in the city of Isfahan.

4-6 Data collection and procedure

In this research, two library methods are used to collect data. Collecting information first from the library method using reliable sources and sites, documents in such a way that after studying the available documents such as books, articles, treatises, databases and reliable online publications and from the data site the desired points have been extracted.

One of the main parts of any research is collecting information. If this work is done regularly and correctly, the work of analyzing and drawing conclusions from the data will be done more accurately and quickly. Four main methods are used to collect information in research works, which are: use of existing documents, observation, interview and questionnaire. The data in this research is used using the databases of Meteorological Organization, Kodal site and Central Bank.

4-7 Information analysis method

In carrying out this research, according to the descriptive research and the library information collection method, the statistical analysis method is used. To analyze the data, we use descriptive statistical methods such as frequency distribution table, mean and standard deviation, and inferential statistics methods to check the relationship between the effective factors and Kolmogorov Smirnov to determine the normality of the data. We use the unit root test to determine whether the time series x_t has a stationary (accumulation order of zero) or divergent (accumulation order of one) process. As in checking the stationarity of the variables, here we also need to use the appropriate method for consolidated data. Also, Limer's and Hausman's F tests are used to determine one of the two methods of fixed effect or random effect. To choose whether to use the pooled or panel method in estimating the models, Limer's F test is used, and if the null hypothesis of this test is rejected, the panel data method should be used. Regression test is used to confirm and reject research hypotheses and Eviews and Excel software are used for data analysis.

✓ Limer's F test

Limer's F test is used to select one of the methods of combined regression patterns and panel data pattern with fixed effects. This method relies on the coefficient of determination of two methods, and investigates whether the coefficient of determination of panel data regression is significantly greater than the coefficient of determination of the combined regression model or not. The assumption of H_0 and H_1 of this test is as follows.

H_0 = mixed data method is preferable.

H_1 = panel data method with fixed effects is preferable.

If the calculated P-VALUE is greater than the error level of 0.05, the null hypothesis is not rejected and the combined data method should be used. Otherwise, tabular data method will be used. If the combined data method is selected in the F-Limer test, the work is complete, but if the panel data method with fixed effects is selected, it is necessary to perform the Hausman test as well.

✓ Hausman test

Hausman test is used to determine the use of fixed effects model versus random effects model. This test is based on the presence or absence of a relationship between the estimated regression error and the independent variables of the model. If there is such a relationship, the fixed effects model will be used, and if there is no such relationship, the random effects model will be used. The assumption of H_0 and H_1 of this test is as follows.

H0 = mixed data method with random effects is preferable.

H1 = panel data method with fixed effects is preferable.

If the calculated P-VALUE value is greater than the error level of 0.05, the null hypothesis is not rejected and the random effects method should be used. Otherwise, the fixed effects method will be used. In this test, the hypothesis that the width of the origins is the same is put against the hypothesis that the width of the origins is not the same. If the hypothesis is accepted, it means that the slopes are the same for different sections, and the ability to combine the data and use the combined regression model is statistically confirmed. But if the hypothesis is rejected, the panel data method is accepted and the panel data method can be used.

✓ Manai test of time series research variables

Manai test: the reliability and unreliability of a series of data can have a strong effect on its behavior and characteristics. If the variables used in estimating the model are unstable, at the same time there may be no logical relationship between the independent and dependent variables, the coefficient of determination obtained by mistake can be very high and cause confusion. The Manai test is mainly performed in order to prevent false regressions. To avoid false regression, the variables must be significant. Otherwise, it is necessary to use the difference of variables which are usually mean. The variability of a time series can have a serious effect on its behavior and properties. If the variables used in estimating the model are unstable, while there may be no logical relationship between independent and dependent variables, the coefficient of determination obtained can be very high and cause the researcher to make incorrect conclusions about to measure the relationship between the variables, so the use of invalid data can lead to false regressions. In this test, the null hypothesis is based on the existence of a single root and the opposite hypothesis is the reliability of at least one panel member. There is a unit root and the desired variable is insignificant.

H0: $\theta = 0$. There is no unit root and the desired variable is insignificant.

H1: θ This test is done to prevent false regressions.

In other words, the presence of the Mana series prevents misinterpretation of the results

4-8 Ethical consideration

Research ethics is a set of attitudes from the researcher that guarantee some regard for the privacy, rights, integrity and confidentiality of those that participated in the research. On the other hand, ethics is a set of moral principles which offers rules and behavioural expectations about the most correct conduct towards participants, organizations, sponsors etc. To make sure this research was ethically acceptable and to strictly abide by the University's policy on ethics, the research proposal was approved by the ethics committee of the institution.

All like in the medical field, research studies in social sciences involving human participants must also follow the ethics review process and the application of the Belmont principles (Koepsell, Brinkman, & Pont, 2015). Key process researchers used to ensure compliance with the ethical demands in research work involving human participants is the informed consent of participants. Informed consent process emanated from the Belmont Report which is a principle that set out the framework for participants to evaluate the benefits and risks of their participation in any research study (Myers & Venable, 2014).

Informed consent has been used to document the participant's voluntary decision to participate in the study (Schrems, 2014). Participants were informed about their responsibilities, risks, and benefits of their participation were the cornerstone of the informed consent process. A researcher must disclose appropriate information about their research to potential participants to allow them to make voluntary choices about their involvement in the study. Sugarman (2017) stated that recent emphasis to enhance the informed consent process have been to foster participant's comprehension and understanding of the research work to enable informed decision process.

The researcher is called to provide detail and sufficient inputs about the study to enable the participants understand the reason for and against their participation Sugarman (2017). Researchers may violate ethical principles in some cases including, (a) too close relationship between the researcher and the participants (principle of justice), (b) poor research design and any imposition of participants (principle of merit and integrity), and (c) lack of knowledge about risk and benefits associated with the study (principle of respect), thus, affecting credibility and validity (Wallace & Sheldon, 2015). Greenwood (2016) argued that the process of identifying the risks and benefits of any research study should be a two-way process that involves both the perspective of the researchers and that of the respondents.

Therefore, I explained the risk and benefits of the research before their participation, as a strategy to install confidence and openness during the interview process. Understanding some of the reasons why individuals or organizations have frequently participated in research as participants, such as transparent communication, the researcher's ability to demonstrate respect for privacy, and participation incentives (knowledge accusation, financial, or social change impact), can improve the researcher's ability to secure informed consent from participants.

4-9 Executive Summary

This chapter presented information about the study area. It also described the selection sampling technique and how data was collected and analysed. The regression model was specified and estimated. The dependent and explanatory variables used in the study were also presented, including their expected effects. The data collection instrument was presented in detail. The findings of the study were discussed in detail in chapter four and five.

SWOT theory :

SWOT stands for the four words strengths, weaknesses, opportunities and threats, meaning strengths, weaknesses, opportunities and threats, which in addition to evaluating the current performance of the organization, can intelligently make the best use of the opportunities ahead, minimize the impact of weaknesses and protect yourself from threats. The SWOT matrix can be considered a square in some way, each side of which contains one of the elements mentioned. In fact, SWOT analysis is a strategic planning method used to assess strengths, weaknesses, opportunities and threats related to a project or business activity. Many experts and business owners believe that the use of the SWAT matrix can be considered an extraordinary guideline for success in today's competitive market. So companies consider SWOT analysis as an important part of their overall organizational planning process to achieve the set financial and operational goals, as well as to develop strategies to achieve these goals.

Diverse SWOT applications:

You don't have any restrictions on using the SWAT Matrix. In simpler terms, small and large companies, public and private organizations can use this method in various activities such as Competitive Analysis, Market Research, Product Development and strategic planning.

Affordable

The SWOT matrix is a simple method that does not require high knowledge and specialized tools; as a result, any employee of the company who has a thorough knowledge of the business and its environment can use this method as a low-cost tool.

Better knowledge of competitors:

SWAT matrix analysis helps you get to know your competitors and their competitive advantages more than ever. In fact, analyzing the information in this table allows you to have a strategy in which, taking into account external threats (competitors), you take advantage of internal strengths (competitive advantages) to maximize opportunities.

More employee participation in decision-making:

In SWOT matrix analysis, management engagement with employees in different departments of the company increases, because employees in each department have a better understanding of the weaknesses and strengths of that department. This greater engagement brings a more thorough understanding of internal weaknesses and strengths and external opportunities and threats that ultimately help make informed decisions. In addition to more interaction between the manager and the staff, this method also improves the cooperation of the employees of different departments. For example, to produce a new product, you need the cooperation of different marketing, production and sales departments with each other to analyze the SWOT Matrix.

Proper use of resources:

In SWAT analysis, some of the strengths and opportunities are related to resources that have either not been seen or have not been fully utilized. This matrix allows you to identify resources and use them to increase productivity and performance.

SWOT Matrix segments:

As mentioned, SWAT analysis, to analyze the performance of an organization, contains four main components and parts that can be segmented in two ways based on their scope and nature.

By domain:

Internal factors: strengths and weaknesses

External factors: opportunities and threats

By nature:

Positive factors: strengths and opportunities

Negative factors: weaknesses and threats

Strengths:

Strengths are the qualities that help you achieve your goals, namely, the skilled and professional staff, the high budget you have invested in the work, the distinctive products you offer, and even the loyal customers you have, fall into the strengths category.

As you can see, these strengths can be specific or intangible. Of the most important by asking the following questions you can determine the strengths:

What are the distinctive advantages and characteristics of business over other competitors?

Is competitive pricing properly applied?

Does the company have access to unique or low-cost resources?

What do customers like most about your product or service?

Weaknesses:

Any feature that diminishes your ability to achieve goals, i.e. limitations or shortcomings of your product, lack of access to enough information to make decisions or lack of equipment to produce a product that directly or indirectly slows down your progress.

Managers can develop appropriate strategies to address or reduce weaknesses realistically by identifying weaknesses. Evaluation through SWOT matrix analysis will turn weaknesses into strengths. The most important questions that can be used to identify weaknesses are:

What should be eliminated and / or improved in competitive business strategy?

What factors make a business fail in the market?

What are customers unhappy with and dislike?

What is more common in customer reviews and discontent?

What is the biggest problem with customer retention?

Opportunities:

What happens in the market and makes it end up benefiting your activities and making more profit from it is opportunity. In fact, opportunities are caused by environmental factors that affect the performance of the company. It's your job to explore market opportunities in a timely manner and use them to your advantage. For example, the coronavirus restriction created good conditions for many educational institutions in the discussion of selling virtual courses. You can use the following questions to identify opportunities:

Can businesses take advantage of the industry's desirable trends?

Can the business meet the unmet needs of the customer?

Can businesses increase their capital by using government-related policy changes such as bank interest rate cuts?

Threats:

A situation that jeopardizes the position and profitability of your business and you have no control over it. You should try to find the right solution to help with the impact of these events, such as new competitors entering the market, sanctions, resignations of key employees, or rising inflation rates.

Research findings:

Strengths
Possession From Background fertile And high quality At villages Area
Possible the reception Innovation At Production From the side Production doers
Existence the force Work Inexpensive At Area
Existence Potential Appropriate To Development Activities productive
income generation And Employment villagers At Background Different
Existence Background Appropriate And Capabilities Range item Opinion At employment And Interest get Appropriate From the force Work Women
Capacity above the References normal
Potential above the Production Products special
Existence Network wide cooperative even From rural ,Production stock agricultural Organizations the part agriculture And....
power Masters Top
population above the resident At areas rural And nomadic
susceptible to be And ready to be Area direction Fund put
Existence Condition above the Consciousness And Literacy At Among People Village And Feeling Cooperation And participation At Among villagers Area
Existence Eye Sizes Beautiful And unique To Man
space Green And gardens At areas rural study done Proximity And Proximity To centers population And centers urban
peace of mind atmosphere And Existence hours Sunny Much At Area
Variety Products And Industry manual And Homemade

the force Work Young And population Much active Economic
the beds And Fields physical Appropriate direction Variety a part To Activity Hi income generating
Variety Powers normal, Economic And social direction Variety a part Economic villages

weak points
Governance the system wisdom owner intense;
old age population Interest vectors At the part agriculture
Down to be level Literacy And Knowledge academic – Professional
Down to be Coefficient mechanisation At level Area
desire the villagers To Migration always To cities
profit Down the part agriculture And Absence formation Fund
Absence Existence Organizations guild
Absence Existence Market rural At level Area
Existence wastage above the Products agriculture At levels Different Production
Down to be Level Efficiency WATERING systems
Top to be Cost Hi Production
Absence Existence Program tiny And Fund Investments Governmental At this District
Inappropriate to be And Absence Sufficiency Facilities sanitary And service
Absence Existence Forces Expert And Education seen At this areas
Orientation dominant People To Use exclusive From space Village At dominant villa And Gardens private

Inappropriate to be Under Constructions environmental And physical(like Road I see And Wastewater)
Decrease rainfall And Increase temperature And At Result From Among to go Eye Natural sizes
Shortage References Blue Superficial And Under terrestrial
Increase Cost Hi life environmental
weakness cover herbal a tree
heat relatively Much At the length Day At Season Summer And Droughts Lately
Limitation Hi physical To expansion space Green And made And instrument
Increase Erosion Soil
Creation pollution Hi Audio From through Drive recreational Engine cycle At next to the Beach I see And River
dry Become River I see Wetland I see And Lake I see
Shortage Program Hi educational To societies local direction protection From References normal And Environment life
weakness At Advertising And Introduction ecosystem I see And gravity Hi Tourism environmental
made And instrument At privacy River I see And References normal
was not Under made Appropriate managerial Total Bring Residue
Shortage Rules Environment biological
weakness At Rules Inhibitor At keep And Protection From References normal
weakness Rules Appropriate direction prevent From change user Background agricultural
Creation jobs With Interest Low Economic
Absence upgrade job Appropriate villagers
division And dispersion villages Low population At areas remote more

Absence formation Cooperatives productive And commercial
Exit Capitals Financial villagers And guidance they To City
a lack of And weakness Network carry And quote Appropriate
Shortage Role Advertising Radio
Decrease Facilities Bank

the opportunity I see
Increase Day In addition demand To Products agriculture
Conditions environmental Appropriate Period radiation Sun And the length the period(the heat To Production some Products special;Existence experiences various At in line Organizing the system small owner types of)
Existence centers Education Excellent numerous To Breeding Forces Expert;
Existence bed favorable direction Development mechanisation And Industry conversion And supplementary;
Existence Markets attractive At Background Buy products productive At this Area
Possible Development killed Products High efficiency
Increase Attention And Protection Officials Country From Development rural With Approach Employment And acquisition Income
Existence Institutions And organizations Different Governmental And non Government direction Protection And Presentation Facilities And Services Different To villages
Existence Forces Expert And With Experience At Proximity With this areas
Possible participation a people At Designs protection From Environment life creation Sights Beautiful To intermediary topography Area
Rate life environmental References normal At direction protection From they
Ratio Down pollutant Hi Environment biological

Interest get From Powers intellectual And executive Organizations non Governmental
Development Activities cultural related With keep Environment life
Organizing societies human At Interaction With Environment life normal
Introduction jobs Alternative direction protection From References normal
Development System Hi Appropriate Store making And Distribution Water
Organizations a people At protection From Environment life
Existence Sight Optimal And determination seriously direction Development rural At Country
Proximity To The biggest Market Consumption(Tehran)
Creation centers complex And Parks researches
Possible Interest get From Technologies novel And researches Practical
Existence University agriculture
Possible Existence Export products To Out From Country

threats
Shortage Programs research And researches Practical educational And promotional
was not Program Hi At Background upgrade Knowledge And Skill Production doers And Interest Area vectors
From Among to go Opportunities job At products Despite the Afghans At Area
was not Marketing Efficient And effective

was not Base Information a place And Descriptive units Interest vector And Interest vectors And Bank Information Market At the part products
Swing Economic And Management Development To special Development rural At State And Area
Increase Process Desertification To some reasons Because why B procedure At pastures And....
Absence Attention To experiences And Comments inhabitants local At Programs executive the part agriculture
Existence reactions negative environmental(Drought,distribution Inappropriate when rainfall And the winds);
drop a little And Qualitative References Water And Soil;
Absence Development villages
Lack of amenities
Migration Day In addition the villagers To Focal points urban At P Attention Appropriate some From Devices executive Fra a part give order;
Increase temperature
Decrease rainfall yearly
Continuation Drought And Decrease References Water
Decrease level farms And gardens
To analysis to go Eye Sizes Beautiful
Top to go Destruction And Pollution Environment biological
Increase fine powder And Round And Dust
pollution Water
do Activities Tourism And Nature roundness Without determination Capacity
Absence Possession From security enough To Fund put the part private
Orientation residents local And native To change user And sale lands agriculture

a lack of Program managerial At direction Control And guidance minds General At to preserve ecosystem Hi local And normal
Increase pollution Air And release Co
Increase Garbage And Residue
a lack of Supervision And Program tiny On made And instrument buildings At Area
Overpopulation and overcrowding of this area compared to competing areas in the future
From Among to go trees And cover herbal And Effects destructive it like Increase Flood Destruction Background agriculture

strategies

Strategies Aggressive(so
Interest get From Location Optimal Placement At Direction Major And Important tourism commercial Country
Creation And the way launch jobs service
Creation Background Hi development and expansion Tourism rural commercial And naturalness roundness At Area
Creation And Reinforcement Culture Entrepreneurship Production And Development At Area With Interest get From Institutions People institution
Creation Beds Necessary legal Official And supportive direction Development Entrepreneurship And log in Fund Hi the part private
Editing Plan Comprehensive Variety a part To Rural economy Area With ID And inclusion all Capacity Hi Area
Evolution At Kind livestock ranchers
attraction Knowledge the learned native field Hi educational related with agriculture At Area
Creation And expansion Clusters And areas industrial rural

Editing Document Development agriculture Area With an approach Export Products
organize the system small owner With Attention To Existence Network Hi wide cooperative And....
Promotion Production Products New And do Possible measurement Agricultural products new At Area
emphasis On Development Tourism normal And Tourism native To the reason Existence Advantages relative To Development this type Tourism At villages study done
Interest get optimal And Targeted From Increase motivation Travel At Among Floor city dweller And also Proximity With centers urban Crowded, in direction Interest vector From gravity I see And the product Hi tourist rural To Purpose Creation employment And Income To inhabitants Study villages done
Use From Forces Expert And With Experience To Purpose Creation Organizations cooperative a people
create coordination Among Institutions And Sections Different related To Purpose integrated making functions to the device Holding the meetings And To employment measures managerial coordinated doer With Presence organizations Governmental non Governmental, People And entrepreneurs.
Background making And Interest vector From Support the part private To Fund put
change At Method Production From Traditional To industrial With Interest get From Technologies novel
grant Subsidy Governmental With assign currency To the payment Cost carry And quote
Reinforcement And Creation union I see And Organizations export At Area
catch Fund The founders Foreign

Strategies Variety(ST)
Education And Promotion Production in the agricultural sector
Holding the period Hi educational To Interest vectors At the part agriculture
Creation Base Information a place And Descriptive units Production doer And Creation Bank Information Market
Capacity adaptability And determination limit Optimal Density population At places Different At villages study done At direction Decrease Pressure And Density over From limit To this Places And gravity I see And prevent From Among to go And Destruction they.
Development And expansion Tourism agriculture To Purpose Interest vector Appropriate From Landscapes, fields And gardens rural At direction acquisition Income And also prevent From Destruction farms And Vegetation
Use From Knowledge local And Consolidation it With techniques Day in line with Development Stable Activities agriculture
Professional to do pattern killed;
Protection At in line Dyer to do Unions animal husbandry To Purpose ease At order preparation necessities And sale Appropriate Products livestock)
review And Development Institutions And organizations related At Area study done To education People And tourists To Purpose Interest get optimal And Targeted From benefits And Effects Positive Tourism.
protection From Road Hi Green And Decrease Cost Hi Environment biological
Increase Actions protection From ecosystem normal With improvement System supervisory
Control And Supervision effective On implementation of regulation Environment biological And requirements At areas
Program tiny And politics put To prevent From Destruction ecosystem
Education At in line protection From Environment life And Culture making At this Therefore From through Media Hi General university Conference And organizations non Governmental
Development Knowledge And Consciousness At direction Management

Residue And Decrease pollution Environment life With Use From tools of Media collective And Holding classes educational
expansion Studies related To Assessment Effects Environment biological At item Project Hi Major
Use From Incomes industry Tourism To Increase level protection From Environment life
Education And Interest get From population Young direction protection From Fund Hi normal And Management local rural
the show to give And obvious to do level Optimal Fund Hi subsistence And Under Constructions physical direction Creation confidence From security Appropriate Area To log in Fund The founders
keep And Reinforcement level Optimal Capitals subsistence direction confrontation With Swing

Strategy Hi review(wo)
Creation Equipment And Possibilities modern inventory
Protection Financial Government From through grant Credits Financial And prevent From Growth swelling the price Agents Production
Organizing ownership lands
assign a part From Facilities Bank To Manufacturers With Target the transfer facilities they From type Traditional And industrial
Reinforcement foundation Hi Economic with role adaptability New Direction villages attraction Increase And sustainability population they.
review To how Distribution,Possibilities Services And Facilities tourist And prioritization Allocation again this type Possibilities To areas rural
review To Rules And regulation Territorial(the earth)rural At The villages of this District To Purpose Interest vector From Parts of Different it To Public People

review To type And how Interest get From Contributions a people At Development,preparation And implementation of Designs And equip areas rural study done To Considering Possibilities And Services
equip And renovation Machine instruments agriculture With Presentation Facilities Low Interest To activists At the part agriculture;
Support Financial technical And technical From Farmers At Background multiplicity Activity their At the part agriculture agriculture,animal husbandry And Gardening
grant Facilities Debt Al-Hasna And Or Low Interest To Farmers
facilitate to do Verand receive loan And guarantee Letter Hi Bank
Trainings promotional And Presentation Support All sideways At active line to do Farmers At Discuss Marketing Products productive
implementation of Plan renovation System WATERING systems From Sui Organization Agriculture And Protection,Financial technical And...From Interest vectors agriculture;
Create rules And regulation At direction Decrease Risks and pollution ecological And life environmental At Area

Strategies defensive(WT)
Move To Side Creation And the way launch Industry conversion And supplementary agriculture
Interest get And Program tiny direction Use From population active And non supervisor household At Development Activities commercial And productive
Creation institution And managerial the unit Formed From Kidney Institutions Development And Program tiny To Organizing And Program tiny Activity Hi Variety a part Economy Area
formation And Protection From Associations People institution With Approach environmental And productive

organize villages Low population And Misc Area
Holding Seminars And meetings Development Fund put rural To the device Council City
prevent From Destruction,pollution And From Among to go this References At this areas
Background making And Encouragement People To participation At direction Development Infrastructures,Equipment And facilities
notification delivery accurate And Use From Advertising At Media Hi a group
Empowerment Interest vectors From through Education And upgrade Skill they To employment At Opportunities job To Existence came
preparation Bank statistics And References Informational At Sections Different agriculture With Attention To Absence coordination Devices executive,Drought Hi P At P Increase Process Desertification And etc
Decrease Process Desertification With care To Interest vector B procedure And non Basic From lands
Creation coordination Among Sections cooperation State With Attention To the presence of small owner And Efficiency down Organizations the part agriculture

5. Data analysis

5.1 Introduction

In this chapter, the findings of the research based on the description and analysis of the data obtained from the sample have been explained. During the first, second and third chapters of the research, respectively, the generalities of the research, a review of the research literature and the research method have been discussed with the implementation process of the research. Due to the fact that financial data is needed for this study, the method of collecting information was that it was collected using financial statements. The collected data was analyzed in eviews9 software.

The logical structure of the chapter is as follows:

a) By using descriptive methods including central, dispersion and relative indicators, the description of findings or independent and functional variables has been done. In addition, due to the qualitative nature of the prediction type variable, it has been measured.

b) Given that linear regression was used in this research, the presuppositions of this method include the normality of the distribution of variables and the residuals of the relationship.

c) Determining the relationship between dependent and independent variables based on regression and based on panel and consolidated data analysis, and after estimating the regression parameters, its validation based on the coefficient of determination, generalization based on the significant level of Student's t test and Fisher's test. The coefficients of the independent variables have been used in the calculation relationship to determine the type of relationship between the variables.

f) At the end of the chapter, a summary of the research findings and a brief description or analysis of the data are provided.

5.2 Descriptive statistics of research variables

Descriptive statistics includes a set of methods used to collect, summarize, classify and describe numerical facts. In fact, this statistic describes the research data and information and provides a general plan or pattern of data for quick and better use of them. In a summary, the characteristics of a group of information can be expressed by appropriate use of descriptive statistics. Central and dispersion parameters are used for this purpose. The functions of these standards are that it is possible to express the main characteristics of a set

of data in the form of a single number, and thus, in addition to helping to better understand the results of a test, it is possible to compare the results of that test with tests and It also facilitates other observations. Therefore, before testing the research hypotheses, the research variables are briefly reviewed in Table 5-1. This table contains indicators to describe research variables.

Table 5-1: Descriptive statistics of research variables

	GDP	TEMPERATURE	PRECIPITATION	WATER	WEATHER
Mean	3.294118	4.235294	0.556775	0.515174	16.88235
Median	4.300000	3.000000	0.550036	0.425880	17.00000
Maximum	8.800000	9.000000	0.967213	0.978882	26.00000
Minimum	-3.700000	1.000000	0.105041	0.112238	3.000000
Std. Dev.	4.125299	2.795743	0.281761	0.298604	6.293671
Skewness	-0.427470	0.794538	-0.055120	0.215985	-0.334992
Kurtosis	1.836610	2.229125	1.705566	1.600610	2.605813

As can be seen in Table 5-1, the average GDP is equal to 3.294118. This figure shows that most GDP values are close to this number. The mean of this variable is equal to 4.300000. This number shows that half of the GDP values are lower than this value and half of the values are higher than this GDP index. The maximum and minimum numbers of this variable are 8,800 and -3,700, respectively. The number of standard deviation is equal to 4.125, which represents the deviation of GDP (according to the minimum and maximum value). For the TEMPERATURE variable, the average value is 4.235. Also, the median value is equal to 3. The highest and lowest values of TEMPERATURE are 9 and 1. The number of standard deviation is equal to 0.794, which represents the deviation of TEMPERATURE (according to the minimum and maximum value). The average PRECIPITATION is equal to 0.556. This figure shows that most of the PRECIPITATION values have an average close to this number. The mean of this variable is equal to 0.550. This number shows that half of the PRECIPITATION values are lower than this value and half of them are higher than this amount of PRECIPITATION. The maximum and minimum numbers of this variable are 0.967 and 0.105, respectively. The standard deviation number is also equal to 0.281, which indicates the amount of PRECIPITATION (according to the minimum and maximum value). The average of WATER is equal to 0.515. This figure shows that most of its values are close

to this number. The mean of this variable is equal to 0.425. This number shows that half of them have less than this amount and half of them have more than this amount of WATER. The maximum and minimum numbers of this variable are 0.978 and 0.112, respectively. The standard deviation number is also equal to 0.298, which indicates the amount of WATER (according to the minimum and maximum value). The mean of WEATHER is equal to 16.882. The mean of this variable is also equal to 17. This number shows that half of them have less than this amount and half of them have more than this amount of WEATHER. The maximum and minimum numbers of this variable are 26 and 3, respectively. The number of standard deviation is also equal to 6.293, which represents the deviation (according to the minimum and maximum value).

Skewness is actually a measure of the presence or asymmetry of the distribution function. For a completely symmetric distribution, the skewness is zero, and for an asymmetric distribution with a skew toward higher values, the skewness is positive, and for an asymmetric distribution with a skew toward smaller values, the skewness value is negative. As can be seen, the greatest skew to the right was for TEMPERATURE. Skewness also describes how peaked a probability distribution is. The more peaked the shape of the probability density function is, the higher the elongation index is for it. In other words, elongation is a measure of the sharpness of the curve at the maximum point, and its value is equal to 3 for normal distribution. In Table 5-1, although all the variables are in a reasonable range in terms of skewness and normality, all research variables have close to normal values in terms of skewness.

5.3 Collinearity test of research variables

Conditional collinearity indicates that an independent variable is a linear function of other independent variables. If the collinearity in a regression equation is high, it means that there is a high correlation between the independent variables and the model may not have high reliability despite the high coefficient of determination. In other words, although the model looks good, it does not have significant independent variables. For this purpose, it is necessary to check the collinearity in the variables of the model. One of the objectives of multiple regression is to determine the effect of each of the independent variables by keeping other independent variables constant. This goal is achieved in the first step by estimating the regression coefficients in the model. But if there is a linear relationship between the independent variables, a unique solution cannot be obtained for the variables. In this case, the

problem of collinearity has arisen for the regression model and the researcher has difficulty in correctly estimating the parameters. The problems caused by collinearity in a regression model on skewness are caused by the omission of the variable and the variance of the parameters. Colinearity leads to problems. One of the main problems of complete collinearity is that, firstly, the coefficients are not estimable. Second, the calculated t's are equal to zero. One of the problems of incomplete collinearity is that, firstly, the calculated t's are small and close to zero, the coefficients are invalid, and secondly, the variance of the coefficients is very large.

Table 5-2: Collinearity of research variables

	GDP	TEMPERATURE	PRECIPITATION	WATER	WEATHER
GDP	1	-0.537	-0.525	-0.537	0.497
TEMPERATURE	-0.537	1	0.157	0.406	-0.545
PRECIPITATION	-0.525	0.157	1	0.302	-0.502
WATER	-0.537	0.406	0.302	1	-0.391
WEATHER	0.497	-0.545	-0.502	-0.391	1

As the results of the collinearity test show, there is no strong collinearity between the variables that can cause problems in the estimates related to the assumptions. Therefore, these variables can be used to perform tests.

5.4 Examining the validity of research variables

As mentioned in chapter three, it is necessary to examine the significance of its variables before estimating the model. A variable is when its mean, variance and covariance remain constant over time. In general, if the time origin of a variable changes and the mean, variance, and covariance do not change, then it is a variable, and otherwise, the variable will be unknown.

The hypotheses related to the meaning of the variables are as follows:

H_0 : The variable is unnamed

H_1 : It is a variable

The significance of the variables can be investigated in three states: "on the level", "on the first difference" and "on the second difference". Variables whose test probability is "at the level" is less than 5%, the null hypothesis is rejected and that variable is at the level of significance, if it is more than 5%, it is non-significant. The results of Manai's test are listed in table (5-3).

In order to check the validity (reliability) of the research variables, Dickey-Fuller unit root tests were used.

Table 5-3: Analysis of significance of research variables

VARIABLE	STATISTICS LIN LEVIN CHO	SIGNIFICANCE LEVEL
GDP	-3/377	0/030
TEMPERATURE	-4/390	0/004
PRECIPITATION	-3/297	0/032
WATER	-3/212	0/038
WEATHER	-3/012	0/039

According to the results seen in Table 5-3, the level of the test statistic is less than 5%. Therefore, considering that the significance level is less than 0.05, the research variables have the necessary stability.

5.5 Checking the normality of data distribution

To use statistical techniques, it must first be determined whether the collected data has a normal distribution or not. Because if the distribution of collected data is normal, parametric tests can be used to test the hypotheses, and if it is not normal, non-parametric tests can be used. For this purpose, in this research, the valid Kolmogorov-Smirnov test is used to check the normality of the distribution of the main variables. This test compares the observed cumulative distribution function with the expected cumulative distribution function in a single variable at the level of distance measurement. In the interpretation of test results, if the value

of the observed error level is greater than 0.05, then the observed distribution is the same as the theoretical distribution and there is no difference between the two. That is, the obtained distribution is a normal distribution. But if the significant value is smaller than 0.05, then the observed distribution is different from the expected distribution and the distribution will not be super-normal. This test examines the normality of the data according to the following assumptions.

H0: There is no difference between the observed and expected frequencies (the distribution is normal).

H1: There is a difference between the observed and expected frequencies (distribution is not normal).

Table 5-4: Normality test of variables

VARIABLE	The type of distribution used	Significance level	Error value	proving a theory	Result
GDP	normal	0.145	0/05	H ₀	normal
TEMPERATURE	normal	0/077	0/05	H ₀	normal
PRECIPITATION	normal	0/098	0/05	H ₀	normal
WATER	normal	0/200	0/05	H ₀	normal
WEATHER	normal	0/099	0/05	H ₀	normal

According to the values obtained from the Smirnof-Kolomogrof statistic in Table 5-4, it can be concluded that the expected distribution is not significantly different from the observed distribution for all variables, and therefore the distribution of these variables is normal.

5.6 Hypothesis testing

(H1): Climate change has an impact on the economy of rural regions in selected areas of Iran.

Table 5-5: Analysis results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TEMPERATURE	0.544718	0.161019	3.379353	0.0157
PRECIPITATION	5.668293	1.393043	4.069000	0.0000
WATER	3.769494	1.066614	3.534075	0.0141
WEATHER	0.403498	0.176996	2.279701	0.0416
C	10.75812	5.246150	2.050670	0.0628
R-squared	0.546072	Mean dependent var		3.294118
Adjusted R-squared	0.394763	S.D. dependent var		4.125299
S.E. of regression	3.209358	Akaike info criterion		5.409948
Sum squared resid	123.5998	Schwarz criterion		5.655010
Log likelihood	-40.98455	Hannan-Quinn criter.		5.434307
F-statistic	3.608979	Durbin-Watson stat		1.887481
Prob(F-statistic)	0.037411			

The significance level for testing this hypothesis is less than 0.05 for the Climate change variable, so the null hypothesis is rejected at the 95% confidence level. That is, between climate change and the economy of rural regions in selected areas of Iran. There is a relationship. By looking at the t calculations and in the last column, the values of the probability level are low. Therefore, both coefficients are significantly different from zero, in other words, they are significant. The coefficient of determination R^2 is equal to 0.546 and this means that climate change has been able to explain 0.546 units of changes in the economy of rural regions in selected areas of Iran. The value of the F statistic shows the overall significance of 3.608 and in other words, the effect of the variable's significance is equal to 3.608, which means it is needed to show the power of the regression equation in prediction. Durbin Watson's statistic, which is used to identify the independence of errors, shows a value of 1.887, which indicates the absence of autocorrelation between errors. Therefore, there is a significant relationship between the main independent and dependent variables.

(H2): Temperature variations affect gross domestic product (GDP).

Table 5-6: Analysis results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TEMPERATURE	0.793838	0.321155	2.471820	0.0259
C	6.656256	1.615195	4.121023	0.0009
R-squared	0.589433	Mean dependent var		3.294118
Adjusted R-squared	0.542062	S.D. dependent var		4.125299
S.E. of regression	3.591471	Akaike info criterion		5.505132
Sum squared resid	193.4800	Schwarz criterion		5.603157
Log likelihood	-44.79362	Hannan-Quinn criter.		5.514876
F-statistic	6.109893	Durbin-Watson stat		1.637947
Prob(F-statistic)	0.025906			

The significance level for testing this hypothesis is less than 0.05 respectively for the variable Temperature variations, so the null hypothesis is rejected at the 95% confidence level. That is, there is a relationship between temperature variations and gross domestic product (GDP). By looking at the t calculations and in the last column, the values of the probability level are low. Therefore, both coefficients are significantly different from zero, in other words, they are significant. The coefficient of determination of R^2 is equal to 0.546, which means that temperature variations have been able to explain 0.589 units of changes in gross domestic product (GDP). The value of F statistic shows the overall significance of 6.109 and in other words, it shows the significance effect of the variable, which is equal to 6.109, that is, it is needed to show the power of the regression equation in prediction. Durbin Watson's statistic, which is used to identify the independence of errors, shows the value of 1.637, which indicates the absence of autocorrelation between errors. Therefore, there is a significant relationship between the main independent and dependent variables.

(H3): Precipitation affects gross domestic product (GDP).

Table 5-7: Analysis results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PRECIPITATION	7.690213	3.216862	2.390595	0.0304
C	7.575840	1.995280	3.796881	0.0018
R-squared	0.575885	Mean dependent var		3.294118
Adjusted R-squared	0.527611	S.D. dependent var		4.125299
S.E. of regression	3.625547	Akaike info criterion		5.524018
Sum squared resid	197.1688	Schwarz criterion		5.622043
Log likelihood	-44.95415	Hannan-Quinn criter.		5.533762
F-statistic	5.714943	Durbin-Watson stat		2.429039
Prob(F-statistic)	0.030378			

The significance level for testing this hypothesis is less than 0.05 respectively for the Precipitation variable, so the null hypothesis is rejected at the 95% confidence level. That is, there is a relationship between precipitation and gross domestic product (GDP). By looking at the t calculations and in the last column, the values of the probability level are low. Therefore, both coefficients are significantly different from zero, in other words, they are significant. The coefficient of determination of R^2 is equal to 0.546, which means that precipitation has been able to explain 0.575 units of changes in gross domestic product (GDP). The value of F statistic shows the overall significance of 5.714 and in other words, it shows the effect of variable significance, which is equal to 5.714, that is, it is needed to show the power of the regression equation in prediction. Durbin Watson's statistic, which is used to identify the independence of errors, shows the value of 2.429, which indicates the absence of autocorrelation between the error components. Therefore, there is a significant relationship between the main independent and dependent variables.

(H4): Water consumption affects gross domestic product (GDP).

Table 5-8: Analysis results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
WATER	7.431598	3.007025	2.471412	0.0259
C	7.122681	1.777260	4.007675	0.0011
R-squared	0.589365	Mean dependent var		3.294118
Adjusted R-squared	0.541989	S.D. dependent var		4.125299
S.E. of regression	3.591643	Akaike info criterion		5.505227
Sum squared resid	193.4984	Schwarz criterion		5.603252
Log likelihood	-44.79443	Hannan-Quinn criter.		5.514971
F-statistic	6.107876	Durbin-Watson stat		1.726757
Prob(F-statistic)	0.025926			

The significance level for the test of this hypothesis is less than 0.05 respectively for the Water consumption variable, so the null hypothesis is rejected at the 95% confidence level. That is, there is a relationship between water consumption and gross domestic product (GDP). By looking at the t calculations and in the last column, the values of the probability level are low. Therefore, both coefficients are significantly different from zero, in other words, they are significant. The coefficient of determination of R^2 is equal to 0.546 and this means that water consumption has been able to explain 0.589 units of changes in gross domestic product (GDP). The value of the F statistic shows the overall significance of 6.107 and in other words, it shows the effect of the significance of the variable, which is equal to 6.107, that is, it is needed to show the power of the regression equation in prediction. Durbin Watson's statistic, which is used to identify the independence of errors, shows the value of 1.726, which indicates the absence of autocorrelation between errors. Therefore, there is a significant relationship between the main independent and dependent variables.

(H5): Extreme weather events affect gross domestic product (GDP).

Table 5-9: Analysis results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
WEATHER	0.325970	0.146829	2.220064	0.0422
C	-2.209022	2.635956	-0.838034	0.4152
R-squared	0.547316	Mean dependent var		3.294118
Adjusted R-squared	0.497137	S.D. dependent var		4.125299
S.E. of regression	3.696375	Akaike info criterion		5.562713
Sum squared resid	204.9479	Schwarz criterion		5.660739
Log likelihood	-45.28306	Hannan-Quinn criter.		5.572457
F-statistic	4.928684	Durbin-Watson stat		1.518470
Prob(F-statistic)	0.042244			

The significance level for testing this hypothesis is less than 0.05 respectively for the Extreme weather events variable, so the null hypothesis is rejected at the 95% confidence level. That is, there is a relationship between extreme weather events and gross domestic product (GDP). By looking at the t calculations and in the last column, the values of the probability level are low. Therefore, both coefficients are significantly different from zero, in other words, they are significant. The coefficient of determination of R^2 is equal to 0.547, which means that extreme weather events have been able to explain 0.447 units of changes in gross domestic product (GDP). The value of the F statistic shows the overall significance of 4.928 and in other words, the effect of the variable's significance is equal to 4.928, that is, it is needed to show the power of the regression equation in prediction. Durbin Watson's statistic, which is used to identify the independence of errors, shows a value of 1.518, which indicates the absence of autocorrelation between error components. Therefore, there is a significant relationship between the main independent and dependent variables.

5.7 Examining the assumptions of the linear regression model

There is a set of assumptions, called classical assumptions, which are discussed about the residual sentence (or model error). In order for the regression coefficient estimates to be the best estimates without linear skew in the linear regression model, it is necessary to

examine and test the assumptions of this model. Therefore, in the following, the method of testing these assumptions is stated and then the results of the estimations are explained.

5.7.1 Stability of the variance of the error term (residuals)

Another assumption of linear regression is that all remaining terms have equal variance. In practice, this assumption may not be true and for various reasons such as: the incorrect form of the model function, the existence of outliers, structural failure in the statistical population, etc., we witness the phenomenon of variance heterogeneity. To investigate this problem, various tests have been introduced by economists. In this study, the assumption of homogeneity of variance of the residuals was investigated through the Brush-Pagan-Godfrey test. The results of which in Table 9-4 show that the null hypothesis that there is no homogeneity of variance in the research models is not rejected.

Table 5-10: The results of the test of the constancy of the variance of the error sentence (F test)

MODEL	THE VALUE OF THE STATISTIC	POSSIBILITY
THE FIRST HYPOTHESIS	2.069	0.155
THE SECOND HYPOTHESIS	3.853	0.069
THE THIRD HYPOTHESIS	4.016	0.052
THE FOURTH HYPOTHESIS	3.747	0.077
THE FIFTH HYPOTHESIS	2.696	0.200

5.7.2 The normality of the error sentence

One of the important assumptions about the remaining sentence is that the distribution of its sentences is normal. In order to test the normality of the error sentence, Jarco-Bra test statistic was used. According to the obtained results, Jarco-Bra test statistic is not significant for all three models at the 5% probability level. Therefore, the null hypothesis that the error term is normal is confirmed in all models.

Table 5-11: The results of the normality of the error sentence (Jarcobra test)

MODEL	THE VALUE OF THE STATISTIC	POSSIBILITY
THE FIRST HYPOTHESIS	4/157267	0/059866
THE SECOND HYPOTHESIS	4/058090	0/065662
THE THIRD HYPOTHESIS	4/756696	0/077896
THE FOURTH HYPOTHESIS	4/963081	0/085331
THE FIFTH HYPOTHESIS	4/081393	0/102536

5.8 Summary of the chapter

This report was compiled in five chapters. The first chapter was dedicated to the general statement about the necessity of conducting research, research goals and questions, and a brief description of specialized vocabulary. In the second chapter, the theoretical foundations and background of the research and related studies were described. The method of conducting the research and explanations about the method and tools of data collection were presented in the third chapter. The results of data analysis were also presented in the form of tables and graphs in the fourth chapter. The current chapter, entitled the fourth chapter, summarizes the results of the research and discusses the results and analyzes them.

6. Discussion, conclusions and suggestions

6.1 Introduction

The current chapter, titled as the fifth chapter, gives a summary of the research results and the discussion about the results, and after a general conclusion, it describes the limitations that the researcher has faced during the implementation of this research. Finally, scientific and practical suggestions are provided.

6.2 Summary of the results of the hypothesis test

Table 6-1: Hypothesis results

Row	The title of the hypothesis	Result
1	(H1): Climate change has an impact on the economy of rural regions in selected areas of Iran.	confirmation
2	(H2): Temperature variations affect gross domestic product (GDP).	confirmation
3	(H3): Precipitation affects gross domestic product (GDP).	confirmation
4	(H4): Water consumption affects gross domestic product (GDP).	confirmation
5	(H5): Extreme weather events affect gross domestic product (GDP).	confirmation

6.3 Discussion

The results of the research showed that the first hypothesis that Climate change has an impact on the economy of rural regions in selected areas of Iran is confirmed due to having a significance level of less than 0.05, so it can be said that it is confirmed. is.

The results of the research showed that the second hypothesis based on Temperature variations affect gross domestic product (GDP) is confirmed due to having a significance level of less than 0.05, so it can be said that it is confirmed.

The results of the research showed that the third hypothesis based on Precipitation affects gross domestic product (GDP), is confirmed due to having a significance level of less than 0.05, so it can be said that it is confirmed.

The results of the research showed that the fourth hypothesis based on Water consumption affects gross domestic product (GDP) is confirmed due to having a significance level of less than 0.05, so it can be said that it is confirmed.

The results of the research showed that the fifth hypothesis based on extreme weather events affect gross domestic product (GDP) is confirmed due to having a significance level of less than 0.05, so it can be said that it is confirmed. The results of other similar studies and researches are as follows:

The study of Kalhor and Mahmoudi (2019) in Kangavar, Kayani Salmi and Amini Faskhudi (2017) in Isfahan and Zarei et al. (2021) in Bijar using the survey method in the field of social consequences of drought showed that drought causes conflict and decrease in social capital, decrease health and quality of life and increased unemployment, poverty and migration. Jamshidi (2014) in Ilam with quantitative and qualitative method and Ghanbari and Biyad (2015) in Jiroft using survey method, studied the socio-economic consequences of drought and showed that drought leads to a decrease in capital, social, income, crop, livestock and Food security and increased poverty, financial dependence, migration and isolation have resulted. The study of Namdar and Bozarjamehri (2016) in Zarin Dasht, Ainali and Shafiei (2014) in Isfahan and Bahrami and Sepri (2015) in Kurdistan using the survey method found the socio-economic and environmental consequences of drought. Drought has consequences such as destroying the environment and its resources, increasing pests and diseases, reducing plant diversity, reducing production, income, savings and social capital, as well as increasing unemployment, mental stress, migration and service jobs.

also (Jafari et al, 2014) conducted a research entitled "Evaluation of the economic effects of climate change in the agricultural sector" using the meta-analysis method and came

to the conclusion that the economic effects of climate change in the form of changes in the performance, production and supply of agricultural products and influence which has on food security and also long-term changes in climatic parameters that affect the profitability and income of farmers are revealed. .." came to the conclusion that climate change, in addition to leaving the labor force from the agriculture, horticulture and animal husbandry sector, has caused temporary and permanent migrations from the villages and the income of most households from the agriculture and horticulture sector shows a significant decrease and even the amount Production and investment in them are declining. (Esmaeli & Vaseghi, 2008) in a research entitled "Investigation of the economic effect of climate change on the agricultural sector of Iran: (wheat)" have come to the conclusion that climatic variables have significant effects and They are non-linear on the net income per hectare of wheat cultivation, so that the increase in temperature and decrease in rainfall in the next 100 years will cause a 41% decrease in the yield of wheat cultivation in the country.

The current study, while paying attention to environmental factors, deals in detail with the state of economy and gross domestic product in the studied villages, which has not been investigated in previous studies.

Unlike domestic studies, in the field of foreign studies there are many researches about the economic effects of climate change that have studied the economic effects of climate change in different dimensions, although there are various problems for research in this field and even in some dimensions of the effects Economically, measuring and evaluating the economic effects of work is considered very difficult and requires extensive studies, and even in some fields, it can be said that there is still no research to measure and evaluate the economic effects of climate changes in rural areas. In the field of foreign studies, for example, one of the most important existing researches is (Nicholas Stern, 2007) report entitled "Stern Review: Economics of Climate Change", the results of this report show that human societies are still unable to avoid the effects Irreversible climate changes have an opportunity; Although climate changes have significant economic costs, the above costs are still recoverable and this issue requires the cooperation and collective efforts of all human societies. (IPCC, 2007) in its report entitled "Climate Change: Effects, Adaptation and Vulnerability" and also in its other report 2014 entitled "Integrated Report on Climate Change" examined the issue of climate change in detail and in different dimensions on the effects The economy emphasizes climate changes in the lives of human societies

6.4 Research limitations

Always taking steps on the way to reach the goal is accompanied by limitations that make reaching the desired goal slow. Research, as a process to achieve the goal of solving the research problem, is not exempt from this. Therefore, in this part, by presenting the limitations of the research, we try to give this message to the reader so that he can act with more knowledge in generalizing the results of the research and make a fair judgment about the research process. In this regard, the limitations of the present research can be mentioned as follows:

A- The present research was conducted using the data of Isfahan city and other cities were left out of the statistical community due to the special nature of their activities, so the results obtained cannot be generalized to all cities.

B- In economic and accounting models, the analysis of the behavior of cities in the future is based on the past behavior of cities. If in uncertain and fluctuating conditions, the research results may not be valuable or may not match with reality. In fact, predicting the future based on past results is reliable if we have stability and confidence.

C- Another limitation of the research is the error of data collection by the researcher, which to some extent may be effective in creating outlier and effective observations.

Nevertheless, we believe that none of the aforementioned limitations have led to the research being damaged and the research still has good internal and external validity.

6.5 Research proposals

In this section, based on the results and findings of the research, two categories of suggestions are proposed. First, practical suggestions that are expected to help the users of accounting and financial information, especially investors and managers in decision-making, and second, suggestions for future research that can be a guide for future research on the research topic.

6.5.1 Functional suggestions

It is suggested that in order to improve the level of GDP, weather conditions should always be considered and policies based on extreme weather conditions should be considered.

It is suggested to pay special attention to the amount of water consumption in order to improve the level of GDP and always control the amount of water consumption in order to improve and increase the level of GDP.

6.5.2 Upcoming offers

It is suggested that the current research be analyzed separately for the Middle East countries and its results be compared with the current research.

It is suggested that the results of the present study be examined in a longer period of time.

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Abbreviation

GHGS: Greenhouses Gases

IPCC: Intergovernmental Panel on Climate Change

GCM: General Circulation Models

GDP: Gross Domestic Product

SLR: Sea Level Rise

SWOT: Strengths, Weaknesses, Opportunities, and Threats

Table

	GDP	TEMPERAT...	PRECIPITAT...	WATER	WEATHER
Mean	3.294118	4.235294	0.556775	0.515174	16.88235
Median	4.300000	3.000000	0.550036	0.425880	17.00000
Maximum	8.800000	9.000000	0.967213	0.978882	26.00000
Minimum	-3.700000	1.000000	0.105041	0.112238	3.000000
Std. Dev.	4.125299	2.795743	0.281761	0.298604	6.293671
Skewness	-0.427470	0.794538	-0.055120	0.215985	-0.334992
Kurtosis	1.836610	2.229125	1.705566	1.600610	2.605813

	GDP	TEMPERAT...	PRECIPITAT...	WATER	WEATHER
GDP	1.000000	-0.537989	-0.525248	-0.537926	0.497309
TEMPERAT...	-0.537989	1.000000	0.157452	0.406023	-0.545344
PRECIPITAT...	-0.525248	0.157452	1.000000	0.302931	-0.502323
WATER	-0.537926	0.406023	0.302931	1.000000	-0.391617
WEATHER	0.497309	-0.545344	-0.502323	-0.391617	1.000000

Null Hypothesis: GDP has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on SIC, maxlag=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.337916	0.0303
Test critical values: 1% level	-3.920350	
5% level	-3.065585	
10% level	-2.673459	

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

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 16

Null Hypothesis: TEMPERATURE has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on SIC, maxlag=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.390121	0.0041
Test critical values: 1% level	-3.920350	
5% level	-3.065585	
10% level	-2.673459	

*** (100%) ** (95%) * (90%)

Null Hypothesis: PRECIPITATION has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on SIC, maxlag=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.297178	0.0327
Test critical values: 1% level	-3.920350	
5% level	-3.065585	
10% level	-2.673459	

Null Hypothesis: WATER has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.212183	0.0382
Test critical values:		
1% level	-3.920350	
5% level	-3.065585	
10% level	-2.673459	

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