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Links between Public Expenditure and the Performance of Agriculture in India

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ABSTRACT

It is evident that the government spending on the agriculture sector has been stagnant in the last few years and so also the sector's contribution to total GDP. Thus, an attempt is made in this paper to establish a link between public expenditure on agriculture and agricultural output. It is also believed that government spending on agriculture is not the only factor which contributes to the AGDP, factors like special area program, irrigation and flood control, village & small industries and rural development contributes too. All mentioned factors comprised and took it as rural development and applied regression analysis for 20 years of data taken from State Finances published by the Reserve Bank of India. Factors like spending on rural development and special area program directly affects the agricultural output which reflects reducing regional disparity. The average ratio of public expenditure on the sector to AGDP has been meager as it stood at 4.85% but the sector has the potential to improve its output if the policymakers focus on reallocation of available resources among sub-heads discussed above.

Keywords: Agricultural production, public expenditure on agriculture

JEL Classification Codes: Q10, Q19, H59

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I. INTRODUCTION

The share of the agriculture sector has been declining gradually in total GDP of the country over the years. It is estimated to around 19 percent in the year 2020-21. Despite this, the agriculture sector continues to play a vital role in the Indian economy. More than half of the workforce depends on it for their sustenance.

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Finance is a basic requirement of the economy whether it is developed or a developing one. It is one of the most important components for the government to bring the economic growth. Rising public expenditure promotes higher standard of living by providing better income, infrastructure, healthcare, education as well as food security. Expenditure on agriculture sector leads to increase in the agricultural output through transformation of the agriculture sector. For an agrarian economy like India, public expenditure on agriculture brings food security also helps industrial sector in providing raw materials for the same. Majority of the population especially in rural areas depended on agriculture for their livelihood; therefore, spending on agriculture sector is one of the most important instruments of the government to promote economic development as well as alleviating poverty.

Government expenditure can directly or indirectly affects the farm income. Investment in research and development for agriculture leads to the improvement in the methods of cultivation, alternative use of pesticides and hence productivity will be improved. Governments spending like access of formal credit to farmers, transportation facilities, spending on healthcare of animals and veterinary etc have a significant impact on the agricultural output.

To analyse the outcome of public expenditure on agriculture sector in India, here is it made an attempt to examine the impact of public expenditure on agriculture & allied activities and rural development on the agricultural output. The variable rural development included here meant for a combination of sectors such as; special area program, irrigation & flood control, village & small industries and rural development classified by the Reserve Bank of India. The Government of India spends separately on each sector mentioned above and it is believed that, public expenditure on rural development only is not the meaning of rural development but a combination of such sectors which have discussed earlier.

II. MOTIVATION

Studies related to public expenditure on rural development and its impact on agricultural output is scarce. Thus, the motivation behind this piece of article is to establish a link between agricultural output and public expenditure on agriculture and to examine how directly or indirectly public expenditure on rural development can accelerate the agricultural outputs as it is believed that expenditure on rural development positively contributes to the agricultural output.

III. REVIEW OF LITERATURE

(Mani, Bhalachandran, & Pandit, 2011) had a study on “Public Investment In Agricultural and GDP Growth: Another Look at the Inter Sectoral Linkages and Policy Implications. This study is based on secondary data taken from Handbook of Statistics on the Indian economy, RBI and National Accounts Statistics, CSO for a period of 1970-71 to 2008-09. It used Augmented Dickey-Fuller test for stationary, OLS and Structural model to analyse the data. It found that, there is a significant influence of agricultural sector on industry sector and also on the service sector. Public sector investment has a crowding-in effect on the private sector investment in both agriculture and industry sector. Agricultural capital stock has been influenced by the increased level of investment in agriculture by both public as well as private sector.

(Bayya & Chittedi, 2012) had a study on "Public Expenditure on Irrigation and Its Impact on Agriculture Production." It used secondary data from different state sources for a period of 1979-80 to 2008-09 to investigate the impact on agricultural production due to investment in irrigation. It used descriptive statistics and regression model to analyse the data. There exists a positive and significant relationship between investment in irrigation and agricultural production and also with the productivity. Increase in the irrigation facility has expanded the cropping pattern and rise in cultivation area too. As the irrigation facility increase the agricultural production and productivity, Government should introduce more irrigation schemes and mechanism to maintain the existing schemes for the smooth functioning of agricultural activities. (Malik & Mohanty, 2023) also highlight the positive impact of irrigation infrastructure on agricultural productivity.

(Singh, Pal, & Jha, 2015) had a study on "Transitioning India's Public Expenditure in Agriculture towards Higher Growth and Equity." Secondary data taken from various publications and used auto-regressive distributed lag bounding test, descriptive statistics to analyse the data. It found that, investment in agriculture has increased in the first decade of 21st century. Public expenditure on research and development has helped in rural poverty reduction and also in stimulating growth. Investment in research & education and in infrastructure development should be prioritizing in relatively backward states of the eastern India. However, owing to the implementation of the Fiscal Responsibility and Budget Management Act in 2005, there has been a stagnation in the public expenditure on agriculture (Mohanty & Singh, 2007).

(Chandio, Yuansheng, Sahito, & Larik, 2016) had a study on "Impact of formal credit on agricultural output: Evidence from Pakistan." This study is based on secondary data collected from Economic survey of Pakistan for a period of twenty years (1996-2015). Augmented Dickey Fuller test and Phillips-Perron test were used to test stationary of time series data and the Ordinary Least Square (OLS) method used to analyse the data. It found that, there exists a positive and significant relationship between formal credit and agricultural output. As the formal credit increases, agricultural output also increases.

(De & Dkhar, 2018) had a study on, **"**Public Expenditure and Agricultural Production in Meghalaya, India: An Application of Bounds Testing Approach to Co-Integration and Error Correction Model." The study used secondary data collected from Directorate of Economics and Statistics, Meghalaya and State Finances published by Reserve Bank of India for a period of 1985 to 2014. It used Augmented Dickey-Fuller test for stationary, Bound test for Co-integration, Error correction model, Auto-regressive distributed lags model to analyse the data. It found that, public expenditure on agriculture and allied sector has a negative impact on the agricultural output while the expenditure on education, rural development and public transportation have a positive impact on the agricultural output of Meghalaya state.

(Dutta, 2019) had a study on "Public Expenditure on Agriculture and Allied activities in Assam and Its Impact on GSDP." It used secondary data for a period of 1990-91 to 2016-17 collected from Directorate of economics and statistics of Assam state and RBI Publications State finances. Vector Auto Regression (VAR) model for selecting lag length, Augmented Dickey-Fuller test and Granger causality test have used to analyse the data. There exists a two way cause and effect relationship between the public expenditure on agriculture sector and

GSDP of Assam. Investment in soil & water conservation and crop husbandry positively affects the GSDP of Assam state.

(Rajesh, Shivaswamy, Anuja, Singh, Shekhawat, & Harish Kumar, 2020) had a study on "Public expenditure on agricultural inputs and farm support services in India – An overview." The study used secondary data collected from different states for a period of 2006-07 to 2016-17. It used descriptive statistics to analyse the data and found that imbalances in public expenditure allocation across states in agriculture sector. Investment in research & development is very low in comparison to other sectors.

IV. OBJECTIVES

The objectives of the current study which have been addressed in the following sections are to analyze the role of agricultural public expenditure on agricultural output and to investigate the impact on agricultural output due to public expenditure on rural development.

V. DATA AND METHODS

Data

Secondary data has taken from Handbook of Statistics on Indian economy, State Finances: A study of budgets published by Reserve Bank of India & National Accounts Statistics CSO for a period of 1999-2000 to 2020-2021.

Tools

- Augmented Dickey-Fuller test has been used to test the stationary of data.

All the variables (after transformed into log form) are stationary at lag length one (I_0) except individual value of special area program, irrigation & flood control, village & small industries and rural development even after first difference.

- Multiple regression analysis has been performed using OLS method.

Models

Several regression models have been used using OLS method for variables listed below;

Log of Agricultural GDP as a proxy for agricultural output as the dependent variable

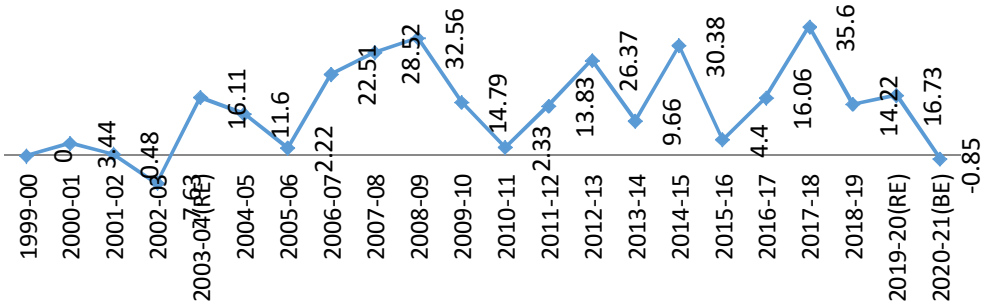
Log of public expenditure on agriculture & allied activities, special area program, irrigation & flood control, village & small industries and rural development separately as independent variables

VI. RESULTS AND ANALYSIS

Growth pattern of public expenditure on different sectors

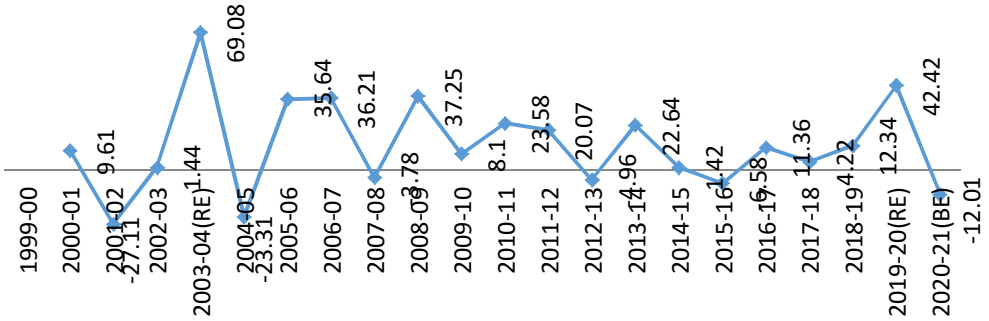
Here it is presented (Figure 1 to figure 5) the growth rate of public expenditure on agriculture & allied activities, special area program, irrigation & flood control, village & small industries and rural development.

Figure 1- Growth rate of public expenditure on Agriculture & allied activities



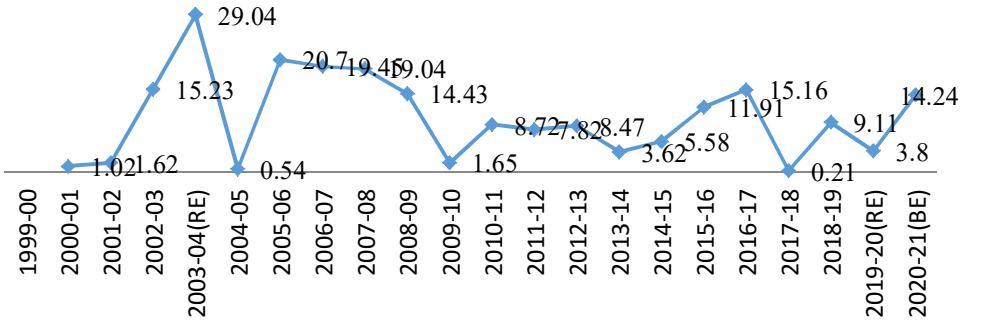
Source- Authors' calculation from data set used

Figure 2- Growth rate of public expenditure on Special Area Programme



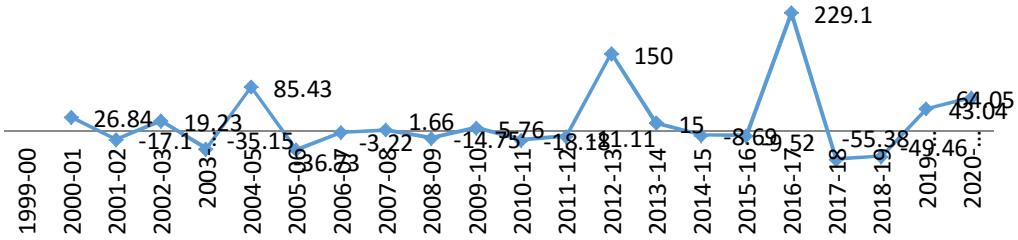
Source- Authors' calculation from data set used

Figure 3- Growth rate of public expenditure on Irrigation & Flood Control



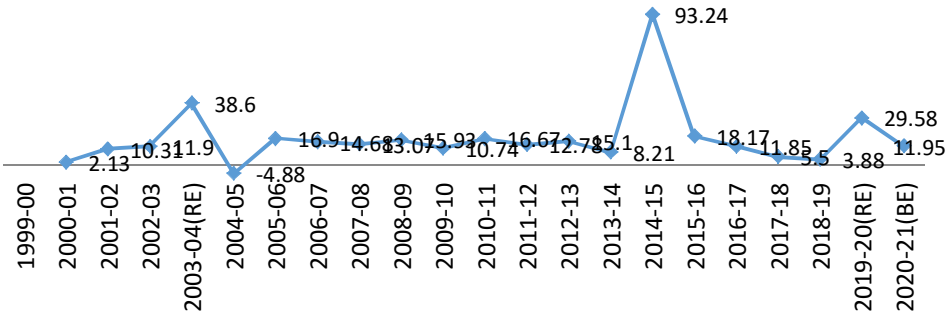
Source- Authors' calculation from data set used

Figure 4- Growth rate of public expenditure on Village & Small Industries



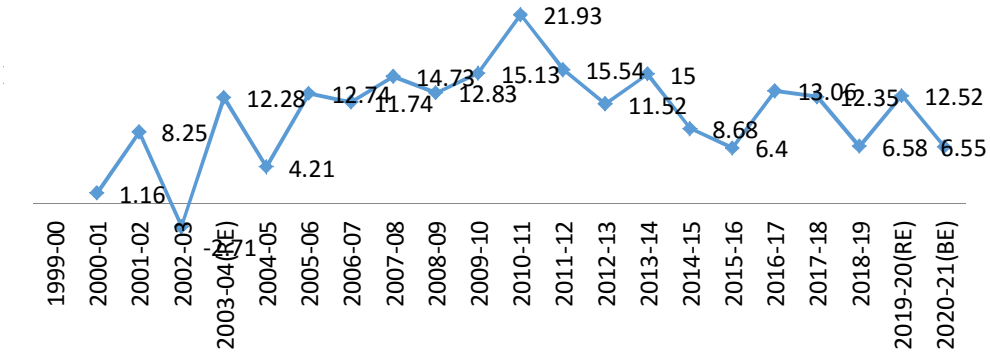
Source- Authors' calculation from data set used

Figure 5- Growth rate of public expenditure on Rural Development



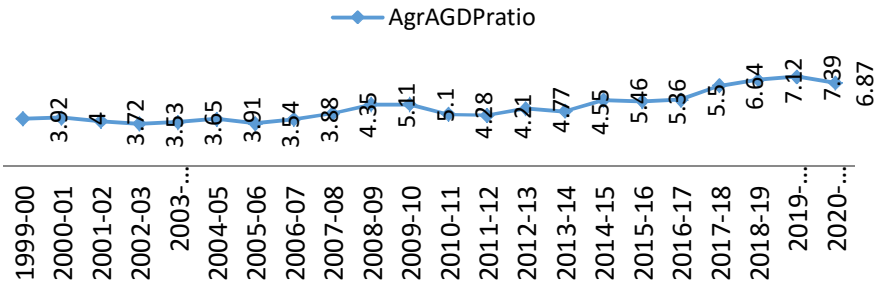
Source- Authors' calculation from data set used

Figure 6- Growth rate of Agricultural GDP



Source- Authors' calculation from data set used

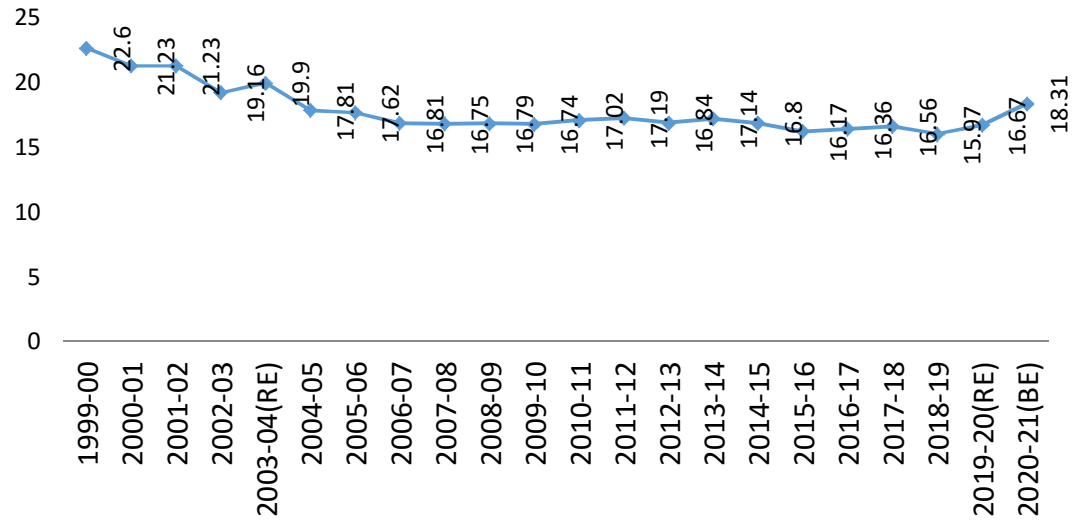
Figure 7- Public expenditure on Agriculture & allied activities to Agricultural GDP ratio



Source- Authors' calculation from data set used

Ratio of public expenditure on agricultural & allied activities to the agricultural GDP shows a moderate increase over the years. The average ratio for the same is stood at 4.85%.

Figure 8- Agricultural GDP to total GDP ratio



Source- Authors' calculation from data set used

Regression Analysis

We have performed five regression models to check the individual impact of independent variables (public expenditure on agriculture and allied activities, special area program, irrigation & flood control, village & small industries and rural development) on dependent variable (agricultural output) and also the aggregate impact of the same.

Model 1: Log of agricultural GDP = f (log of investment in agriculture & allied activities only)

Table 1- Coefficients table for model 1

Variables	Beta	t value	p val.
Constant	2.44	27.48	0
logPEonAgr&Allied	0.76	41.08	0

Note: R-squared= 0.9883, F value= 1687.36, Sig= 0.000, DW d-stat.= 0.89
Source: Author's calculation from secondary data set used

The regression result in Table-1 shows that there is a positive and significant relationship between investment in agriculture & allied activities and agricultural GDP. A one unit increase in investment in agriculture & allied activities will lead to a change of 0.76 units in agricultural GDP. The value of R squared shows that, 98.83% of the dependent variable is explained by the independent variable and rest are explained by the error term.

Model 2: Log of agricultural GDP = f (log of investment in Rural Development with Agriculture & Allied Activities)

Table 2- Coefficients table for model 2

Variables	Beta value	t value	p value
Constant	1.66	15.49	0
logRDwithAGR	0.84	41.07	0

Note: R-squared= 0.9883, F value= 1686.75, Significance= 0.000, DW d-statistic = 0.68
Source: Author's calculation from secondary data set used

Model 3: Log of agricultural GDP = f (log of investment in agricultural & allied activities and log of rural development without agriculture & allied activities)

Table 3- Coefficients table for model 3

Variables	Beta value	t value	p value
Constant	2.14	14.73	0.00
logAgrAllied	0.517	4.96	0.02
logRDwithoutAGR	0.29	2.40	0.00

Note: R-squared= 0.9910, F value= 1047.29, Significance= 0.000, DW d-statistic = 0.83
Source: Author's calculation from secondary data set used

The regression result in Table-2 show that there is a positive and significant relationship between investment in rural development with agriculture & allied activities and agricultural GDP. A one unit increase in investment in rural development with agriculture & allied activities will lead to 0.84 unit change in agricultural GDP. The value of R squared shows that, 98.83% of the dependent variable is explained by the independent variable and rest are explained by the error term.

The regression results in Table-3 show that there is a positive and significant relationship between independent variables (investment in agriculture & allied activities and investment in rural development without agriculture & allied activities) and dependent variable agricultural GDP. A one unit increase in

investment in agriculture & allied activities will lead to an increase of 0.51 units in agricultural GDP with 5 percent level of significance. Similarly one unit increase in rural development without agriculture and allied activities leads to 0.29 unit change in the dependent variable. The value of R squared shows that, 98.83% of the dependent variable is explained by the independent variable and rest are explained by the error term.

Model 4: Log of agricultural GDP = f (log of rural development without agriculture and allied activities)

Table 4- Coefficients table for model 4

Variables	Beta value	t value	p value
Constant	1.61	11.12	0.00
logRDwithoutAGR	0.88	30.82	0.00

Note: R-squared= 0.9794, F value= 950.07, Significance= 0.000, DW d-statistic = 0.62

Source: Author's calculation from secondary data set used

The regression results in Table-4 show that there is a positive and significant relationship between investment in rural development without agriculture & allied activities and agricultural GDP. A one unit increase in investment in rural development without agriculture & allied activities will lead to 0.88 unit of change in agricultural GDP. The value of R squared shows that, 97.94% of the dependent variable is explained by the independent variable and rest are explained by the error term.

Model 5: Log of agricultural GDP = f (log of investment on agriculture & allied activities, special area programme, irrigation & flood control, village & small industries and rural development)

From model -5 (Table-5), it is found that one unit increase in investment in agriculture & allied activities leads to a 0.5 unit of change in the dependent variable. Similarly, one unit increase in special area program increases the agricultural GDP by 0.31 units. There exists a negative relationship between the expenditure on irrigation & flood control and agricultural GDP, which shows that one unit increase in irrigation & flood control will decrease the agricultural GDP by 0.37 units. Variables like village & small industries and rural development are found to be statistically insignificant. 98.71% of the dependent variable is explained by independent variables and rests are by error term.

Table 5- Coefficients table for model 5

Variables	Beta value	t value	p value
Constant	3.35	9.90	0.000
logAgrAllied	0.5	3.36	0.004
logSAP	0.31	2.15	0.047
logIFC	-0.37	-2.21	0.042
logVSI	0.04	0.84	0.411
logRD	0.17	1.29	0.214

Note: F value = 245.46, P value = 0.0000, R-squared = 0.9871, DW d-statistic = 1.43

Source: Author's calculation from secondary data set used

VII. FINDINGS AND CONCLUSION

From the above analysis it is found that, as the public expenditure on agriculture & allied activities increases, agricultural output also increases. Expenditure on components like rural development and special area programme positively contributes to the agricultural output. There exists a negative relationship between agricultural output and spending on irrigation & flood control. Various types of Government spending have varied impacts on agricultural output implying potential to improve efficiency of government spending by reallocation among sectors.

VIII. REFERENCES

Bayya, P. K., & Chittedi, K. R. (2012, September 10). Public expenditure on irrigation and its impact on agricultural production. *Munich Personal RePEc Archive (MPRA)* , 1-17.

Chandio, A. A., Yuansheng, J., Sahito, J. G., & Larik, S. A. (2016). Impact of formal credit on agricultural output: Evidence from Pakistan. *African Journal of Business Management , 10* (8), 162-168.

De, U. K., & Dkhar, D. S. (2018). Public Expenditure and Agricultural Production in Meghalaya, India: An Application of Bounds Testing Approach to Co-Integration and Error Correction Model. *International Journal of Environmental Sciences & Natural Resources , 8* (2), 01-08.

Dutta, M. (2019, November). Public expenditure on agriculture and allied activities in Assam and its impact on GSDP. *Selected Social Science Works of Young Researchers , 1*, pp. 56-65.

Malik, B., & Mohanty, S. S. (2023). Fluctuations in Agricultural Production: A Comparative Study across Selected Countries. *Journal of Studies in Dynamics and Change (JSDC), 10*(1), 9–26.

Mani, H., Bhalachandran, G., & Pandit, V. N. (2011). Public Investment In Agricultural and GDP Growth: Another Look at the Inter Sectoral Linkages and Policy Implications. *Centre for Development Studies. Department of Economics, Delhi School of Economics* .

Mohanty, S. S., & Singh, R. G. (2007). FRBM–A Review. *Centre for Budget and Governance Accountability*.

Rajesh, T., Shivaswamy, G. P., Anuja, A. R., Singh, K. N., Shekhawat, R. S., & Harish Kumar, H. V. (2020). Public expenditure on agricultural inputs and farm support services in India- An overview. *Annals of Agricultural Research , 41* (4), 418-423.

Singh, A., Pal, S., & Jha, G. K. (2015). Transitioning India's Public Expenditure in Agriculture towards Higher Growth and Equity. *Indian Journal of Agricultural Economics , 70* (3), 246-258.