IMPACT OF MAJOR AGRICULTURAL PRODUCTION ON ECONOMIC GROWTH OF NEPAL

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By:

KRISHNA PRASAD SAPKOTA

Roll No.190156

TU Reg. No: 5-1-19-72-2003

Birendra Multiple Campus,

Bharatpur, Chitwan,

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DECLARATION

I, KRISHNA PRASAD SAPKOTA, hereby declare that this thesis entitled "IMPACT OF MAJOR AGRICULTURAL PRODUCTION ON ECONOMIC GROWTH OF NEPAL" submitted to Department of Economics Birendra Multiple Campus, Bharatpur, Chitwan, Nepal is my own original work unless otherwise indicated or acknowledged in the thesis. The thesis does not contain materials which has been accepted or submitted for any other degree at the University or other institution. All sources of information have been specifically acknowledged by reference to the author(s) or institution(s).

.....

Mr. Krishna Prasad Sapkota
Roll No.190156
TU Reg. No: 5-1-19-72-2003
Birendra Multiple Campus,
Bharatpur, Chitwan,

त्रिभुवन विश्वविद्यालय
TRIBHUVAN UNIVERSITY
वीरेन्द्र बहुमुखी क्याम्पस
BIRENDRA MULTIPLE CAMPUS
DEPARTMENT OF ECONOMICS
भरतपुर, चितवन
Bharatpur, Chitwan
☎:056 520253 520809 526159
Fax:056-520253

पत्र संख्या:
च.नं. (Ref.)

मिति:
Date:

LETTER OF RECOMMENDATION

This thesis entitled "IMPACT OF MAJOR AGRICULTURAL PRODUCTION ON ECONOMIC GROWTH OF NEPAL" has been prepared by Mr. KRISHNA PRASAD SAPKOTA under my guidance and supervision. I, hereby, recommend it in partial fulfillment of the requirements for the Degree of MASTER OF ARTS in ECONOMICS for final examination.

.....

Thesis Supervisor

Omkar Poudel

Assistant Professor of Economics.

Date: 20 Aug 2023

त्रिभुवन विश्वविद्यालय
TRIBHUVAN UNIVERSITY
वीरेन्द्र बहुमुखी क्याम्पस
BIRENDRA MULTIPLE CAMPUS
DEPARTMENT OF ECONOMICS
भरतपुर, चितवन
Bharatpur, Chitwan
☎:056-520253, 526159
Fax:056-520253

पत्र संख्या:
च.नं. (Ref.)

मिति:
Date:

APPROVAL SHEET

We certify that this thesis entitled "IMPACT OF MAJOR AGRICULTURAL PRODUCTION ON ECONOMIC GROWTH OF NEPAL" submitted by Mr. KRISHNA PRASAD SAPKOTA to the Department of Economics, Tribhuvan University, Birendra Multiple Campus, Bharatpur, Chitwan, in partial fulfillment of the requirements for the Degree of MASTER of ARTS in ECONOMICS has been found satisfactory in scope and quality. Therefore, we accept this thesis as a part of the said degree.

Thesis Committee

Thesis Supervisor
(Omkar Poudel)
(Assistant Professor) .....

External Examiner
Krishna Prasad Bhushal .....

Head of Department
Deepak Regmi
(Associate Professor) .....

Date: 13 Sept. 2023

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ABSTRACT

Background: Agricultural production and economic growth are closely interconnected, especially in developing countries where agriculture plays a significant role in the economy. The objective of this research is to study Impact of Major Agricultural Production on Economic Growth of Nepal.

Materials and Method: An analytical cross-sectional study was conducted to study the impact of Agricultural production on economic growth of Nepal based on secondary data 1974/75 to 2020/21. Data are be analyzed using descriptive and inferential statistical tools. In the descriptive statistics the trend of data trend analysis is done while for continuous variable, mean and standard deviation calculated. In the inferential statistics, Multiple regression was used. P-value <0.05 is considered as statistically significant. In order to interpret the data, the acquired data were analyzed by using E-views Statistical Package version 10.

Result: The trend line of major agriculture production is in increasing order except Barely. There is very high degree of positive correlation between GDP with major crops. As per the study, result of Johansen Co-integration Test supported the existence of co-integration in the model. The coefficient of VECM was negative and significant expresses that there was evidence of long run relationship.

This study's findings revealed that production of Wheat, Paddy, Maize and Barley account for 29.48% of the GDP's fluctuation.

Conclusion: The study's empirical results show that agricultural output directly affects agriculture income and employment, and they also demonstrate that agricultural production directly affects economic growth. Major crops and GDP have a very strong positive correlation, and their relationship has been found to be significant. The GDP was significantly impacted by major crops.

Keywords: Unit root test, GDP, Multi-collinearity, VECM, Co-integration test

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ACRONYMS AND ABBREVIATIONS

Acronyms and abbreviations	Full form
ARDL	Autoregressive Distributed Lag
ARIMA	Autoregressive Integrated Moving Average
EG	Economic Growth
CPI	Consumer Prices Index
GDP	Gross Domestic Product
HDI	Human Development Index
IMF	International Monetary Fund
NRB	Nepal Rasta Bank
OPEC	Organization of the Petroleum Exporting Countries
p-value	Probability value
VIF	Variance Influence factors
UNDP	United Nations Development Programmed
WTI	West Texas Intermediate

CHAPTER I

INTRODUCTION

1.1 Background of the study

Agricultural production refers to the process of growing crops and raising livestock for food, fiber, and other products. It involves a wide range of activities, including preparation of land, planting, harvesting, animal husbandry, and processing. Agricultural production is essential for feeding the world's population and providing raw materials for various industries (Chhetri & Dhakal, 2020). The methods of agricultural production vary depending on factors such as climate, soil type, availability of water, and technology. Traditional methods involve manual labor and simple tools, while modern agriculture employs advanced technologies such as genetically modified crops, precision farming, and automated machinery (Lawal, 2011). Agricultural production has a significant impact on the national economy, and sustainable practices are becoming increasingly important. Sustainable agriculture aims to produce food while minimizing the negative impact on the environment, promoting biodiversity, and supporting the economic and social well-being of farmers and rural communities (Awan, 2015). Overall, agricultural production plays a crucial role in our lives and the world's economy. It provides food, fiber, and other products essential for our survival and contributes to the growth and development of various industries.

Agriculture has been a major sector in most developing nations' national economies (Mongues et al, 2012), and it plays a vital role in nearly all social and economic activities of any country (Lawal, 2011). On the other hand, discovered that people in developing countries who rely on agriculture for a living are typically much poorer than people who work in other sectors of the economy, and that they represent a significant share, often the majority, of the total number of poor people in the countries where they live in thirty years. Agriculture may provide jobs, food security, and raw resources for agro-based enterprises. Agriculture is most important part of global economic growth, poverty reduction, and environmental sustainability because 75% of the world's poor live in rural regions and depend mostly on farming (Cervantes-Godoy, 2010). In most low-income countries like Nepal, agriculture is still the most significant productive sector, typically in terms of its percentage of the Gross Domestic Product (GDP) and

nearly always in terms of the number of people it employs, and it is essential to meeting global poverty reduction objectives (UNDP, 2012).

Agricultural production is the major backbone of national economy in the developing countries like Nepal. More than 80% peoples are in rural areas, who are involved on it and is a major source of livelihoods (Chhetri & Dhakal, 2020). The development of agricultural production involves improving the efficiency and productivity of agriculture to meet the growing demand for food and other agricultural products as well as raw materials for industry. Any country's expansion and development are largely depending on the expansion of agricultural production. Industrialization requires the development of the agricultural sector because it creates a home market for industry, raises rural incomes, provides industrial raw materials, and most importantly, releases resources to support the industry (Timmer, 2004). Ignoring the agricultural area in favor of industry would just result in slow economic development and wealth disparity. Despite the fact that agriculture may not be able to change an economy on its own, it is a required and adequate precursor for initiating industrialization in the early stages of expansion (Byerlee, et al., 2005).

The agricultural sector, its expansion, and agricultural production have traditionally been seen as essential preconditions for economic success in developing nations like Nepal. It is a significant driver of economic growth in Nepal, accounting for 32% of GDP growth (large share of GDP) (Paudel & Acharya, 2020). It directly affects farmer income and helps to advance economic growth in sectors other than agriculture, creating additional employment and stimulating the economy (Byerlee, & Sadoulet, 2009). Growing agricultural productivity boosts farm earnings, expands the food supply, brings down food costs, and generates additional employment possibilities (Reardon et al., 1998). Agriculture's ability to provide enough food to feed the entire nation creates jobs, and advance development all contribute to economic prosperity. Industry helps a nation's economy grow by supplying food and raw materials to non-agricultural businesses, which increases demand for the products made in other industries (Kulshrestha & Agrawal, 2019).

Awan (2015) emphasizes that the basis of Nepal's economy is agriculture. Nepal is endowed with a variety of natural resources. Nonetheless, a big amount of arable land is the most significant aspect of our national riches. With the greatest and largest

irrigation system in the world and fertile land, Nepal can produce a wide range of agricultural products. Hence, it serves as a foundation for economic growth. According to, Awan (2015) agriculture contributes to economic development in a variety of ways, including as a source of food, an economic activity, and a provider of environmental services. This makes the agricultural sector a special sector for a nation's economic development. Overall, agriculture production is essential for a nation's economic, social, and environmental well-being. A strong agriculture sector can provide food security, employment, economic growth, rural development, environmental sustainability, and national security. The importance of agriculture in most developing nations means that it cannot be ignored in initiatives intended to support early economic growth. Increased job prospects in rural regions, decreased regional income inequalities, halted premature rural-urban migration, and eventually reduced poverty at its root might all result from the sustainable promotion of the rural economy (Adhikari, 2002). For the early phases of industrialization, agriculture's input of food, raw materials, and financial surplus (including foreign exchange for investment) is crucial. The industrial revolutions that swept the temperate globe, from Japan in the late 19th century to England in the middle of the 18th century, were preceded by agricultural development (UNDP, 2012). By boosting agricultural production and lowering the cost of the staple food. So, it is consider as part of the green revolution, which can assure food security and eliminate poverty. This will result in an increase in supply and a decrease in pricing. A significant limitation of the nation in accomplishing the goals of food security and poverty reduction is its historical failure to prioritize and promote food production. Poverty is mostly a result of inefficient agriculture. The effects of agricultural growth on the poor can be either direct, such as increased agricultural earnings, or indirect, such as effects on employment, wages, product pricing, and non-farm asset productivity (Paudel & Acharya, 2020).

Adhikari, (2002) mentions that during the people's movement-II in 2005/06, the agriculture sector contributed close to 35% of GDP. Despite the fact that different initiatives were attempted to enhance agricultural productivity in succeeding years, the sector's contribution to GDP remained between 32 and 36 percent (Chhetri et al.,2020). According to early projections, agriculture's contribution to GDP in the current fiscal year 2011/12 would be 35.68 percent, down from a revised estimate of 37.47 percent in the previous fiscal year. GDP is predicted to climb by 4.56 percent at constant prices

in the current fiscal year, while the agricultural sector's growth rate is expected to stay somewhat higher at 4.93 percent. This fiscal year's agricultural production is expected to be while the agricultural sector is predicted to increase at a slightly faster rate of 4.93 percent. Agricultural Production in the current fiscal year is expected to be 0.46 percent higher than in the previous fiscal year (Chhetri et al.,2020).

1.2 Statement of the Problem

Agricultural production is of great significance for Nepal's economy and for Nepalese population. Agriculture is a major sector of the Nepalese economy, contributing around 28% of the country's GDP and employing about 70% of its workforce (Economic Survey, 2020/21). It is the backbone of the rural economy, which constitutes most of the country's population. Also, Nepal is a predominantly agricultural country, with more than 80% of the population depending on agriculture for their livelihood (Chhetri et al.,2020). According to recent statistics, Nepal's economic growth rate is the lowest among its neighbors. From the last few decades, the annual per capita GDP growth is not significantly improved. With rising food costs and decreasing and diminishing monsoon rainfall during the last two years the economy has performed even worse. The expansion of the agricultural sector, which provides the majority of Nepal's impoverished with a means of subsistence. Agriculture provides food for the people, and hence it is crucial for ensuring food security and reducing hunger in the country. It is also an important source of exports for Nepal, with products like tea, cardamom, ginger, coffee, and lentils being major exports. The country's agricultural exports play a significant role in earning foreign exchange and contributing to the country's balance of payments and has the potential to reduce poverty and improve the living standards of the rural population. By increasing agricultural productivity and income, farmers can improve their livelihoods, and this can have a positive impact on the overall economy of the country. Agriculture in Nepal is mostly rain-fed and organic, which means that it is environmentally sustainable. Promoting sustainable agriculture practices can help protect the environment and maintain the soil fertility for future generations. So, agriculture plays a vital role in Nepal's economy, food security, exports, poverty reduction, and environmental sustainability (Paudel & Acharya, 2020).

The agricultural sector, its expansion, and agricultural production have traditionally been seen as essential preconditions for economic growth in developing nations like Nepal. Many studies have been undertaken, and indicated that agricultural output is a dominant requirement. Despite significant technological advancements in the agricultural sector over the past few decades, farmers' standard of living has not increased (Bandaru, 2019). The government has also implemented a new policy of regulated agricultural markets. The goal of adopting all the changes was to boost agricultural productivity in order to make the nation self-sufficient in agricultural production, as well as to create jobs in rural regions and advance rural development, all of which were intended to contribute to economic growth. According to information on Nepal's rural development, it is crucial to boost agricultural output and create job possibilities in the countryside. It will result in more adequate food supply and a decrease in the importation of food products into the nation. Also, when agricultural output is in surplus, there will be more foreign money available for the country's industrial and services sectors to flourish. Economic expansion in Nepal is inevitable. As a result, the expansion of agriculture can serve as the catalyst for significant changes in the functioning of the Nepalese economy. Broad-based development in agricultural earnings is crucial in nations where agriculture accounts for a significant portion of total employment in order to promote growth across the board, particularly in non-agricultural industries that cater to rural consumers. It follows that the capacity of agriculture to spur total GDP development and its comparative advantage in eradicating poverty would differ from one country to the next.

The foundation for the nation's overall development is the agriculture sector. The industry is essential to raising the standard of living for Nepalese citizens, boosting income, and reducing poverty. Current research regularly demonstrates that poverty reduction is greatly aided by agricultural expansion. Growth in the agricultural sector's Gross Domestic Product (GDP) is nearly two times more effective in reducing poverty than growth outside the industry. Rural poverty was significantly reduced in several nations with comparatively rapid agricultural development rates. So, the study will be milestone for future agriculture planning.

The agriculture industry is vital to the Nepalese economy since it still generates more than one-third of Nepal's GDP and employs more than two-thirds of the country's

population. Lack of necessary knowledge, skill, technology, and entrepreneurship to change the existing traditional agricultural system to a commercial farming system not only confines farmers to subsistence farming, but also causes underemployment and hidden unemployment. Factors such as easy access to irrigation facilities on agricultural lands, improved seed and seedlings, chemical fertilizers, pesticides, agricultural loans, advanced farming technology, and farmers' access to technology and knowledge all play an important role in mitigating this problem and increasing agricultural output. However, according to prior year statistics, the addition of irrigation facilities, agricultural finance, chemical fertilizers, better seeds, and seedlings has not been adequate. Due to substantial changes in the supply of such inputs, farmers continue to be hesitant to take risks due to the uncertainty in the availability and accessibility of these inputs, which has a direct influence on agricultural productivity.

1.3 Significance of the study

Many studies have examined the relationship between agricultural output and GDP, particularly in developing nations. Yet, because there is a lack of empirical research on the effect of agricultural production on growth in Nepal. In order to show the sector's contribution to the economy and to help design policies that would support it, this research will be essential. Moreover, research on Nepal's agricultural productivity is interesting from a policy and scholarly perspective. As a result, if agricultural output does eventually have a noticeably bigger influence on growth, it would further highlight the need to optimize other production and offer more support for state-owned enterprises' agricultural production. Major agricultural production has a significant impact on economic growth through employment, income generation, export earnings, food security, input supply, infrastructure development, and technology advancement. Therefore, the promotion of the agricultural sector is crucial for sustainable economic growth, particularly in developing countries. The study will add significant body of knowledge on how agricultural production impact on economic growth of Nepal.

1.4 Research hypothesis

i. Null hypothesis: Major agriculture crops production has no impact on economic growth (GDP) of Nepal.
ii. Alternative hypothesis: major agriculture crops production has an impact on economic growth of Nepal.

1.5 Research question

i. What is the trend of GDP and major agriculture crops production (Paddy, Maize, Wheat, Millet and Barely)?
ii. Does the gross domestic product depend on major agriculture crops?

1.6 Objectives of the study

The main objective of the study is to find the impact of major agriculture production (Paddy, Maize, Wheat, Millet and Barely) on economic growth of Nepal.

1.6.1 General objective

i. To examine the impact of major agriculture crops production on economic growth of Nepal.

1.6.2 Specific objectives

i. To study the trend of major agriculture production (Paddy, Maize, Wheat, Millet and Barely) and economic growth (GDP) in Nepal.
ii. To Analyze the relationship between gross domestic products with major agriculture product of Nepal.

1.7 Limitations of the Study and Scope for Further Research

The study was constrained since it only employed secondary data taken from the economic survey of Nepal for the chosen for 1974/75 to 2020/21 time period, hence the validity of the study depended on the caliber of the data. Multiple regression analysis was used in this study as one of several econometric approaches to determine the connection between the dependent and independent variables.

For the analysis, the study is further constrained by the fact that only five significant crops were chosen, and their effects on economic growth over the previous 47 years are determined. Notwithstanding its shortcomings, the current study offers farmers, academics, merchants, and politicians a chance to properly and effectively implement agricultural policies for increasing the agricultural production in Nepal.

1.8 Organization of the Study

i. This research was divided into following five different chapters.
ii. The first chapter focuses on introduction, which includes the history, problem statement, aims, importance, and limitations of the study.
iii. The second chapter is a review of the literature that includes empirical data on agricultural productivity in both the national and international contexts.
iv. The third chapter discusses the study technique, which includes the research strategy, data type, and data sources. This chapter also explains the multiple regression analysis model and other data analysis tools and procedures.
v. The chapter four is related with the presentation and analysis of data where the overall trend of GDP and major crops of agriculture production (Paddy, Maize, Wheat, Millet and Barely).
vi. The last chapter, chapter five, includes a summary of the results, a conclusion, and suggestions. Lastly, the thesis concludes with a bibliography.

CHAPTER II

REVIEW OF THE LITERATURE

Theoretical analysis, concepts, opinions, and ideas concerning agricultural productivity and economic growth are shown in this chapter along with an empirical analysis. The purpose of a literature review is to evaluate papers that were discovered in the literature that was relevant to the investigation. This literature should be described, summed up, assessed, and made clear in the review. It ought to provide a theoretical framework for the study and assist us in defining the parameters of our own investigation. Instead of attempting to compile a huge number of works that are not as directly related to our issue area, choose a small number of works that are essential to our field.

2.1 Review of Empirical Studies

The role of financial development for agricultural production has been a topic of discussion since the time of the industrial revolution. During this period, the importance of finance became intertwined with economic activities in society. Gurley and Shaw (1955) argued that the agricultural sector, referring to the production of goods and services, cannot progress without a well-functioning financial sector. In 1973, McKinnon and Shaw further emphasized the role of agricultural development in economic growth. According to their perspective, a robust agricultural system is necessary for fostering economic growth. However, Buffie (1984) presents a contrasting view regarding the relationship between agricultural development and economic growth.

The study conducted by Awokuse & Xie in 2015 explored the dynamic relationship between agricultural productivity and economic growth. It specifically examined the association between agricultural production and economic growth using time-series analysis of 15 developing and transition economies in Latin America, Asia, and Africa.

To investigate this relationship, the researchers utilized various economic variables, including exports, agriculture value added per worker, real GDP per capita, population as a proxy for labor, and gross capital formation per worker as a proxy for capital. These variables were sourced from the World Bank Development Indicators and the International Monetary Fund (IMF) for the time period spanning 1971 to 2006.The

findings of the study indicated that agriculture plays a crucial role in fostering economic growth. Furthermore, the research suggested that trade openness had a positive and favorable impact on GDP per capita.

Awokuse et al. (2009) attempted to investigate the dynamic interaction between agricultural productivity and economic growth in general, using time series analysis of fifteen developing and transition economies in Latin America, Asia, and Africa to discover the relationship between agriculture and economic growth. Real export, agriculture value added per worker, real GDP per capita, population as a proxy for labor, and gross capital formation per worker as a proxy for capital were the economic variables. Data were gathered from World Bank development indices and worldwide monetary systems from 1971 to 2006. The auto regressive distributed lag model and co integration were used to determine the empirical connection between variables.

Awan et al. (2014) aimed to analyze the influence of major macroeconomic variables on economic development in Pakistan following the SAP structural adjustment program and to identify some of the required conditions for sustained economic development in Pakistan. As economic variables, annual inflation, GDP per capita, financial openness proxies by foreign direct investment, credit to the private sector as a proportion of GDP for financial development, and trade openness as exports + imports / GDP were used. The empirical association between variables was discovered using an auto regressive distributed lag model. The findings indicate that some of the causal conditions for sustained economic success in Pakistan exist following the Structural Adjustment Program. The ARDL F-statistics confirm the long-term connection. The development of the financial sector, trade openness, and remittances were favorably connected with the country's economic development; inflation and economic growth were adversely correlated in the country.

Awan (2012) attempted to assess the growth of Pakistan's agriculture sector and total factor productivity of agriculture growth from 1971 to 2006 using the Tornqvist-Theil index number approach. The inputs employed in the creation of the agriculture input index were labor, land, fertilizer offtake, capital, fodder, wheat, and pesticide use, while the output categories for index measurement were minor crops, major crops, and key vegetables and fruits. Data for the outputs and inputs categories were gathered from several issues of Pakistan's Economic Survey and agriculture statistics. The results

demonstrate that total factor productivity growth rate was lowest during the 1970s decade and highest during the last six years of the research, from 2001 to 2006, at 2.86 percent. According to the findings, the proportion of total factor productivity increase in total agricultural production growth was 33 percent in the last six years of the research and 83 percent in the first six years.

Kannan and Sundaram (2011) studied the trends and patterns in the expansion of the agriculture production. To examining its causes of agricultural production in India. There has been a substantial movement away from the production of food grains and toward commercial crops in India's cropping pattern. The study also showed a positive correlation between dependent and explanatory factors in the agricultural production growth model.

Ahmad (2001) evaluated output growth in terms of input growth and total factor productivity, taking into account technological progress and technical efficiency. The study made use of 34 district-level data sets from Punjab, encompassing the year of (1991 to 1999). Variables include crop area in acres not irrigated, crop area irrigated, total fertilizer, rainfall in inches, short term loan by ADBP, and long-term loan by ADBP. Agricultural statistics, the Agricultural Development Bank of Pakistan, and Punjab development statistics were used to compile the data. To estimate the data, OLS estimates, fixed effect approaches, and random effect techniques were applied. The results reveal that farm size has a favorable relationship with technical efficiency and total factor production. It was stated that saving the economy from output price volatility requires active engagement.

According to Cao and Birchenall (2013), China's post-reform economic development and sectoral reallocation were mostly determined by agricultural production. In terms of agricultural production in China, the study found the association between agricultural production, economic growth and labor redistribution.

Awan and Anum (2014) conducted research to look at the factors affecting the agricultural sector and the interdependence between agricultural economic development and gross domestic product. By taking 31 observations from 1980 to 2010. Growth in the economy and in agriculture were taken into consideration in the research using the World Bank and Pakistani Meta data. The analysis revealed that there is a

strong and positive correlation between GDP growth and agricultural production. This research argued that the expansion of agriculture was crucial for the nation's economic development. According to Oyakhilomen and Zibah (2014), Nigeria's agricultural production and economic growth are positively associated.

A study was conducted to show the role of the agricultural production in economic growth, by Gilbert, & Divine (2013) conducted research to find the association between agricultural production in economic growth for Cameroon. This research was conducted using 30 years data to find the correlation between agricultural production and economic growth. This research concluded that agricultural production and economic growth implying that increases in agricultural production ratio boost economic growth. This research also showed that if we increase agricultural production by one unit then economic growth will be increased by 1.4 unit.

A neoclassical growth theory was used by Craumer (2003) to find the relationship between agricultural production and economic growth using Co-Integrated Vector Autoregressive model. This research highlighted that between 1963 and 1993, agricultural production underpinned Tunisia's economic expansion.

Research was done by Patnaik (1995) using the same methodology as Ghali (2017) used for Sudan. This research found that agricultural production had positive impact on economic growth.

A pooled time series cross section data was used by Noula, et al., (2013) using long time period data from 1970-1990. This research showed that there is a positive contribution of agricultural production to economic growth. This research also highlighted that agricultural production had larger impact on economic growth especially during the 1980s.

Research conducted by Yusuf (2018) showed that agricultural production had positive contribution on economic growth especially for nine major Latin American countries. Research conducted by Ayeomoni and Aladejana (2016) showed that agricultural production plays a vital role in South African countries for long-term stabilization policies. Nefedova (2017) conducted research by taking Sub-Saharan Africa data from 1981-1997. This research found that agricultural production is large and statistically significant with economic growth. Another study was also conducted by Easterly and

Rebelo (1993), which showed that agricultural production significantly associated with economic growth.

However, Adam (2018) also conducted research in Ethiopia economy. This research found that agricultural production positively contributed to economic growth.

Stead (2018) conducted research in Ethiopia using data from 1981 to 2000 to analyze the relationship between impacts of agricultural growth in real GDP using Harrod-Domar growth model and found a positive correlation between production and GDP growth rate. This research also suggested that investment on exports and capital inflow helps to promote economic growth.

There are prospects for enhanced agricultural output and marketing through modernization and commercialization despite significant limitations including challenging terrain, limited connection, and landlocked situations. Nepal is fortunate to be close to large markets in India, Bangladesh, and China as well as a variety of agro ecological zones. The hills have a comparative advantage in a range of crops, including off-season vegetables, temperate and subtropical fruits, cash crops like tea and coffee, seed production, and spices, but the mountains have a natural edge in livestock and medicinal plants. Food production, as well as the cultivation of fruits, vegetables, oilseeds, and cash crops, has considerable potential in the Terai's flatlands. By reducing farm level yield gaps through increased use of improved technologies, inputs (fertilizers), credits, irrigation facilities, and improving rural roads, electricity, communication, and marketing facilities, there is currently a significant potential to increase production, productivity, and income of farmers. More than 60% of the country's cultivated land is occupied by no more than 25% of the rural population who own more than one hectare of arable land. This group might be in a position to fund investments in industrial agriculture (CBS, 2001).

Agricultural production is the major backbone of national economy in the developing countries. More than 80% people’s major source of livelihoods is agricultural production (Chhetri et al., 2020). For industrialization every country requires the development of the agricultural sector because it creates a home market for industry, raises rural incomes, provides industrial raw materials, and most importantly, releases resources to support the industry (Timmer, 2004). Despite the fact that agriculture may

not be able to change an economy on its own, it is a required and adequate precursor for initiating industrialization in the early stages of expansion (Byerlee et al., 2005). Awan (2015) emphasizes that the basis of Nepal's economy is agriculture. Nepal is endowed with a variety of natural resources. Nonetheless, a big amount of arable land is the most significant aspect of our national riches. With the greatest and largest irrigation system in the world and fertile land, Nepal can produce a wide range of agricultural products. The industrial revolutions that swept the temperate globe, from Japan in the late 19th century to England in the middle of the 18th century, were preceded by agricultural development (UNDP, 2012). The effects of agricultural growth on the poor can be either direct, such as increased agricultural earnings, or indirect, such as effects on employment, wages, product pricing, and non-farm asset productivity (Paudel & Acharya, 2020). Despite significant technological advancements in the agricultural sector over the past few decades, farmers' standard of living has not increased (Bandaru, 2019). A study on such a regulated agricultural market conducted by Rehman (2020) revealed that farmers had a favorable opinion of the markets.

Adhikari, (2002) mention that during the people's movement-II in 2005/06, the agriculture sector contributed close to 35% of GDP. Despite the fact that different initiatives were attempted to enhance agricultural productivity in succeeding years, the sector's contribution to GDP remained between 32 and 36 percent. According to early projections, agriculture's contribution to GDP in the current fiscal year 2011/12 would be 35.68 percent, down from a revised estimate of 37.47 percent in the previous fiscal year. GDP is predicted to climb by 4.56 percent at constant prices in the current fiscal year, while the agricultural sector's growth rate is expected to stay somewhat higher at 4.93 percent. This fiscal year's agricultural production is expected to be while the agricultural sector is predicted to increase at a slightly faster rate of 4.93 percent. Agricultural Production in the current fiscal year is expected to be 0.46 percent higher than in the previous fiscal year.

In many respects, the agricultural industry may be harmful to the environment. Indeed, the growing demand for agricultural products, increased domestic food production by fewer individuals due to rural exodus, and the need for nontraditional export products as a means of increasing income and earning valuable foreign currency for the country

drive farmers to seek alternative agricultural methods to increase productivity (Andreatta, 1998).

2.2 Research gap

There is very limited literature related to the agriculture production and GDP in the context of Nepal. Previous studies are not particularly based on the Nepalese agriculture production using econometric tools. This study has explored the literature gaps and added a value on the existing literature by exploring the significance of the relationship between agricultural production and economic growth in Nepal using econometric model. More over most studies used previous data and did not include the latest on the topic. Therefore, this study provided an update to previously conducted studies. This implies that this study addressed both timeframe gap and economic reform problems, as combining both regulated and deregulated eras in a study may cause spurious result.

CHAPTER III

RESEARCH METHODOLOGY

Methodology is a tool that is employed as a device or apparatus that is required to complete this research. Although it does not outline precise procedures, it does list a number of steps that must be taken for soulful research. These procedures make up a broad framework. They might be merged, divided up into smaller processes, or their order could be altered. Yet, these procedures must be used in some capacity during each task activity. The output of main agricultural crops has been used to measure agriculture more thoroughly. According to the goals, the study has given a lot of attention to how farm output affects economic growth and real GDP of Nepal.

3.1 Type of study

This research is based on quantitative information so, this research is quantitative research.

3.2 Research design

The descriptive and analytical method was used in this research, which was designed as a quantitative study. To quantify the effects of independent variables on the dependent variable, secondary data was employed to measure the variables. In order to interpret the data, the acquired data was analyzed using E-views statistical package version 10.

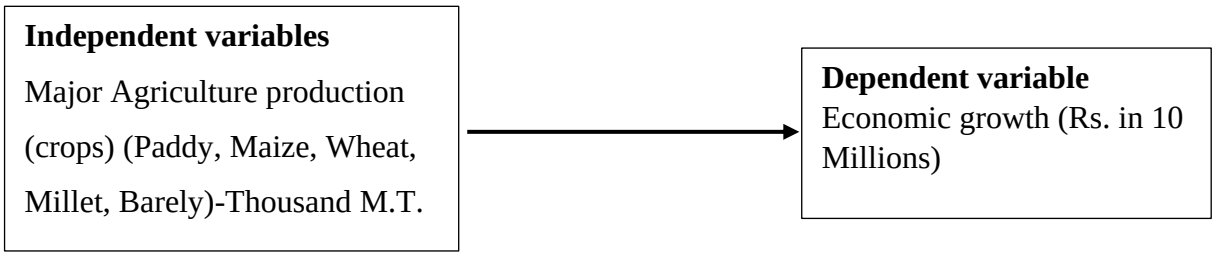
3.3 Conceptual framework of study variables

Dependent variable:

Economic growth (Real GDP) (Rs. in 10 million)

Independent variables:

Major agriculture crops production (Rice, Maize, Wheat, Millet and Barely) (in Thousand M.T.)



$LNRGDP=\beta\ 0 + \beta\ 1\ t + \beta\ 2\ LNPADDY + \beta\ 3\ LNMAIZE + \beta\ 4\ LNWHEAT + \beta\ 5\ LNBARLEY + \beta\ 6\ LNMILLET + et$

Where,

LNRGDP = Natural Logarithms of Real Gross Domestic Product

LNPADDY= Natural Logarithms of production of paddy

LNMAIZE= Natural Logarithms of production of maize

LNWHEAT= Natural Logarithms of production of wheat

LNBARLEY= Natural Logarithms of production of barley

LNMILLET= Natural Logarithms of production of millet

et= error term

βi= constant coefficient

3.4 Sources of data

This thesis is entirely based on secondary data and is both descriptive and analytical in nature. The report does not use any primary data, so there is no questionnaire or other primary data collection equipment. As per the objectives of the study, available books, journals, annual reports of agriculture production, and Nepal Rastra Bank have been used. For the study of major agriculture production, the data related to Major crops and GDP from 1974/75 to 2020/21 had been taken from economic survey of Nepal (Published by MoF), Ministry Finance of Nepal and Quarterly Economic Bulletin, Nepal Rastra Bank.

3.5 Data Processing

The researcher used secondary data for this study. Therefore, there was no need for extensive data processing as in the case of primary data collection. The researcher employed techniques such as tabulation, pie charts, various graphs, bar diagrams, and charts to simplify and facilitate understanding of the data, as per the specific requirements of the study.

3.6 Econometric Method

For the time series method studies, the following procedures were used to test for the determinants of GDP:

3.6.1 Stationery Test

The majority of time series econometric techniques were built upon the assumption that the time series variables were stationary. Therefore, standard estimations and test procedures were applied in the dynamic time series model. As the first step, it was necessary to examine the stationary property of each series.

A crucial concept in time series analysis is a stationary series. It was evident that not every time series encountered in the study was stationary. A stationary series is one in which its fundamental characteristics, such as mean and variance, remain constant over time. The series that were found to be non-stationary were considered to be integrated of order one, denoted as I(1), indicating the presence of unit roots. To make these non-stationary data stationaries, they were modeled in first difference (Δyt = yt - yt-1). By differencing the data, the non-stationary series were transformed into stationary series, allowing for the application of the chosen time series econometric techniques in subsequent analyses. (i) No constant no trend model for unit root test

$$\Delta y_t = \varphi^* y_{t-1} + \sum_{i=1}^{p-1} \varphi_t \, y_{t-1} + u_t$$

(ii) Constant and no trend model for unit root test

$$\Delta y_t = \beta_0 + \varphi^* y_{t-1} + \sum_{i=1}^{p-1} \varphi_t \, y_{t-1} + u_t$$

Where ,

$\Delta y_t = Value\ of\ variable\ at\ time\ period\ t$

$\Delta y_t = y_t - y_{t-1}$

$\beta_0 = Constant\ term$

t = Linear time trend

$u_t = Error\ tertm$

The basic objective of this test is to examine null hypothesis and alternative hypothesis below in above equations three models.

$$H_0: \varphi^* = 0 \rightarrow \text{Series contains a unit root}$$

$$H_1: \varphi^* < 0 \rightarrow \text{Series is stationary}$$

To test for the presence of a unit root, we need to calculate the T statistic $\tau = \frac{\varphi^*}{\sqrt{var(\varphi^*)}}$and then compare it to the corresponding critical value at different significant levels. If the null hypothesis was rejected, it was concluded that a series y_t, which included drift and trend, did not contain a unit root. The term used to describe a series with a unit root process is "integrated to the order one," commonly denoted as I(1). On the other hand, a stationary process is referred to as an I(0) process. This terminology is widely used to categorize time series based on their stationarity properties.

3.6.2 Autocorrelation Test

The study analysed the correlation between a variable's present value and its historical values, which is commonly referred to as autocorrelation, lagged correlation, or serial correlation. When autocorrelation was detected in the model's residuals, it suggested that the model might have been incorrectly specified or in some sense wrong. One possible reason for this could be the absence of a crucial variable or set of variables from the model. To test for autocorrelation in this study, the Breusch-Godfrey Lagrange multiplier test was employed. This test is commonly used to assess the presence of autocorrelation in the residuals of a model.

3.6.3 Test of Normality

The Normality tests were used in statistics to examine whether the data set was well-modeled by a normal distribution and to calculate the likelihood that a random variable underlying the data set would be normally distributed. In this study, the Jarque-Bera test was utilized to determine the normality of the data. The Jarque-Bera test measures how well the sample data fit a normal distribution in terms of skewness and kurtosis.

At the 5% significance level, a result of 1 indicated that the null hypothesis was rejected, suggesting that the data were not distributed according to a normal distribution. A value of 0 would indicate that the data were normally distributed, meeting the assumptions of a normal distribution.

3.6.4 Test of Heteroskedasticity

Heteroskedasticity was a situation in which the variability of a variable was unevenly distributed throughout the range of values of a second variable that predicted it. This violation of the assumption of homoscedasticity could impact the validity of econometric analysis, particularly in linear regression modeling. The problem with heteroskedasticity arises because ordinary least squares (OLS) regression assumes that all residuals are drawn from a population with a constant variance. When heteroskedasticity is present, the assumption of constant variance is violated, and it can lead to biased and inefficient regression estimates.

3.6.5 Co-integration Test

If we regressed the non-stationary variables X on the non-stationary variables Y, the "Spurious Regression" could arise, which would lead to incorrect estimation of the result. However, there existed one exception that was if two or more than two time series variables were non-stationary themselves but a linear combination of them was stationary. In this case, the series were said to be co-integrated. This technique examined the correlation between non-stationary time series variables. In practice, many economic time series variables that contained unit roots moved together over time and the variable under consideration might have drifted away from equilibrium for a while, but there existed some forces on the series that made them converge upon some long-run value. Hence, the Co-integration test was conducted to know the nature and

degree of the long-run relationship between the variables. There were various tests regarding co-integration such as the Engle-Granger Residual-based test and the Johansen Co-integration test.

The Engle-Granger Residual-based test was not appropriate if there were more than two variables under consideration or the multivariate time series model. This was because there might have existed more than one co-integrating relationship in the case of a multivariate time series model. For such situations, an alternative multivariate technique of co-integration, the Johansen Co-integration test, was used. In this study, there were eight time series variables, so the Johansen Co-integration test was carried out.

The Johansen co-integration tests and estimations were carried out by restricting a vector autoregressive (VAR) model. It was supposed that a set of n variables (n≥2) were non-stationary and integrated to order one, i.e., I(1), then they were thought to be co-integrated. A vector autoregressive (VAR) model with k lags containing these variables could have been set up as:

$$Y_t = \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + \beta_3 Y_{t-3} + \dots\dots\dots\dots\dots\dots + \beta_k Y_{t-k} + u_t$$

Where,

$$Y_t = N \times 1 \; column \; vector \; of \; dependent \; variables \; which \; are \; I(1)$$

$$u_t = N \times 1 \; column \; vector \; of \; error \; terms$$

3.6.6 Vector Error Correction Model

The co-integration test only considered the long-run relationship or long-run linkages between the level series of variables, whereas the Vector Error Correction Model (VECM) was developed to measure any dynamic adjustment between the first differences of the variables. It was conducted to determine the nature and degree of temporal causality between the variables. A vector error correction (VEC) model was a restricted VAR designed for use with non-stationary series that were known to be co-integrated.

3.6.7 Long Run and Short Run Relationship

Since there was a long-run association between the variables, the vector error correction model could be applied.

3.6.8 Test of Multicollinearity

Multicollinearity is a statistical term that refers to a high degree of correlation among two or more predictor variables in a multiple regression model. In other words, it occurs when independent variables in a regression model are highly correlated with each other, making it difficult for the model to determine the separate effect of each independent variable on the dependent variable. Multicollinearity can lead to several problems. Unreliable and unstable regression coefficients: When two or more independent variables are highly correlated, the regression coefficients become unstable, making it difficult to interpret the effects of each independent variable. It is important to check for multicollinearity before building a multiple regression model, as it can have a significant impact on the validity and reliability of the model's results (Gujarati, 2004). The Multicollinearity among the independent variables (five major crops Paddy, Maize, Wheat, Millet and Barely) were checked by using variance inflation factors (VIF).

3.6.9 Trend line

A trend line is a line that is used to represent the general direction of a set of data points in a graph or chart. It is also known as a line of best fit or regression line. The purpose of drawing a trend line is to help identify the underlying trend or pattern in the data, which can then be used to make predictions about future values. There are different methods for calculating trend lines, but the most common is linear regression, which involves finding the line that minimizes the distance between the data points and the line. Trend lines can be useful for identifying long-term trends and for making forecasts based on historical data. However, it's important to remember that trend lines are not always accurate predictors of future values and should be used in conjunction with other analysis tools and techniques (Gujarati, 2004).

3.7 Data analysis plan

First of all, the data was be collect from secondary sources. Then collected data was check for completeness, accuracy and then entered and analyzed by using SPSS 20. For econometric analysis Eviews software was used. Data was be analyzed using descriptive and inferential statistical tools. In the descriptive statistics to show the trend of data trend analysis was done. While for continuous variable mean and standard deviation was be calculated. In the inferential statistics to Multiple regression was used. P-value <0.05 was be considered as statistically significant.

3.8 Software Used for the Analysis

It is nearly impossible to meet the objectives of the study without the use of appropriate computer software. In order to generate the result related to the research objective SPSS-20 and EViews-10 were used for data analysis purpose.

CHAPTEER IV

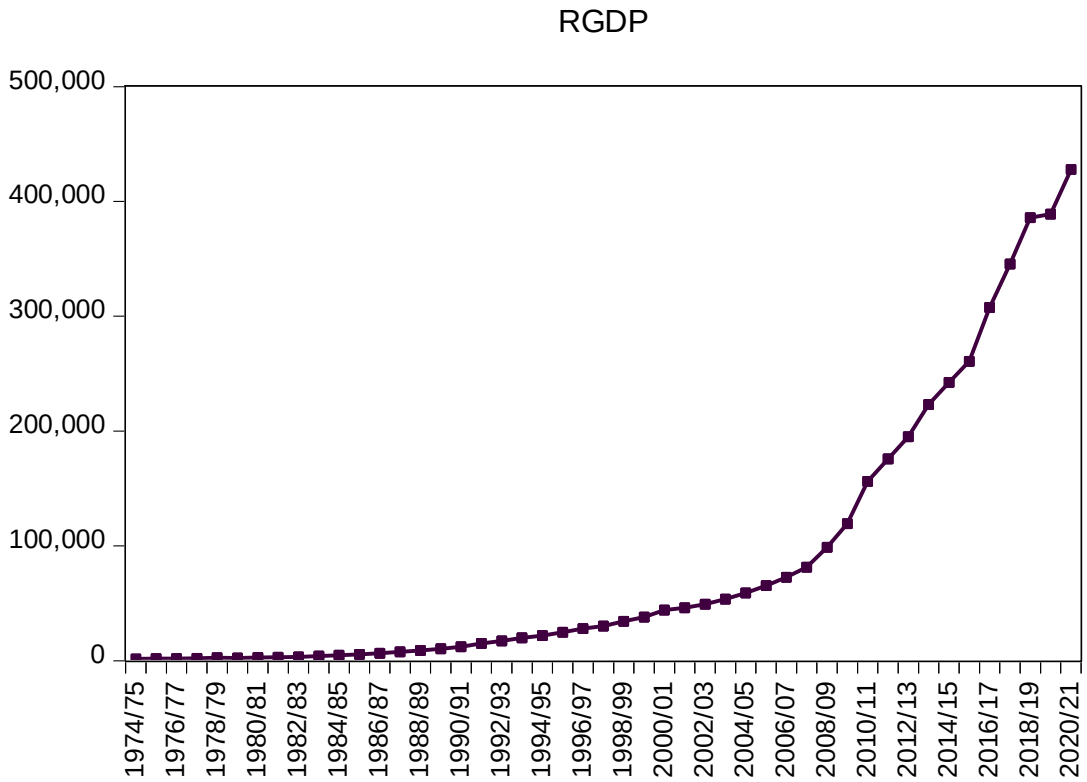
DATA ANALYSIS AND INTERPRETATION OF DATA

The chapter deals with the analysis and interpretation of data regarding Impact of Major Agricultural Production (Crops) on Economic Growth of Nepal. Presentation and Analysis In this section of the study, the presentation and analysis of data has been done for meeting the objectives stated earlier. Collected data are first presented in systematic manner in tabular and graphical forms and then analyzed by different statistical tools. Multiple linear regression and time series modeling has been used to analyze and interpret the findings of the study.

4.1 Descriptive statistics of data (Trend line)

In the descriptive statistics data was first presented using graphical tools. In order to study the pattern of particular variable tend line was draw. This shows whether the values are in increasing or decreasing trend.

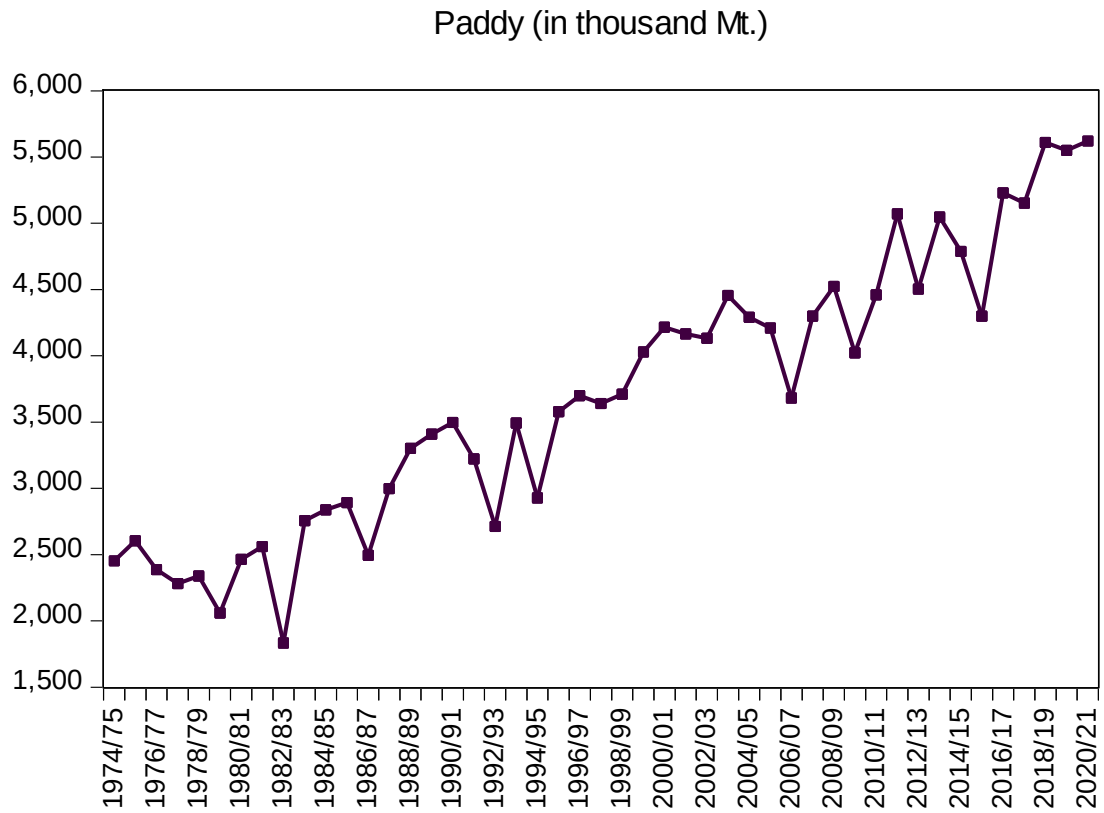
Figure 1 : Trend Line of Gross Domestic Product GDP



Source: Economic Survey, 1974/75 to 2020/21

Above figure 1 showed the trend line of GDP of Nepal. This showed that the trend of GDP of Nepal is in increasing order. Gross domestic product (GDP) trends from 1974–1995 fiscal year to 2020–2021. In the fiscal year 1974–1975, GDP was 1660.1 million rupees; in the fiscal year 1990/91, it was 12037 million rupees. Up to 1990/91 GDP increase slowly but at 2008/09 to 2020/21 its grow rapidly, in 2008/09 GDP was 98827.15 million rupees and in the fiscal year 2020/21 it was observed 427430 million ruppes. Although the change in GDP is observed to be growing, the pattern is rather erratic. The percentage change in GDP is shown in the Figure 1.

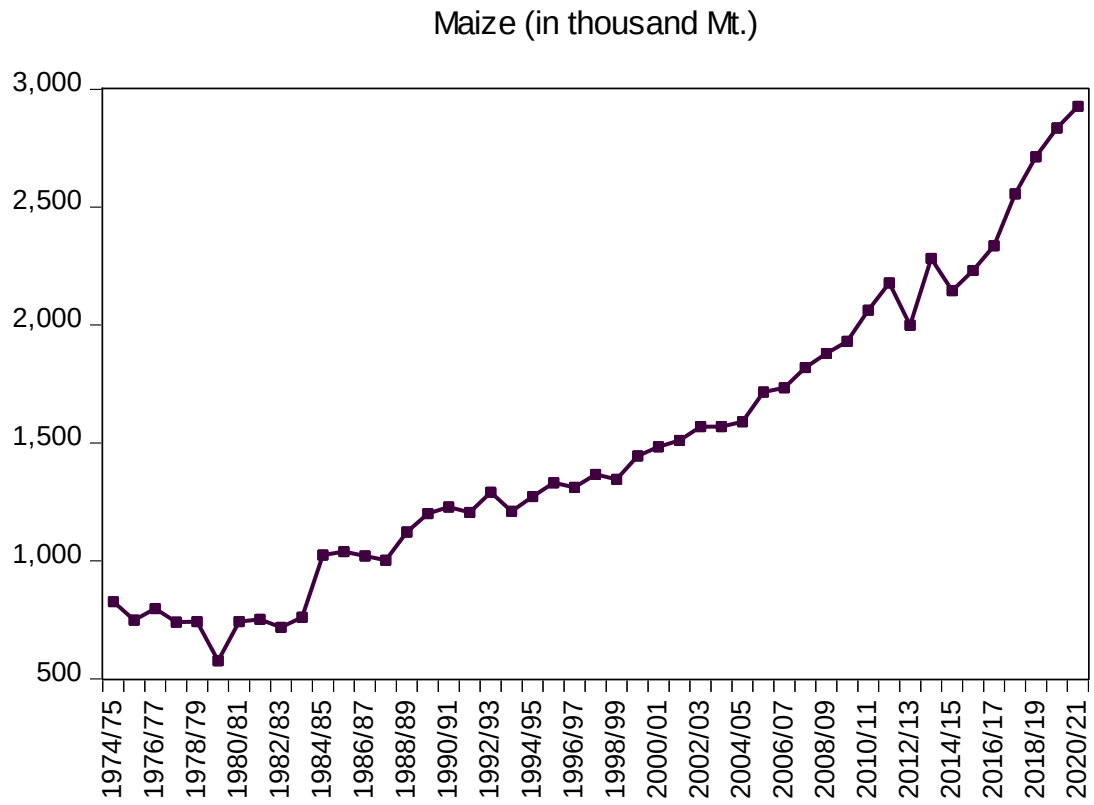
Figure 2. Trend line of Paddy



Source: Economic Survey, 2020/21

Above figure 2 shows the Trend line of Paddy Production in Nepal from the fiscal year 1974/75 to 2020/21. In the fiscal year 1974/75 Production of Paddy was 2452 thousand Mt. and it became 1833 thousand Mt in fiscal year 1982/83. This showed that production of Paddy decreases from fiscal year 1974/75 to 1982/83 then in fiscal year 1990/91 it was 3498 thousand Mt., in fiscal year 2020/21 it was 5621.7 thousand Mt. which shows that production of Paddy is in increasing trend but with fluctuating.

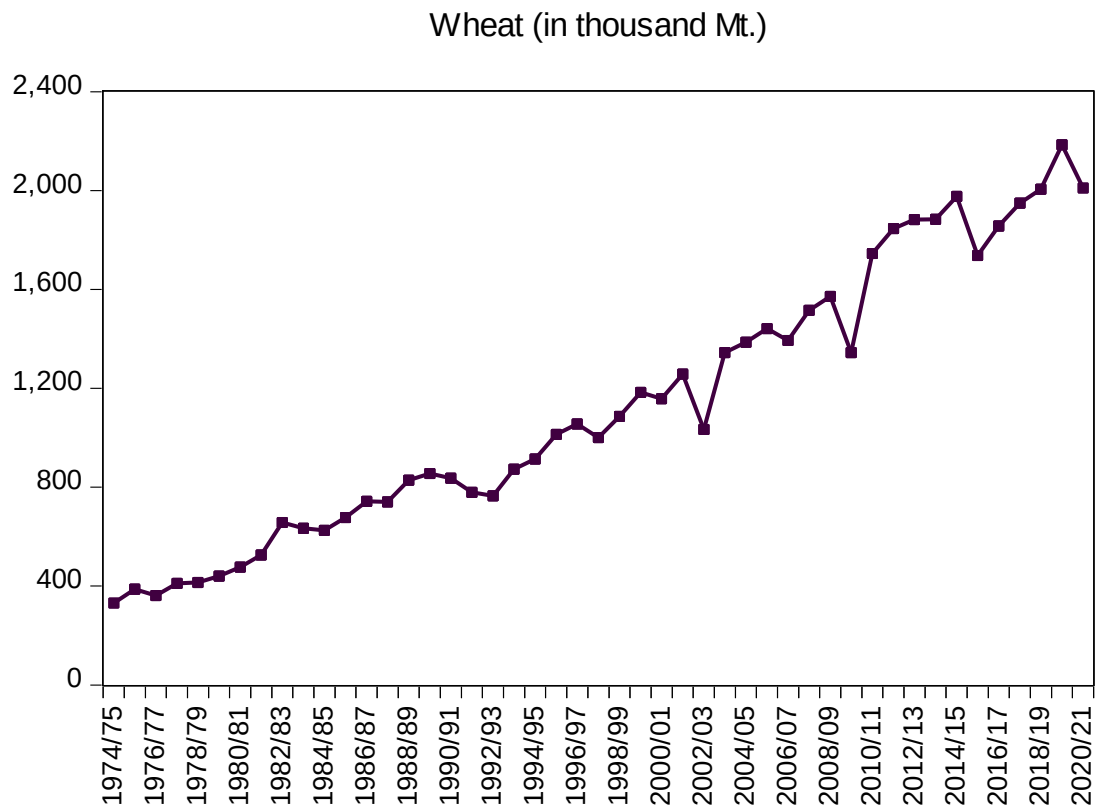
Figure 3. Trend line of Maize Production



Source: Economic Survey, 2020/21

This figure 3 shows the Trend line of Maize Production in Nepal from the fiscal year 1974/75 to 2020/21. It shows that in fiscal year 1974/75 production of maze was 827 thousand Mt. in fiscal year 1979/80 it became 576 thousand Mt., in fiscal year 1985/86 production of maze was 1039 thousand Mt., in fiscal year 2011/12 production of maze was noticed 2179 thousand Mt. and in fiscal year 2012/13 it falls to 1999 thousand Mt. then increase with increase with fluctuating. This showed that at first production of Maize is decreasing trend from 1974/75 to fiscal year 1980/81 and increase from fiscal year 1980/81 to 2020/21 with fluctuating.

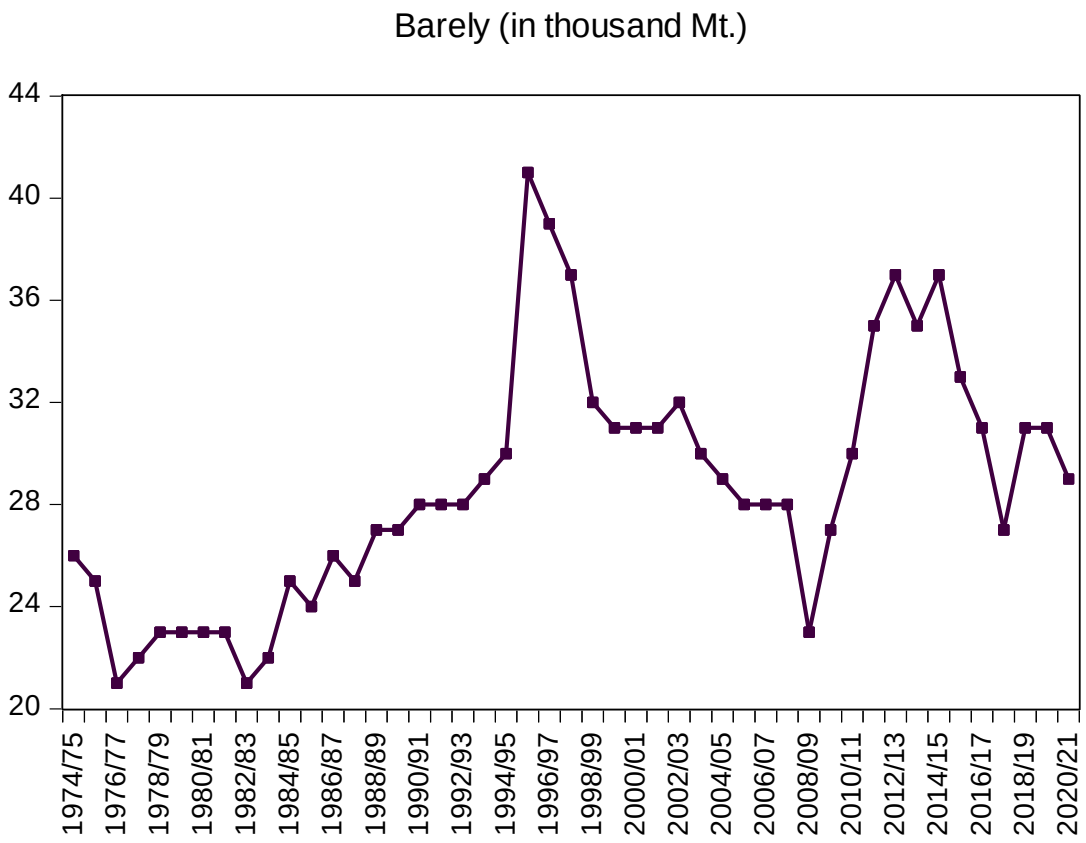
Figure 4. Trend line of Wheat Production



Source: Economic Survey, 2020/21

This figure 4 shows the Trend line of wheat Production in Nepal from the fiscal year 1974/75 to 2020/21. In fiscal year 1974/75 production of wheat was found 331 thousand Mt. in fiscal year 1989/90 it was 855 thousand Mt. in fiscal year 1992/93 it was 765 thousand Mt.. In fiscal year 2020/21 Production of wheat was 2009.8 thousand Mt.. This showed that production of Wheat increase from fiscal year 1974/75 to 2020/21 with minor fluctuating.

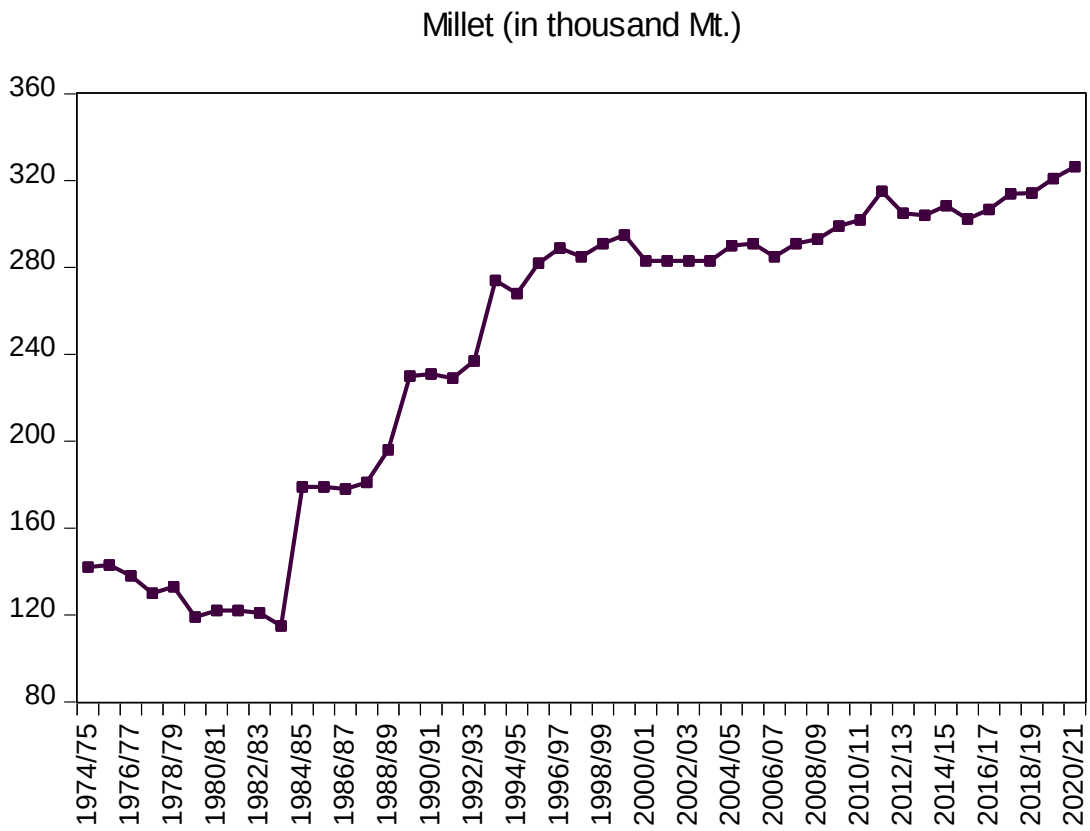
Figure 5. Trend line of Barely Production



Source: Economic Survey, 2020/21

This figure 5 shows the Trend line of Barely Production in Nepal from the fiscal year 1974/75 to 2020/21 in thousand Mt.. This showed that production of Barely was highest in fiscal year 1995/96 it was 41 thousand Mt. and then decreases till the year 2008/09 production of Barely reached to 23 thousand Mt.. The production of Barely increases till 2012/13 then the production is decreases. This shows that overall production is in minor increasing order.

Figure 6. Trend line of Millet Production



Source: Economic Survey, 2020/21

This figure 6 shows the Trend line of Millet Production in Nepal from the fiscal year 1974/75 to 2020/21. In the fiscal year 1974/75 production of Millet was 142 thousand Mt. then in fiscal year 1983/84 production of Millet decreased and reached 115 thousand Mt. and in the fiscal year 2020/21 production of Millet was reached to 326.44 thousand Mt.. This showed that production of Millet first decrease from fiscal year 1974/75 to 1983/84 then from fiscal year 1983/84 production of was found to be in increasing order up to fiscal year 2020/21 with minor fluctuating.

4.2 Econometric Analysis

4.2.1 The unit root test

The unit root test is employed to examine the stationarity of the data. The ADF test is utilized as a unit root test, which helps determine if the variables satisfy the condition of stationarity.

Table 1 : Unit root test

Series	On Level		On First Difference	
	t-Stat	Prob-Value	t-Stat	Prob-Value
LNRGDP	-0.2483	0.9244	-6.7129	0.0000*
LNPADDY	-0.5956	0.8613	-10.9189	0.0000*
LNMAIZE	0.0521	0.9584	-9.2079	0.0000*
LNWHEAT	-1.9220	0.3195	-7.6789	0.0000*
LNBARLEY	-1.9226	0.3193	-6.6354	0.0000*
LNMILLET	-1.6853	0.4312	-2.5597	0.1095

Source: Author's calculations performed using E-Views

* denotes significance at the 1% level, indicating that the result is highly significant.

The outcomes of the Augmented Dickey-Fuller (ADF) test, with a significance level of 5%, indicate the following: (i) The null hypothesis that the level series of all variables possess a unit root is accepted, but (ii) it is rejected for the first difference of the variables. This means that all the series become stationary when differenced once, indicating that they are integrated of order one. This suggests that the variables are co-integrated, indicating a long-term relationship between them. While LNMILLET is not significant at first difference so production of millet is excluded from model.

4.2.2 Co-integration Result

Co-integration can occur when multiple time series variables of the same level of integration are combined. Since LNGDP, LNPADDY, LNMAIZE, LNWHEAT, LNBARLEY are co-integrated, it indicates that they are closely related in the long run, suggesting a long-term connection among them. Multiple co-integrating relationships may exist between these variables. The Johansen test is used to determine the number of co-integrating equations and provides test statistics and estimates. Table 3.4 presents the findings of the Johansen co-integration test.

Table 2 : Co-integration Result

Included observations: 45 after adjustments
Trend assumption: No deterministic trend (restricted constant)
Series: LNRGDP LNPADDY LNMAIZE LNWHEAT LNBARLEY
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.617748	98.95996	76.97277	0.0004
At most 1 *	0.399285	55.68462	54.07904	0.0357
At most 2	0.269539	32.75103	35.19275	0.0896
At most 3	0.242936	18.61746	20.26184	0.0828
At most 4	0.126645	6.093614	9.164546	0.1836

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.617748	43.27534	34.80587	0.0039
At most 1	0.399285	22.93359	28.58808	0.2230
At most 2	0.269539	14.13358	22.29962	0.4498
At most 3	0.242936	12.52384	15.89210	0.1576
At most 4	0.126645	6.093614	9.164546	0.1836

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

4.2.3 Vector Error Correction Model

Given the presence of a long-term relationship between the variables, we can proceed to estimate and analyze the VECM. The calculations in the model are based on the level data, and the variables are automatically converted to their first differences. The estimated long-run relationship can be expressed as follows:

(LNRGDP) = C(1)*(LNRGDP(-1) + 3.7*LNPADDY(-1) - 0.89*LNMAIZE(-1) - 4.89*LNWHEAT(-1) + 0.69*LNBARLEY(-1) - 2.56) + C(2)*D(LNRGDP(-1)) + C(3)*D(LNRGDP(-2)) + C(4)*D(LNPADDY(-1)) + C(5)*D(LNPADDY(-2)) + C(6)*D(D LNMAIZE(-1)) + C(7)*D(LNMAIZE(-2)) + C(8)*D(LNWHEAT(-1)) + C(9)*D(LNWHEAT(-2)) + C(10)*D(LNBARLEY(-1)) + C(11)*D(LNBARLEY(-2)) + C(12)

Table 3 : Vector Error Correction Model

	Coefficient	**Std. Error**	**t-Statistic**	**Prob.**
C(1)	-0.073766	0.025872	-2.851194	0.0076
C(2)	-0.101048	0.165541	-0.610411	0.5459
C(3)	-0.087089	0.191215	-0.455451	0.6519
C(4)	0.117623	0.119113	0.987492	0.3308
C(5)	0.089652	0.117040	0.765996	0.4493
C(6)	-0.113132	0.177081	-0.638873	0.5275
C(7)	-0.065810	0.145604	-0.451975	0.6543
C(8)	-0.302755	0.146064	-2.072751	0.0463
C(9)	-0.246174	0.125537	-1.960959	0.0586
C(10)	0.057376	0.112605	0.509535	0.6139
C(11)	-0.179607	0.107570	-1.669674	0.1047
C(12)	0.172394	0.034360	5.017249	0.0000
R-squared	0.2948	Mean dependent var		0.125262
Adjusted R-squared	0.0524	S.D. dependent var		0.063549
S.E. of regression	0.061862	Akaike info criterion		-2.500810
Sum squared resid	0.122462	Schwarz criterion		-2.014212
Log likelihood	67.01781	Hannan-Quinn criter.		-2.320356
F-statistic	25.216090	Durbin-Watson stat		1.780260
Prob(F-statistic)	0.003123			

Table 3 displays the outcome of the Vector Error Correction Model, with R-squared values indicating variance in explanatory factors. It indicates the model's explanatory strength.The model exhibits a satisfactory R-square value of 0.29.47 (29.47%), indicating that it is appropriate and does not suffer from spurious regression. The coefficient of the Vector Error Correction Model (VECM) is significant and negative, providing evidence of a long-term relationship between GDP and the independent factors.

4.2.4 Long Run Causality

The coefficient of ECM has the anticipated sign is negative, sits between zero and one, and is statistically significant at the 5% level. The importance of the error correction mechanism supports co-integration and shows that a long run steady-state equilibrium exists between the level of real output (GDP) and the explanatory variables. The ECM suggests a feedback of roughly 7.38% of the previous year's disequilibrium from the explanatory factors' long term elasticity. In other words, the error correction term's coefficient quantifies the rate at which the level of real output adjusts to changes in the explanatory variables in order to reach long run static equilibrium. As a result, the rate of adjustment might be described as rapid.

4.2.5 Short run causality

Table 4 : Wald Test

Coefficient	Test Statistic	Value	df	Probability
C(2)	Chi-square	0.373602	1	0.5416
C(3)	Chi-square	0.207436	1	0.6488
C(4)	Chi-square	0.975140	1	0.3234
C(5)	Chi-square	0.586749	1	0.4437
C(6)	Chi-square	0.408159	1	0.5229
C(7)	Chi-square	0.204281	1	0.6513
C(8)	Chi-square	4.296296	1	0.0382*
C(9)	Chi-square	3.845362	1	0.0499*
C(10)	Chi-square	0.259625	1	0.6104
C(11)	Chi-square	2.787810	1	0.0950
C(12)	Chi-square	25.17279	1	0.0000*

Source: Author’s calculation through E-views

There is insufficient evidence to support the existence of short-term causation from lagged production of paddy, maize, and millet to GDP, as indicated by the Chi-square probability values exceeding 5%. However, there is evidence of short-term causation from lagged GDP to production of wheat as the Chi-square probability values are below 5%.

Model Diagnosis

i. F-Test

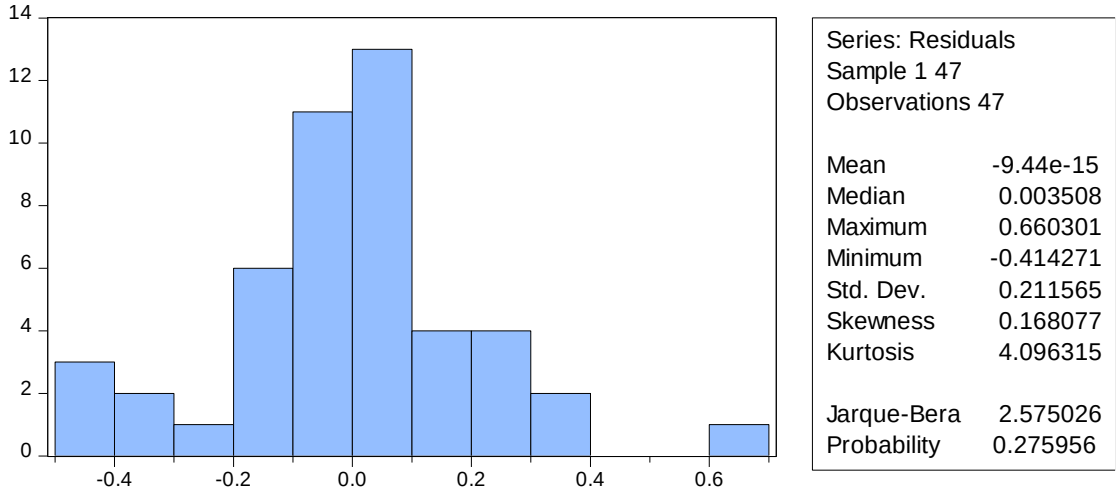
The research model demonstrates a good fit, supported by an R-squared value of 29.48 percent. Additionally, the probability-valuCe of the F-statistic is <1%, indicating statistical significance.

ii. Normality of data

In statistics, the normality of data refers to the distribution of data points within a dataset. A normal distribution, also known as a Gaussian distribution or bell curve, is a symmetrical probability distribution characterized by its shape, mean, and standard deviation. Data is considered to be normally distributed when it follows a bell-shaped curve, where the majority of the data points are clustered around the mean, and the values gradually taper off towards the tails. In a normal distribution, the mean, median, and mode are all equal, and specific percentages of data fall within certain standard deviations from the mean.

The JB test is employed to evaluate whether the distribution of the variables in the model conforms to the assumption of normality. The statistical significance of this test indicates that the variables exhibit a normal distribution. The findings of the JB normality test are depicted in following figure.

Figure 7 : Test of Normality



(Source: Authors Calculation)

The JB test was conducted to examine the normality of the residuals in the model. Given that the p-value of the test (0.2759) exceeds the 5% significance level, the results indicate that the null hypothesis is accepted, This suggests that the residuals in the model follow a normal distribution.

iii. Test of Heteroskedasticity

Below is the table presenting the results of the Bruesch-Pagan-Godfrey test, which is used to detect heteroskedasticity:

Table 5 : Heteroskedasticity Test: Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.576100	Prob. F(15,28)	0.0148
Obs*R-squared	25.51302	Prob. Chi-Square(15)	0.0435
Scaled explained SS	23.22876	Prob. Chi-Square(15)	0.0794

Source: Author's calculation through E-views

Table 5 presents the findings of the Breusch-Pagan-Godfrey test, which examines the presence of heteroskedasticity in the data. If the p-value of the observed R-squared is greater than 5%, it suggests that the null hypothesis of homoscedasticity is not rejected at a significance level of 5%. This implies that the data exhibits homoscedasticity, meaning that the variability of the residuals is constant across all levels of the independent variables.

iv. Serial Correlation Test

To examine whether there is serial correlation within the model, the Breusch-Godfrey LM test was performed. The results of the test are presented in Table 6, which displays the findings of the Breusch-Godfrey Serial Correlation LM Test.

Table 6 : Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.800580	Prob. F(2,30)	0.4584
Obs*R-squared	2.229381	Prob. Chi-Square(2)	0.3280

Source: Author's calculation through E-views

H_0 : There is no serial correlation in the residuals. Table 6 shows results of the Breusch-Godfrey Serial Correlation LM Test. Based on the F-statistic and the probability of the observed R^2, both exceeding the 5% significance level; the null hypothesis of no serial correlation is accepted.

v. Test for Multicollinearity

Multicollinearity refers to a situation in which two or more independent variables in a regression model are highly correlated with each other. This can pose problems in regression analysis, as it violates the assumption of independent predictors and can lead to unstable estimates and misleading interpretations of the mode. The basic assumptions of regression is that there shouldn't be multicollinearity among independent variables. Variance inflation values (VIF) were used to check the multicollinearity of independent variables.

Table 7 : Test for Multicollinearity

Variance Inflation Factors
Included observations: 44

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C(1)	0.000669	2.077949	2.077949
C(2)	0.027404	6.122540	1.359830
C(3)	0.036563	8.189102	1.742662
C(4)	0.014188	2.853215	2.804992
C(5)	0.013698	2.767485	2.711759
C(6)	0.031358	2.775605	2.444887
C(7)	0.021201	1.921683	1.743917
C(8)	0.021335	2.403328	2.023649
C(9)	0.015760	1.845611	1.541827
C(10)	0.012680	1.248290	1.244806
C(11)	0.011571	1.143804	1.141678
C(12)	0.001181	13.57409	NA

(Source: Authors Calculation)

Above table sowed the test of multicollinearity of independent variables (Paddy, Maize, Wheat and Barley). The Variance inflation values (VIF) of all independent variables. All the VIF values are less than 10 showed that there is no multi-collinearity in the model.

4.2.7 Correlation matrix

A correlation matrix is a table that displays the correlation coefficients between multiple variables. Each cell in the matrix represents the correlation coefficient between two variables. The correlation coefficient measures the strength and direction of the linear relationship between two variables. It ranges from -1 to +1, where -1 indicates a perfect negative correlation, +1 indicates a perfect positive correlation, and 0 indicates no correlation.

Table 8 : Correlation matrix between Agriculture production and GDP.

	LNRGDP	LNPADDY	LNMAIZE	LNWHEAT	LNBARLEY
LNRGDP	1	0.9467	0.9828	0.9809	0.6671
LNPADDY		1	0.9562	0.9333	0.6762
LNMAIZE			1	0.9583	0.6485
LNWHEAT				1	0.6617
LNBARLEY					1

(Source: Authors Calculation)

Above table 8 showed the correlation between major agriculture production and GDP of Nepal. This showed that there is positive correlation between GDP and major agriculture production (Maize and Wheat). This relation was found to be statistically insignificant (p-value>0.01).

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

i. The trend of GDP of Nepal is in increasing order. Gross domestic product (GDP) trends from 1974–1975 fiscal year to 2020–2021.

ii. The production of Paddy decrease from fiscal year 1974/75 to 1982/83 then onwards till 2020/21 production of Paddy is in increasing trend but with fluctuating.

iii. The production of Maize is decreasing trend from 1974/75 to fiscal year 1980/81 and increase from fiscal year 1980/81 to 2020/21 with fluctuating.

iv. The production of Wheat increase from fiscal year 1974/75 to 2020/21 with minor fluctuating.

v. The production of Barely was highest in 1995/96 and then decreases till the year 2008/09. The production of Barely increases till 2012/13 then the production is decreases. The overall production is in minor increasing order.

vi. The production of Millet first decrease from fiscal year 1974/75 to 1984/85 then from fiscal year 1984/85 production of was found to be in increasing order up to fiscal year 2020/21 with minor fluctuating.

vii. The outcomes of the augmented Dickey-Fuller (ADF) test, with a significance level of 5%, indicate the following: (i) The null hypothesis that the level series of all variables possess a unit root is accepted, but (ii) it is rejected for the first difference of the variables. This means that all the series become stationary when differenced once, indicating that they are integrated of order one. This suggests that the variables are co-integrated, indicating a long-term relationship between them.

viii. LNMILLET is not significant at first difference so production of millet is excluded from model.

ix. Co-integration can occur when multiple time series variables of the same level of integration are combined. Since LNGDP, LNPADDY, LNMAIZE,

LNWHEAT, LNBARLEY are co-integrated, it indicates that they are closely related in the long run, suggesting a long-term connection among them.

x. Given the presence of a long-term relationship between the variables, we can proceed to estimate and analyze the VECM. The calculations in the model are based on the level data, and the variables are automatically converted to their first differences.

xi. The estimated long-run relationship can be expressed as follows:

xii. (LNRGDP) = C(1)*(LNRGDP(-1) + 3.7*LNPADDY(-1) - 0.89*LNMAIZE(-1) - 4.89*LNWHEAT(-1) + 0.69*LNBARLEY(-1) - 2.56) + C(2)*D(LNRGDP(-1)) + C(3)*D(LNRGDP(-2)) + C(4)*D(LNPADDY(-1)) + C(5)*D(LNPADDY(-2)) + C(6)*D(D LNMAIZE(-1)) + C(7)*D(LNMAIZE(-2)) + C(8)*D(LNWHEAT(-1)) + C(9)*D(LNWHEAT(-2)) + C(10)*D(LNBARLEY(-1)) + C(11)*D(LNBARLEY(-2)) + C(12)

xiii. The model exhibits a satisfactory R-square value of 0.29.48 (29.48%), indicating that it is appropriate and does not suffer from spurious regression. The coefficient of the Vector Error Correction Model (VECM) is significant and negative, providing evidence of a long-term relationship between GDP and the independent factors.

xiv. The coefficient of ECM has the anticipated sign is negative, sits between zero and one, and is statistically significant at the 5% level.

xv. The ECM suggests a feedback of roughly 7.38% of the previous year's disequilibrium from the explanatory factors' long term elasticity.

xvi. There is evidence of short-term causation from lagged GDP to production of wheat as the Chi-square probability values are below 5%.

xvii. The research model demonstrates a good fit, supported by an R-squared value of 29.48 percent. Additionally, the probability-value of the F-statistic is <1%, indicating statistical significance.

xviii. The JB test was conducted to examine the normality of the residuals in the model. Given that the p-value of the test (0.2759) exceeds the 5% significance level, the results indicate that the null hypothesis is accepted, This suggests that the residuals in the model follow a normal distribution.

xix. If the p-value of the observed R-squared is greater than 5%, it suggests that the null hypothesis of homoscedasticity is not rejected at a significance level of 5%. This implies that the data exhibits homoscedasticity, meaning that the

variability of the residuals is constant across all levels of the independent variables.

xx. Based on the F-statistic and the probability of the observed R2, both exceeding the 5% significance level; the null hypothesis of no serial correlation is accepted.

xxi. The Variance inflation values (VIF) of all independent variables. All the VIF values are less than 10 showed that there is no multi-collinearity in the model.

xxii. There is positive correlation between GDP and major agriculture production (Maize and Wheat). This relation was found to be statistically insignificant (p-value>0.01).

5.2 Conclusions

The study's empirical results show that agricultural output directly affects agriculture income and employment, and they also demonstrate that agricultural production directly affects economic growth. Major crops and GDP have a very strong positive correlation, and their relationship has been found to be significant. The GDP was significantly impacted by major crops. The analysis shows that the six key independent factors in the Nepalese economy are positively correlated with the dependent variable (gross domestic product, or GDP). According to the report, India's economic growth will suffer if there is no improvement in agricultural production in Nepal. In Nepal, the agriculture industry is experiencing serious issues.

5.3 Recommendations

This research is based upon few variables (only include major agriculture production), so this study can be enlarged by using more variable. This research is based upon the secondary data similar type of research can be conducted using other econometric models like ARIMA, ARDL. The following factors can be taken into account while creating policy in order to resolve agricultural problems and boost the trend of agricultural production:

- There should be measures on the circulation of money because it directly affects the general price level of goods in the country. • Government of Nepal should take measures to increase the employment of labor force in a country with the help of higher education in both the agricultural and industrial sectors.

- With the aid of modern agricultural technology, the distribution of high-quality seeds, and other agricultural inputs, the productivity of agriculture and its value-added component has to be increased at a greater level.

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ANNEX

(Value in Thousand Mt.)

Year	RGDP	Paddy	Maize	Wheat	Barley	Millet
1974/75	1660.1	2452	827	331	26	142
1975/76	1739.4	2605	748	387	25	143
1976/77	1728	2386	797	362	21	138
1977/78	1972.7	2282	740	411	22	130
1978/79	2612.8	2339	743	415	23	133
1979/80	2335.1	2060	576	440	23	119
1980/81	2730.7	2464	743	477	23	122
1981/82	3098.8	2560	752	526	23	122
1982/83	3382.1	1833	718	657	21	121
1983/84	3929	2757	761	634	22	115
1984/85	4658.7	2837	1024	625	25	179
1985/86	5573.4	2892	1039	677	24	179
1986/87	6386.4	2494	1021	743	26	178
1987/88	7690.6	2999	1003	740	25	181
1988/89	8927	3302	1122	828	27	196
1989/90	10341.6	3409	1201	855	27	230
1990/91	12037	3498	1228	836	28	231
1991/92	14948.7	3223	1205	779	28	229
1992/93	17147.4	2712	1291	765	28	237
1993/94	19927.2	3493	1210	873	29	274
1994/95	21917.5	2928	1273	914	30	268
1995/96	24891.3	3579	1331	1013	41	282
1996/97	28051.3	3699	1312	1056	39	289
1997/98	30084.5	3641	1367	1001	37	285
1998/99	34203.6	3710	1346	1086	32	291
1999/00	37948.8	4030	1445	1184	31	295
2000/01	44151.9	4216	1484	1158	31	283

Year	RGDP	Paddy	Maize	Wheat	Barley	Millet
2001/02	45944.26	4165	1511	1258	31	283
2002/03	49223.08	4132	1569	1034	32	283
2003/04	53674.91	4456	1569	1344	30	283
2004/05	58941.17	4290	1590	1387	29	290
2005/06	65408.41	4209	1716	1442	28	291
2006/07	72782.7	3681	1734	1394	28	285
2007/08	81565.82	4299	1820	1515	28	291
2008/09	98827.15	4524	1879	1572	23	293
2009/10	119277.4	4023	1931	1344	27	299
2010/11	156268.1	4460	2063	1745	30	302
2011/12	175837.9	5072	2179	1846	35	315
2012/13	194929.5	4504	1999	1882	37	305
2013/14	223252.5	5047.05	2283	1883	35	304
2014/15	242363.8	4788.61	2145.29	1975.63	37	308.49
2015/16	260818.4	4299.08	2231.52	1736.85	33	302.4
2016/17	307714.5	5230.33	2336.68	1856.19	31	306.7
2017/18	345595	5151.92	2555.84	1949	27	313.99
2018/19	385893	5610.01	2713.63	2005.67	31	314.23
2019/20	388870	5550.88	2835.67	2185.29	31	320.95
2020/21	427730	5621.7	2926.95	2009.8	29	326.44