Effect of Agriculture GDP on Economic Active Population With Reference to Nepal

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Abstract- The impact of agriculture in developing countries like Nepal are in top priority, moreover agriculture is used to create employment and to increase the national income and per capita income. This research paper examines casual-relationship between Gross Domestic Product of agriculture and Economic Active Population with reference to Nepal. The data were drawn from Ministry of Finance and Central Beauro of Statistics from 1983/84 to 2016/17 in macro level. It estimates the output of production function where R-square 0.990 means that 99 percent Gross Domestic Product of agriculture explained on the basis of economic active population and expenditure in agriculture sector of Nepal. So that, this is highly significant among them. Similarly to estimate the growth rate, where one percent increase in economic active population age (15 to 59) years leads to 0.630 percent increase in gross domestic product of agriculture in Nepal. Overall result shows that there has been significant impact of GDP of agriculture on macroeconomic variables.

Index Terms- Gross Domestic Product, Growth rate, Macroeconomic Variables.

I. BACKGROUND OF THE STUDY

Agriculture has been a major occupation for livelihood. With progress in science and technology, contribution of the agriculture sector to the economy is declining while that of industries and services sector is gradually increasing. The share of the agriculture sector in GDP is 28.9 percent while about two third of the population is engaged in this sector. Likewise, more than 40 percent of total land area is covered by forests. Progress in Agriculture and Forestry sectors could not be achieved to the desired level for failing to link these sectors with other sectors of the economy (Economic Survey 2016/17).

Oxford (2000) defines agriculture as the science or practice of farming. Anyanwu (1997) noted that agriculture means "involves the cultivation of land, raising and rearing of animals for the purpose of production of food for man, feed for animals and raw materials for industries." It involves cropping live-stock, forestry, and fishing, processing and marketing of these agricultural products. While rising agricultural productivity has been the most important concomitant of successful industrialization. Among the roles conventionally ascribed to the agricultural sector in a growing economy do those of providing adequate food for an increasing population, supplying raw materials to a growing industrial sector, constitute the major

source of employment earning foreign exchange through commodity experts, and providing market for the products of the industrial sector?

In specific, agriculture GDP (Gross Domestic Product) is the total value of everything produced by all the people and companies in the country. It does not matter if they are citizens or foreign owned companies, if they are located within the country's boundaries. The government counts their production as GDP. Usually, GDP is the broadest quantitative measure of a nation's total economic activity. GDP in Nepal was worth 21.14 billion US Doller in 2016. According to Asian Development Bank (ADB) Nepal's GDP growth in 2017 was 6.9%.Similarly, Economic Active Population ages (15to 59) years is the proportion of a country's population that is involved in the production and distribution of goods and services, that is the labour force. According to the CBS(Central Beauro of Statistics) index Economically Active Population covered the ages from(15to59) years. Furthermore, Government Expenditure in Agriculture Sector of Nepal and their composition to develop an analytical framework for determining differential impacts of governmental expenditure on economic growth of Nepal. The primary purpose of this research article is that to establish the logical relationship among variables whether they are significance or not.

In Nepal, economy is estimated to expand by 5.9 percent in the current FY 2017/18.It was 7.4 percent in FY(Fiscal Year)2016/17. In the current FY, the growth of overall agriculture production is estimated to limit within 2.8 percent mainly because of the paddy production, the major contribution having the share of 20.8 percent of total agriculture production, decreased by 1.5 percent due to unfavorable monsoon and floods in terai. Due to the improvement in trade and service sector, non –agricultural sector is estimated to expand by 7.1 percent in FY 2017/18. Overall economic activities are oriented towards positive directions as a result of conductive environment in investment due to stable government formed after the election of three tiers of government.

The annual economic growth has remained 4.3 percent on an average in the last decade. In this period, the average annual growth rate of agriculture and non-agriculture sector remained 2.9 percent and 4.9 percent, respectively. In the last decade, the contribution of agricultural sector to GDP has decreased annually. In the current FY 2017/18, the respective contribution of agricultural and non-agriculture sectors to GDP is estimated to remain at 27.6 and 72.4 percent. In the FY 2016/17,the contribution of agricultural and non-agriculture sector to GDP was 28.8 percent and 71.2 percent, respectively.

II. IMPORTANCE OF AGRICULTURE GDP IN NEPAL

The list of the importance of agriculture to Nepalese economy is endless. Therefore, the bulk of the work lies in the hands of the government and would be entrepreneurs to take advantage of the enormous benefit that is in the agriculture sector. Similarly, agriculture sector is also capable of reducing the country's level of unemployment on the account that the sector is labour intensive. It will also curb the effect of rural-urban migration which will help to decongest the urban areas and make life easier for people both in the rural or urban area. The government needs to implement agriculture policy and programs that help improving agro-based industry while raising production and productivity of the agriculture sector. Program is needed to encourage production and consumption of healthy food grains while promoting the use of organic pesticides in the agriculture system. Food sovereignty guaranteed by the constitution of Nepal requires to be ensured by raising the size of agriculture production while adopting scientific method in food grains and cash crops farming systems. Agriculture policy and programs have been geared towards this direction Wagle (2018).

This study explores what has happened in the Nepalese agriculture research and seeks to rebuild and extend the primal approach in GDP of agriculture production to analysis by Factor Analysis. The research recognizes that input such as government expenditure in agriculture sector of Nepal and economic active population ages (15to59) years used in agriculture production have distinct function and this must be accounted for explicitly in the simple and multiple correlations, whether they are significance or not. In Nepal, every agro-ecological zone, priority is given to food crops first such as rice, wheat, maize and millet and then to cash crops that is, vegetables, fruits, jute and cotton. People need food crops for meeting household needs and cash crops for income generation with regard to success stories of crop diversification. Many people/farmers have successfully adopted cultivation of different off-season vegetables like cabbage, peas, cucumber, and tomato etc using modern technology.

III. REVIEW OF LITERATURE

Numerous works have studied the Gross Domestic Product of agriculture and it's relationship with economic active population and government expenditure in agriculture sector of Nepal in the past. Literatures reveal three types of indices in practice such as global or international, national or Nepalese contest and regional for different objectives, methodology and conclusion. Numerous studies have been conducted to investigate the logical relationship between GDP of agriculture on economic active population and government spending in agriculture sector of Nepal. This section is divided into two parts.(a) review of theoretical foundation and (b) review of empirical studies. The theoretical review Numerous studies have been conducted to investigate the relationship between production function and other macroeconomic variables under classical hypothesis, while the empirical review examines both the short run and long run relationship between or among the variables under consideration. In this section, it is tried to review various studies research reports, articles and the reposts of national and international institutions in the area of production function in the agriculture sector of Nepal.

There are a few researches in this area in Nepalese contest. More appropriate and relevant literatures are included in here.

Acharya, U.P.(2018) argued that in The Journal of Economic Concerns Volume 9. Number 1 pp 96 has concluded that Agriculture is a primitive sector for the economic development of any country. Currently industrialized nation backed themselves by agricultural sector to attain the growth of their nation. The impact of agriculture in developing countries like Nepal is in top priority, moreover in means to use the agriculture for rural development. In this paper initially major three dimensions are selected and analyzed based on the statistical information. This research concludes that three dimension viz , rural poverty alleviation, major supplies of food and stimulants of economic growth of rural economy. Positively helps for the rural development.

Economic Survey (2017) revealed that Nepalese economy is passing through structural changes. The contribution of agricultural sector (agriculture, forest and fisheries) in total Gross Domestic Product is estimated to be 27.6 percent in the current FY 2017/18 which was 28.8 percent in the FY 2016/17. The annual growth rate of agriculture in the basic price level is estimated to be 2.7 percent in the current FY.

In the past two decades, the production of Nepalese agricultural sector has been increased by 3.2 percent. This growth has been 3.2 percent of India, 3.9 of both China and Bangladesh during this period.

Satyal, V.R. (2011) argued in the Economic Journal of Development of issues Vol.11 pp 1-18, Co-Supervisor Concluded that despite decade long investment and planning in Agriculture it is declining in terms of production and engaged labour force. If such structural shift were natural it would be satisfactory. However, in absence of sustainable development in other sector like service or industry, such shift could be very dangerous for the country whose primitive knowledge, life style, culture, religion are based on agriculture. This paper attempts to show the current disappointment in agriculture and analysis some causes for the decline with few recommendations for improvement.

Wagle, T.P.(2016) has written in research publication "Global Journal of Agriculture Research "on the research topic Government Expenditure in Agriculture Sector of Nepal : An Empirical Analysis, Volume 4, No.3,pp.1-12, July 2016 published by European Centre for Research Training and Development UK(www.eajournals.org) has mentioned that this study examines the logical relationship between Agriculture Production and Government Expenditure in Nepal. The empirical research has applied Cochrane-Orcutt auto-regressive model from panel data for the period 1983/84 to 2013/14 in averages. In this regard, the empirical evidence confirm that the expenditure in agriculture sector is the causes of economic growth in Nepal. More specifically, iteration five gives the D-W value is 1.697 to compared tabulated dL,dU values are 1.284 and 1.567 at the two independent variables. The D-W value lies between dU and 4-dU, where this is nearest to 2. So that, there is no auto-correlation among error terms. Fact finding to shows that, the checking results homogeneous with theory and healthy and strong of the conclusion.

Wagle,T.P. and Satyal,V.R.(2018) have concentrated in research publication "The Journal of Economic Concerns" on the research topic The Role of Agriculture in an Economy: A case of

Nepal, Volume 09, No 01,pp84-95, January-July 2018 in Nepal has described that this research paper summarizes information on the importance of the objectives of agriculture and agricultural policies based on previous studies. We focus on studies that examine logical relationship between production and investment in agriculture for the economic. Chow-test is concluded to determine the impact of expenditure on economic growth in agriculture sector of Nepal. This research has been analyzed over the period of 1983/84 to 2013/14 in macro-level of time-series data. The marginal impact is estimated of agriculture production means that one percent increase government expenditure in agriculture sector of Nepal leads to 0.98 percent increase in gross domestic product of agriculture. The overall results show that there has been significant impact of expenditure on macro-economic variables. So the conclusion is robustness.

IV. Objective of the Research

The general objective of this research is to develop a multiple regression model so that existing methods of time series modeling and forecasting can be improved. The overall objective of the article was to generate statistics required for the development of agriculture GDP in Nepal. For this the specific objectives are set here in:

-To estimate the strength of linear relationship between production of agriculture and constant.

-To estimate GDP of agriculture production on economic active population and investment in agriculture at national level.

-To provide relevant statistics required for the development of food and agriculture production to planners, policy makers, and researchers.

So that, this research to develop a new paradigm for agriculture production analysis in Nepal.

V. Methodology and Data Analysis

The quantitative research is based on inferential statistics, for testing objective theories by examining the relationship among variables with structural bases, and testing regression model by using deductive methods. In regression model, we establish the cause and effect relationship between GDP of agriculture production on constants. The study is mainly based on secondary data have been collected from the various issues of economic survey published by central beaureu of statistics and Ministry of Finance. As the study is based on time series data from (1983/1984 to 2016/2017) in a macro-economic level.

To analyze the data SPSS Vs 20 is used for standard multiple regressions. Target variable GDP of agriculture production is put in the dependent variable and all other independent variables i.e. Economic Active Population ages (15to59) years and government expenditure in agriculture sector of Nepal are put in the independent variables, then to check in estimates and in model fit. The output window of SPSS pups up with several output sections, the output in Regression table serve our purpose for this study.

VI. Model specification

Given the foregoing discussion, the following model is specified in order to determine the impact of agriculture production on economic growth in Nepal. The relationship between gross domestic product of agriculture as an indicator of economic growth and economic active population ages(15to59) years and government expenditure in agriculture sector of Nepal are independent variables has been analyzed by applying the OLS method under which parameters have been estimated via regression models. The model is being used to test the hypothesis then there is significant impact of economic active population in the economy of the country. Then t-test, F-test, regression coefficients and coefficient of determination have been computed by using SPSS software version-20. In functional form, the multiple regression analysis is:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + U_i \dots\dots\dots\dots\dots\dots\dots\dots(1)$$

This is the population equation, where α, β_1, β_2, are parameters.

Where, X_1, X_2, are economic active population ages(15to59) years and government expenditure in agriculture sector of Nepal represents independent variables whereas Y is the GDP of agriculture production or dependent variable, and then U_i is the random error term.

The estimated regression line is
$$y = \hat{\alpha} + \widehat{\beta_1} X_1 + \widehat{\beta_2} X_2 + \hat{U_i} \quad \dots\dots\dots\dots\dots\dots\dots\dots(2)$$

We know that regression line passes through mean values of X and Y i.e. $(\bar{X}, \bar{Y})$
$$\bar{Y} = \hat{\alpha} + \widehat{\beta_1} \bar{X_1} + \widehat{\beta_2} \bar{X_2} + E(\bar{U_i}) \quad \dots\dots\dots\dots\dots\dots(3)$$

Subtracting equation (3) from equation (2),   resulted as below
$$y = \widehat{\beta_1} x_1 + \widehat{\beta_2} x_2 + \hat{u} \quad \dots\dots\dots\dots\dots\dots\dots\dots(4)$$

This is the estimated production function equation on various constants.

While U is the random error, with mean zero and constant variance.

The simple model is converted in to the Log-Log Models have been used to observe the effects of GDP of agriculture on the Independent variables. The data are constant prices have been tested in the following Models.

$\ln(GDP\_agri)_t =$ $B_0 + B_1 \ln (Pop\_LF) + B_2 \ln (Exp\_agri) +$ …………(U_i)…..(5)

Where,$(GDP)_t$ = Gross Domestic Product of agriculture with long period of time.

B_0 = Autonomous Constant i.e. in research inputs and output are approximately equal.

U_i = Error terms, in average is equal to zero.

VII. Analysis of hypothesis

Based on the above facts related to agriculture based population we will test a few hypotheses.

In linear regression, we tested for a significant relationship by looking at the t or F-ratio. In multiple regressions, the two ratios test two different hypotheses.

The t ratio and significance level in each row of the table of coefficients tell us whether to reject each of the null hypotheses. In this instance, at the 0.05 level of significance, we reject in both cases, due to the very low P-values. That is to say, both independent variables have statistically significant relationships among constants.

The F- ratio in a multiple regression is used to test the null hypothesis that all of the slopes are equal to zero:

H0: $\beta_1 = \beta_2 = 0$ There is no significance difference between GDP of agriculture and Economic active population with reference to Nepal. In other words, regression coefficients are independent to each other. Null hypothesis is true.

H1: $B_1 \neq B_2 \neq 0$ There is significant difference between GDP of agriculture and Economic active population with reference to Nepal. In other words, regression coefficients are dependent to each other, or the null hypothesis is not true.

Note that the alternative hypothesis is different from saying that all of the slopes are non zero. If one slope were zero and the other were not, we would reject the null in the F-test. In the individual significance test i.e. t-tests, we would reject the null in both independent variables, and we reject the null hypothesis or in other words, we accept the alternative hypothesis. In research, they are statistically significance at five percent level of significance.

VIII. Regression:

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.995[a]	.990	.989	.03302	.867

a. Predictors: (Constant), LNExp_agri, lnPop_LF
b. Dependent Variable: lnGDP_agri

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3.199	2	1.600	1467.378	.000[b]
	Residual	.034	31	.001		
	Total	3.233	33			

a. Dependent Variable: lnGDP_agri
b. Predictors: (Constant), lnExp_agri, lnpop_LF

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	.056	1.895		.029	.977	-3.809	3.920
	LNpop_LF	.630	.133	.439	4.742	.000	.359	.901
	lnExp_agri	.170	.028	.560	6.049	.000	.113	.228

a. Dependent Variable: lnGDP_agri

IX. Discussion and Major Findings:

Agriculture is in the mainstream in the development. It creates backward and forward linkages in economy. Forward linkages are mainly in the GDP of agriculture and food processing industries. Similarly, the main backward linkages are with the agricultural industries that produce animal feed and mineral industry for purchased fertilizers. Usually, various factors affect gross domestic product of agriculture but the present study tests the logical relationship between GDP of agriculture and economic active population and government expenditure in agriculture sector of Nepal. In this process, a regression model was fit. The simple model was converted in to the Log-Log Models have been used to observe the effects of GDP of agriculture on the Independent variables. The data are constant prices have been tested in the following Models.

$$\ln(\text{GDP\_agri})_t = B_0 + B_1 \ln(\text{Pop\_LF}) + B_2 \ln(\text{Exp\_agri}) + \ldots\ldots\ldots\ldots\ldots\ldots(U_i)$$

Where, $(\text{GDP})_t$ = Gross Domestic Product of agriculture with long period of time.

B_0 = Autonomous Constant i.e. in research inputs and output are approximately equal.

U_i = Error terms, in average is equal to zero

The following result was obtained:

$$\ln(\text{GDP\_agri})_t = 0.056 + 0.630 \ln(\text{Pop\_LF}) + 0.170 \ln(\text{Exp\_agri}) + \ldots\ldots\ldots..(U_i)$$

t_{cal}	= (0.029)	(4.742)	(6.049)
S.E.	= (1.895)	(0.133)	(0.028)
Significance	= 0.977	0.000	0.000
R^2	= 0.990	F_{cal} = 1467.378	D.W. = 0.867

The results of the present research article derived through the use of prescribed methodology. These are in accordance with the said objectives and are describe, discussed on the basis of regression results. In linear regression, we tested for a significant relationship by looking at the Collective significance test i.e. F-test and Individual Significance test i.e. t-test. Above empirical results to show that, F-test is statistically significance at five percent level of significance. Similarly, the t-ratio and significance level in each row of the regression table of coefficients tell us whether to reject each of the null hypotheses. In this instance, at the 0.05 level of significance, we reject null hypothesis in both independent variables, due to the very low P-value. This is to say, both independent variables have statistically significant relationships among constants.

While, in time-series data, to test the Durbin-Watson whose value is 0.867. If D-W value is less than 1, then to improve the model, Cochrane-Orcutt iteration ten procedure was applied. The iteration result with improvement considering the zero iteration to upto ten was taken as under.

$R^2 = 0.263$,	Adj $R^2 = 0.187$,	$F_{cal} = 5.17$
$F_{0.05}(2,31) = 3.340$	D.W. = 1.436,	$k^* = 2$
$d_L = 1.321$,	$d_U = 1.577$,	No of

observation = 34

4 - d_U = 4 – 1.577 = 2.422 i.e. nearest to 2. It concludes that 2.422 lies between d_U and 4 -d_U i.e. do not reject the null hypothesis. So that there is positive no auto-correlation among error terms of multivariate variables in agriculture sector of Nepal. In other words, figure to show that R-square is decreasing while; D.W. value is gradually increasing in real sense. In fact, robust error terms of Government Expenditure in agriculture sector and Economic Active Population are Independent to Economic growth of Nepal.

X. CONCLUSION:

The present study concludes that there is a significant impact of Gross Domestic Product of agriculture on Economic Active Population with reference to Nepal. The collective significant test i.e. F-test is 1467.378, which is higher than tabulated value F(2,31) is 3.34 at five percent level of significance. So it concludes statistically significance, this implies that agriculture production on economic active population and expenditure in agriculture sector of Nepal have a positive sign and thus denoting a positive relationship with GDP of agriculture (Economic Growth) which is expected to exist. Similarly for individual significance test (t-test) is also same nature, tabulated value of student t-statistic at five percent level of significance t(33) is 1.96 and calculated value for economic active population is 4.742, so that it is statistically significance, and tabulated value of expenditure is 6.049. It reveals that calculated value is higher than tabulated value, so it is statistically significance among them. Fact findings to show that the checking results consistency with theory and robustness of the conclusion.

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Annex-0I
Large Size Secondary Time-Series Data

year	real_GDP	POP_LF	Exp_Agri
1983/84	84944.37	7953806	2257.2
1984/85	93045.33	8119245	2276.1
1985/86	95237.36	8288125	2713.6
1986/87	97810.66	8460518	3062.3
1987/88	97128.63	8636497	3675.5
1988/89	103497.03	8816136	4257.2
1989/90	109877.99	8999512	5047.04
1990/91	116212.92	9186702	5536.8
1991/92	118715.09	9377785	6515.6
1992/93	117451.46	9572843	7009.01
1993/94	116723.4	9576569	8058.9
1994/95	125598.16	9792042	8556.9
1995/96	125179.74	10012363	9689.6
1996/97	129950.57	10237641	10878.5
1997/98	135620.9	10467988	11249.5
1998/99	136775.72	10703518	13237.3
1999/00	140660.4	10944347	14513.1
2000/01	147542.9	11190594	15378.1
2001/02	155624.54	11442383	16392.5
2002/03	160422	11699836	17063.4
2003/04	165761	12310968	18362.1
2004/05	173734	12477166	19668.6
2005/06	179811	12645608	20859.1
2006/07	183015	12816324	22353.6
2007/08	184796	12989344	24332.3
2008/09	195559	13164700	30547.7
2009/10	201500	13342423	39151.9
2010/11	203752.9	13522546	47327
2011/12	214786.44	13705101	50046.5
2012/13	224730.25	13890119	52786.9
2013/14	227193.41	15091848	58369.2
2014/15	237521.88	16376446	61124.22
2015/16	240137.93	16817783	64009.28
2016/17	240205.94	17262195	67030.51

Sources: (i) Real_ GDP of agriculture: Economic Survey 2000/01, 2013/14, 2016/17, from Ministry of Finance.

(ii) Pop_LF(Labour Force) Population Census 1981, Volume I part I page no 299, In 1991 table-05, Population by five year age group. Similarly, 2001 Census Table 10, page 24 population by five year age group, and 2011 Census, page 65, Volume 01.

(iii) Exp_agri, Expenditure in agriculture sector of Nepal, by MOF (red books) from 1983/84 to 2016/17.