

IMPACT ON ECONOMIC GROWTH OF AGRICULTURE IN INDIA VIS-À-VIS A FEW COUNTRIES OF ASIA

Abstract

India is recognized all over the world as an agriculture dependent country. In recent times emphasis has been placed not only on the agricultural crops but also on horticultural crops. The current commercialization takes hold of the progressive peasantry and greatly benefits the farmer. In the present day, commercialization of agriculture plays a vital role behind the economic growth. It is revealed that for first quarter of 2020, agriculture was the only sector to have reported positive growth. The Gross value added (GVA) by agriculture has enhanced by 3.4 per cent in the first quarter of 2020, compared to 2019. Thus the agriculture sector has added Rs 14,815 crore in the first three months of 2020 in absolute monetary terms. It is obvious that there are few drawbacks involved with this process as peasants are over using their lands in order to increase the commercialization of crops which leads to lack of soil fertility and environmental pollution. However the economic aspects of farming and the impact on economic growth cannot be ruled out.

Major objective of the chapter is to analyze the influence or the impact of agriculture on GDP of India and few countries of Asia such as Afghanistan, Bangladesh, Bhutan, China, Japan and Nepal. The data used for the study have drawn from World Bank and other statistical reports. The study covers the period of 1990 to 2019. Ordinary least squares multiple regression models have used to analyze the relation between GDP growth and contribution of agriculture of

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the selected countries.

Keywords: Agriculture, commercialization, GDP growth, Economic growth, Gross value added (GVA), regression analysis.

I. INTRODUCTION

Agriculture is a very important sector in developing nations. Agriculture plays a very important role in Indian economy. More than 70 percent of the rural households rely on agriculture. Agriculture contributes around 17% of the total GDP of India and provides employment to more than 60 percent of the population. Over the last few decades, Indian agriculture has seen tremendous growth. Food grain production increased from 51 MMT in 1950-51, to 250 MMT in 2011-12, the highest since independence. The contribution of the agriculture sector in the Indian economy is much lower than the world average (6.4%) while the contribution of the industry and service sector is lower than the global average (30% for industry and 63% for service) (Ministry of statistics and programme implementation, 04 Jan 2021). The resilience of the agricultural community in face of adversity made it the only sector to grow by 3.4% in constant price year-on-year in 2020-21 when other sectors declined. The share of the agriculture in GDP increased 13.9 percent in 2020-21, compared to 17.8 percent in 2019-20.(Shagun Kapil,2021). India is currently the world's largest producer of 80% of all agricultural produce items, including many cash crops like coffee and cotton in 2010. India is currently the second largest producer of a number of dry fruits agriculture based textiles, raw materials, tuber crops, pharmacies, eggs, fishes, sugar cane and many vegetables. In Asia and the Pacific, women play a significant role in economic activity. The relative share of men and women in the labour force in agriculture is particularly high in South Asian countries like India (more than 60%) and Bhutan (more than 98%). It is now widely accepted by most stakeholders that agriculture and rural economy are essential for achieving sustainable gains in poverty alleviation (FAO, 2008). A productivity-driven expansion can attract actors with increased economic activity and have an impact on cities in rural areas (Anriquez et al., 2007). The research results from Davis et al (2007) showed that despite revenue diversification of rural households, the lowest expenditure category still drew from a larger proportion of total earnings from the agriculture sector compared to households in higher income groups. This highlights the need to continue to focus and increase resource allocation on the agriculture sector in the long term (FAO, 2008). Agricultural sustainable development is especially important in South Asia and Southeast Asia. The agricultural sector plays an important role in the economic & social development of South and Southeast Asian countries. It has contributed exclusively to the creation of employment, improved food security and poverty reduction in South and Southeast Asia. The World Bank's Millennium Development Goals (MDGs) have an ambition to eliminate extreme poverty, hunger and malnutrition among developing countries. As a result, it has become clear that agricultural growth not only contributes to overall growth but is most effective in alleviating rural & urban poverty. In food-producing countries, the focus is on sustainable agriculture – to improve food production, increase farmers' incomes, and sustain rural economies. (UNESCAP, Sustainable agriculture and food security in Asia and the Pacific, 2009). The world's demand for food is projected to double in the next 50 years. The natural resources that support agriculture will become depleted, degraded, and exposed to the consequences of climate change. Agriculture provides at least 40% of GDP and 80% of employment in many poor countries. About 70% of the world's poverty living in rural areas rely mostly on agriculture for their daily livelihoods. Agriculture provides employment for most of the global poor. In 2004, agriculture accounted for 53% of the global workforce (GerdienMeijerink & PimRoza2007). Asia is home to the most underprivileged people in the world, where agriculture is abundant in terms of both total income and total labor. In Asia's three major regions (South East Asia, Southeast Asia and East Asia), 55% of total population

lived in agriculture in 2012, and 73% of global population was in agriculture in the same year. Therefore, agriculture remains a key driver of development, particularly in these parts of Asia where agrarian economies are prevalent.(Lorna econg 2014). In recent years, there has been a renewed focus on agriculture, driven by China and India, which are promoting smallholder agriculture as a key strategy for agricultural commercialization in order to reduce the widening gap between rural income and urban income (Pingali (2010). According to a World Bank report (2008), agriculture can be a key driver of growth in economics that are based on agriculture, while in countries that are transforming, agriculture is a minor economic activity but still a key tool for reducing rural poverty.

The role of agriculture in a nation's economic development has long been studied by agricultural economists. Lewis (1954), for example, argued that agriculture was the foundation for industrial and economic development because of its abundance of resources and its capacity to pass on surpluses to industrial sectors. Shultz (1953), on the other hand, argued that agriculture provided sustenance for the people in a society and that without it, there would be no total economic growth. This argument is still supported by modern studies that view agriculture as the engine room of economic growth. Most developing countries rely on agriculture as the main source of employment for large segments of their population, thus bringing long-term economic growth to them (Anthony, 2010; Johnston, 1961; Mellor, 2014). For agro fundamentalists, agriculture does not just provide food and labor, but is essential for production and consumption connections.(Lorna econg, 2014).

The ADLI (Agricultural Demand Led Industrialization) theory was developed by Adelman (1984). ADLI advocates a development strategy based on agriculture. The theory states that increased agricultural productivity leads to industrialization. Adelman emphasizes that small- to medium-size farmers are more likely to rely on domestically produced intermediate goods than large-scale producers, which would lead to a weakening of the relationship between agriculture and other industries. Timmer (2002), using the panel data approach, estimated endogenous growth models for 65 developing countries over the 1960-85 period. He found that a 1% rise in agricultural growth leads to an increase of 0.2% in non-agriculture growth. Similarly, Self (2007) found a positive relationship between various measures of agricultural productivity over 1960-1995 for a wide range of countries(Lorna Econg , 2014).In Japan, farmers claim that the agricultural sector is "strayed or weakened" due to a "dependence or reliance" on tariffs and "ineffectiveness" of government subsidies that do not provide incentives for innovation and productivity" (hiroko tabuchi,New York Times,11 November 2010). In Bhutan, agricultural farming is highly sensitive to climate change. It is completely dependent on monsoonal rains and the short growing season. The rugged mountain topography and the fragile mountain ecosystem make it even more vulnerable to climatic fluctuations. For example, in 1996, rice production was lost by 80-90%. In 2007, Turcicum destroyed 50% of the maize crop, and in 2008, maize crops were destroyed by severe windstorms.

The purpose of this chapter is to explore and analyze whether agriculture plays a "vital role" in India's economic development and GDP growth as compared to a few countries in Asia, including China, Bangladesh, Nepal, Bhutan, Japan and Afghanistan.

II. DATA BASE AND METHODOLOGY

To fulfill the objectives of our study, secondary data has been taken from World Bank data base of seven different Asian economies namely India, Afghanistan, Bangladesh, Bhutan, China, Japan & Nepal. Essential statistical methods have used to examine and interpret the information. The different tools namely CAGR(compound annual growth rate), regression have been used.

- 1. Regression:** To examine the relationship of dependent and independent variables, we have used regression analysis. Now, an equation of the linear regression line can be written as,

$Y = \beta_0 + \beta_1 X_1 + \dots + \beta_n X_n + e$; here Y is the dependent variable and X_1, X_2 are the explanatory variables. β_0 is the constant or intercept. $\beta_1, \beta_2, \dots, \beta_n$ are regression coefficients. The adjusted R^2 and F of the estimated regression equation of this model are such that the relevant regression model is fitted to the data set.

- 2. Durbin Watson Test:** It is a measure of autocorrelation / serial correlation in residuals from regression analysis. Autocorrelation is the similarity of a time series data over successive time intervals. It can lead to underestimate of the standard error. It can show the predictors are significant when actually they are not.

The value of test statistic is estimated by the following method:

$$DW = \frac{\sum_{t=2}^T (e_t - e_{t-1})^2}{\sum_{t=1}^T e_t^2}$$

Where e_t are residuals from ordinary least squares (OLS) regression the DW test reports test statistic with a value which live between (0 to 4), If the values of DW are,

- exactly 2 ,then there is no autocorrelation.
- 0 to less than 2, then there is positive autocorrelation.
- more than 2 but less than 4, then there is negative autocorrelation.

But a thumb rule is that, the values of test statistic in the range of 1.5 to 2.5 are relatively normal. Values outside the range could be cause for concern.

III. AN EMPIRICAL EXERCISE OF IMPACT ON ECONOMIC GROWTH OF AGRICULTURE

Here we consider Annual Growth Rate of Per Capita Gross Domestic Product (PCGDPGRT) as regressand and gross capital formation (GRSCF), Annual Growth Rate of Total Agricultural Value Added (AGLVAGRT), Annual Growth Rate of Total Manufacturing Value Added (MFVAGRT), and Annual Growth Rate of Total Services Value Added (SRVVAGRT) as explanatory variables. Thus we can show the model as,
 $PCGDPGRT = \beta_0 + \beta_1 AGLVAGRT + \beta_2 MFVAGRT + \beta_3 SRVVAGRT + \beta_4 GRSCF + e$

According to the collected data for the study period 1990 to 2019(Except Japan & Afghanistan), the equation is estimated through Ordinary Least Squad method. The results of the selected countries are presented below.

- 1. India:** The Regression equation concerning Annual Growth Rate of Per Capita Gross Domestic Product (PCGDPGRT) as regressand and gross capital formation (GRSCF), Annual Growth Rate of Total Agricultural Value Added (AGLVAGRT), Annual Growth Rate of Total Manufacturing Value Added (MFVAGRT), and Annual Growth Rate of Total Services Value Added (SRVVAGRT) as explanatory variables or regressors shows that the variation in annual growth rate of per capita gross domestic Product is significantly explained by the value of gross capital formation (GRSCF), Annual Growth Rate of Total Agricultural Value Added (AGLVAGRT), Annual Growth Rate of Total Manufacturing Value Added (MFVAGRT), and Annual Growth Rate of Total Services Value Added (SRVVAGRT) to the extent of 83 per cent i.e, the model has a very high predictive ability. The DW value is 1.8.Thus it is free from autocorrelation problem. It is also observed that coefficient of the variables are significant at 1 per cent except gross capital formation , which is significant at 5 percent level of significance. The significance level of model is at 1 per cent level in the case of India (Table-1).
- 2. Bangladesh:** The Regression equation concerning Annual Growth Rate of Per Capita Gross Domestic Product (PCGDPGRT) as regressand and gross capital formation (GRSCF), Annual Growth Rate of Total Agricultural Value Added (AGLVAGRT), Annual Growth Rate of Total Manufacturing Value Added (MFVAGRT), and Annual Growth Rate of Total Services Value Added (SRVVAGRT) as explanatory variables or regressors shows that the variation in annual growth rate of per capita gross domestic Product is significantly explained by the value of gross capital formation (GRSCF), Annual Growth Rate of Total Agricultural Value Added (AGLVAGRT), Annual Growth Rate of Total Manufacturing Value Added (MFVAGRT), and Annual Growth Rate of Total Services Value Added (SRVVAGRT) to the extent of 74 per cent this means that the model has a very high predictive ability. It is also observed that coefficient of the variables are significant at 1 per cent level of significance. The DW value is 2.1.Thus it indicates the model is free from autocorrelation problem. The significance level of model is at 1 per cent level of significance in the case of Bangladesh (Table-1).
- 3. China:** The Regression equation concerning Annual Growth Rate of Per Capita Gross Domestic Product (PCGDPGRT) as regressand and gross capital formation (GRSCF), Annual Growth Rate of Total Agricultural Value Added (AGLVAGRT), Annual Growth Rate of Total Manufacturing Value Added (MFVAGRT), and Annual Growth Rate of Total Services Value Added (SRVVAGRT) as explanatory variables or regressors shows that the variation in annual growth rate of per capita gross domestic Product is significantly explained by the value of gross capital formation (GRSCF), Annual Growth Rate of Total Agricultural Value Added (AGLVAGRT), Annual Growth Rate of Total Manufacturing Value Added (MFVAGRT), and Annual Growth Rate of Total Services Value Added (SRVVAGRT) to the extent of 78 per cent this means that the model has a very high predictive ability. The DW value is 1.7.Hence the model is free from autocorrelation problem. It is also observed that coefficient of the variables are significant at 1 per cent level of significance. The significance level of model is at 1 per cent level of significance in the case of China (Table-1)

- 4. Bhutan:** The Regression equation concerning Annual Growth Rate of Per Capita Gross Domestic Product (PCGDPGRT) as regressand and gross capital formation (GRSCF), Annual Growth Rate of Total Agricultural Value Added (AGLVAGRT), Annual Growth Rate of Total Manufacturing Value Added (MFVAGRT), and Annual Growth Rate of Total Services Value Added (SRVVAGRT) to the extent of 46 per cent. It is also observed that coefficient of the variable annual growth rate of total manufacturing value added (MFVAGRT) is significant at 1 per cent level of significance. The variable, annual growth rate of total services value added (SRVVAGRT) is significant at 5 percent level of significance. Here the variable annual growth rate of total agricultural value added (AGLVAGRT), is not significant. The DW value is 1.9. So that it lies in the normal range (i.e, 1.5 to 2.5). Hence the model is free from autocorrelation problem. The significance level of model is at 1 per cent level of significance in the case of Bhutan (Table-1).

Total Services Value Added (SRVVAGRT) as explanatory variables or regressors shows that the variation in annual growth rate of per capita gross domestic Product is significantly explained by the value of gross capital formation (GRSCF), Annual Growth Rate of Total Agricultural Value Added (AGLVAGRT), Annual Growth Rate of Total Manufacturing Value Added (MFVAGRT), and Annual Growth Rate of Total Services Value Added (SRVVAGRT) to the extent of 46 per cent. It is also observed that coefficient of the variable annual growth rate of total manufacturing value added (MFVAGRT) is significant at 1 per cent level of significant. The variable, annual growth rate of total services value added (SRVVAGRT) is significant at 5 percent level of significance. Here the variable annual growth rate of total agricultural value added (AGLVAGRT), is not significant. The DW value is 1.9. So that it lies in the normal range (i.e, 1.5 to 2.5). Hence the model is free from autocorrelation problem. The significance level of model is at 1 per cent level of significance in the case of Bhutan (Table-1).

- 5. Nepal :** The Regression equation concerning Annual Growth Rate of Per Capita Gross Domestic Product (PCGDPGRT) as regressand and gross capital formation (GRSCF), Annual Growth Rate of Total Agricultural Value Added (AGLVAGRT), Annual Growth Rate of Total Manufacturing Value Added (MFVAGRT), and Annual Growth Rate of Total Services Value Added (SRVVAGRT) as explanatory variables or regressors shows that the variation in annual growth rate of per capita gross domestic Product is significantly explained by the value of gross capital formation (GRSCF), Annual Growth Rate of Total Agricultural Value Added (AGLVAGRT), Annual Growth Rate of Total Manufacturing Value Added (MFVAGRT), and Annual Growth Rate of Total Services Value Added (SRVVAGRT) to the extent of 84 per cent this means that the model has a very high predictive ability. It is also observed that coefficient of the variables are significant at 1 per cent level of significance except the variable annual growth rate of total manufacturing value added (MFVAGRT) , which is not significant in the model. The DW value is 1.8 . Thus it shows the model is free from autocorrelation problem. The significance level of model is at 1 per cent level of significance in the case of Nepal (Table-1).

Table 1. Results of Regression Analysis for the Nations India, Bangladesh, China, Bhutan and Nepal for the Study Period 1990 to 2019.

REGRESSION EQUATIONS		AdjR ²	F -Value	DW - Value
INDIA	PCGDPGRT=0.24AGLVAGRT*+0.20MFVAGRT*+0.58SRVVAGRT*+0.08GRSCF **-4.3 (6.1) (5.4) (5.9) (2.6)	83%	36.7*	1.8
BANGLA DESH	PCGDPGRT=0.18AGLVAGRT*+0.26MFVAGRT*+0.47SRVVAGRT*+0.12GRSCF *4.2 (5.1) (7.5) (3.1) (3.3)	74%	128.7*	2.1
CHINA	PCGDPGRT=0.17AGLVAGRT*+0.28INVAGRT*+0.59SRVVAGRT*+0.08GRSCF* -4.2 (3.5) (14.5) (17.2) (6.3)	78%	533.2*	1.6
BHUTAN	PCGDPGRT=0.06AGLVAGRT+0.38MFVAGRT*+0.20SRVVAGRT**+0.01GRSCF +0.8 (0.28) (4.8) (2.2) (0.31)	46%	7.32*	1.9
NEPAL	PCGDPGRT=0.43AGLVAGRT*+0.006MFVAGRT+0.56SRVVAGRT*+0.13GRSCF *-2.9 (6.4) (0.23) (5.2) (4.8)	84%	37.9*	1.8
<p>* Indicates significant at 1% level, ** Indicates significant at 5% level .The values of parentheses are 't' Values. Sources: Author's calculation by using open source data From World Bank.</p>				

6. Japan: The Regression equation concerning Annual Growth Rate of Per Capita Gross Domestic Product (PCGDPGRT) as regressand and gross capital formation (GRSCF), Annual Growth Rate of Total Agricultural Value Added (AGLVAGRT), Annual Growth Rate of Total Manufacturing Value Added (MFVAGRT), and Annual Growth Rate of Total Services Value Added (SRVVAGRT) as explanatory variables or regressors shows that the variation in annual growth rate of per capita gross domestic Product is significantly explained by the value of gross capital formation (GRSCF), annual growth rate of total agricultural value added (AGLVAGRT), Annual growth rate of total manufacturing value added (MFVAGRT), and annual growth rate of total services value added (SRVVAGRT) to the extent of 75 per cent this means that the model has a very high predictive ability. The DW value is 1.9.Hence it can be aid that the model is free from autocorrelation problem. It is observed that coefficient of the variable total agricultural value added (AGLVAGRT), is not significant but positive. On the other hand it is also observed that coefficient of the variables, annual growth rate of total manufacturing value added, annual growth rate of total services value added are significant at 1 per cent level of significance but coefficient of the variable, gross capital formation is significant at 5 percent level of significance. The whole model's significance level is at 1 per cent level of significance in the case of Japan for the study period 1995-

2018. In the case of Japan, the study period has been taken 1995 to 2018 due to lack of availability of data. (Table-2).

Table-2.Results of Regression Analysis for the Nation JAPAN for the study period 1995 to 2018			
Regression Equation	AdjR ²	F	DW
$PCGDPGRT=0.005AGLVAGRT+0.26MFVAGRT^{*}+0.77SRVVAGRT^{*}+0.09GRSCF^{**}+1.96$ <div style="display: flex; justify-content: space-around; margin-top: 5px;"> (2.11) (0.3) (9.8) (7.05) </div>	75%	101.9*	1.9
* Indicates significant at 1% level , ** Indicates significant at 5% level .The values of parentheses are ‘t’ Values. Sources: Author’s calculation by using open source data From World Bank.			

7. Afganistan: The Regression equation concerning Annual Growth Rate of Per Capita Gross Domestic Product (PCGDPGRT) as regressand and Annual Growth Rate of Total Agricultural Value Added (AGLVAGRT), Annual Growth Rate of Total Manufacturing Value Added (MFVAGRT), and Annual Growth Rate of Total Services Value Added (SRVVAGRT) as explanatory variables or regressors shows that the variation in annual growth rate of per capita gross domestic Product is significantly explained by the value of Annual Growth Rate of Total Agricultural Value Added (AGLVAGRT), Annual Growth Rate of Total Manufacturing Value Added (MFVAGRT), and Annual Growth Rate of Total Services Value Added (SRVVAGRT) to the extent of 87 per cent this means that the model has a very high predictive ability. The DW value is 2.2. Thus according to the thumb rules the model is free from autocorrelation problem. It is also observed that coefficient of the variables, annual growth rate of total agricultural value added (AGLVAGRT), and annual growth rate of total services value added (SRVVAGRT) are significant at 1 per cent level of significance but annual growth rate of total manufacturing value added (MFVAGRT) is not significant. The level of significance is at 1 per cent in the case of India for the study period. In the case of Afghanistan, the study period has been taken 2003 to 2019 due to lack of availability of data. Here we did not take the value of gross capital formation due to unavailability of the data (Table-3).

Table-3.Results of Regression Analysis for the Nation AFGANISTHAN for the study period 2003 to 2019			
Regression Equation	AdjR ²	F	DW
PCGDPGRT=0.26AGLVAGRT*+0.06MFVAGRT+0.54SRVVAGRT*-2.5 (7.4) (0.65) (6.6)	87%	36.7 *	2.2
* Indicates significant at 1% level. The values of parentheses are ‘t’ Values. Sources: Author’s calculation by using open source data From World Bank.			

To sum up, the analysis shows that agriculture plays a positive and significant role in the economic growth of India (India), Bangladesh (Bangladesh), China (China), Afghanistan (Afghanistan) and Nepal (Nepal), while the economic growth of Japan (Japan) and Bhutan (Bhutan) does not explain the economic growth of the agricultural sector. Sustainable agriculture in Bhutan plays an important role in the socio economic development and economic growth of Bhutan. In addition to climatic hazards, there are challenges to productive and agricultural activities in Bhutan such as water scarcity, land holding, land use change, human wildlife interactions, lack of irrigation and poor infrastructure development. In 2017, the Government of Bhutan developed the most significant project 'Enhancing sustainability and climate resilience of forest and agricultural landscape and community livelihoods in Bhutan' (N Chogyel, 2018). The main goals of this project are to strengthen biological corridors, adapt to climate change, and promote sustainable agriculture in the country by 2023 (N Chogyel, 2018). In the economy of Japan, high transaction costs impede consolidation of farmland and increase efficiency. In addition, a large and complicated distribution system reduces farmers’ income or their total income on the farm(Hiroko Tabuchi (November 11, 2010).

IV. CONCLUSION

The empirical results show that, for the majority of our sample countries, there is evidence to support agri-fundamentalists, who believed and saw agriculture as the engine for growth. While we are currently focusing on the service sector, we must not forget that agriculture is among the most important sectors for economic growth.

In this chapter we have seen that almost all of our selected countries except Japan and Bhutan are associated with agricultural development. Bhutan has a number of barriers to agricultural production, such as natural or ecological, water scarcity, fragmented landholding, changing land use, negative human-wildlife interactions, inadequate irrigation and poor infrastructural development. If such obstacles can be overcome, then we must see a direct impact on agricultural development and with it economic development. Citizens in these two countries are still largely dependent on agriculture. In Japan According to the farmers, their farm sector has been destabilized or weakened by a dependence or reliance on tariffs and ineffective government subsidies, which do not reward farms for innovation or productivity (Hiroko Tabuchi, New York Times, November 11, 2010). It can be said that ,in Japan high level transaction costs also hamper efforts to consolidate farmland and raise efficiencies. Moreover, a sprawling and bureaucratic distribution system dissipates farmers’ total earnings or their total revenue from the farm. [Hiroko Tabuchi, New York Times, November 11, 2010] Therefore, it is not entirely correct to say that economic development depends only on the service sector and the manufacturing sector, but it can also be said that the agricultural sector

in an economy plays a leading role in economic development in tandem with the service sector and the manufacturing sector.

Thus it can be said that if economic development is to be done properly or appropriately in the future, economic development can be possible not only in the service sector or manufacturing sector but also in agriculture.

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