



IMPACT OF EXTENSION SERVICE ON FARM INCOME: A CASE STUDY IN KAMRUP DISTRICT OF ASSAM

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Abstract : The study aims at exploring the technical relationship between extension service provisioning and farm level income among farm households; particularly engaged in paddy and horticultural crops. Extension service can be a game changer in agriculture as it provides livelihood to almost 70 percent of the workforce in Assam. The study is based on primary data which reveals some significant results regarding impact of extension service on farm business income. Though public extension service is still not popular mode of extension, its impact has been found to be significant in raising farm income. However, its penetration is still a major concern.

Keywords: Farm Income, Extension Service, Regression

1.Introduction: Agriculture has been the mainstay of Assam economy contributing still 23.02 percent of GSDP of the State as per latest data (Economic Survey, 2024-25). While presenting the budget for the year 2016-17 the Finance Minister of India had proposed that by 2022 the farmers' income would be made double. The feasibility and achievability of such an objective within that time frame unlocked some research questions and accordingly many studies were conducted (Satyasai, 2016). However, the importance of raising farm income can not be denied and it is the need of the hour. The pathway for doubling of farmers' income encompasses several dimensions, from production to post-harvest management. These include: bridging yield gap, crop diversification, improvements in total factor productivity and proper management of irrigation (GoI, 2007; Evenson and Rosegrant, 1999; Chand *et. al.*, 2011; Birthal *et al.*, 2007) along with the provision of market and institutional support for efficient post-harvest management (Saxena and Chand, 2017; Government of India, 2015).

Agricultural extension in general means assisting farm people through institutional set up in improving farming methods and techniques, increasing production efficiency and income, bettering their levels of living and lifting social and educational standards. While transfer of technology still has relevance, agricultural extension is now seen as playing a wider role by developing human and social capital, enhancing skills and knowledge for production and processing, facilitating access to markets and trade, organizing farmers and producer groups, and working with farmers towards sustainable natural resource management practices (Swanson, 2008). Following the NSSO 59th round survey report and available literature, we have categorised sources of extension service under two broad categories- public extension service and private extension service. Following are the sources considered under the public extension service: i) Village Level Extension Worker (VLEW), ii) Extension

Officer/ any other government agent, iii) training by government, iv) field demonstration, v) radio, vi) newspaper, vii) television, viii) Kisan Call Centre (KCC) and any other government help line, and ix) KrishiVigyan Kendra (KVKs). Following sources are considered under private extension service: i) fellow farmers, ii) field management committee (FMC)/progressive farmers, iii) NGOs, iv) local input dealers/ traders, v) books, printed materials other than government, and vii) private agri-clinics and agribusinesses (ACAB). In the context of the present study, the following literatures can serve our purpose of understanding extension service and farm income relationship.

In the Indian context, farmers specifically marginal and small farmers have little knowledge about the existing opportunities related to the strategies mentioned above through which income can be increased (Satyasai, 2016). Anderson and Feder (2004) in their global review, emphasized the importance of well-functioning extension systems tailored to local needs. They argued that decentralized, farmer-responsive models supported by strong institutional mechanisms are more effective in increasing farm incomes. Again, Glendenning et al. (2010) showed that only 40% of Indian farmers had access to any form of extension service. The study recommended expanding outreach and ensuring alignment between farmer needs and extension content. In another important study, Birthal et al. (2015), using data from the National Sample Survey (SAS), explained that farmers who received extension advice earned 24% higher net returns compared to those without access. It emphasized that extension services lead to better resource use efficiency, greater technology adoption and ultimately higher productivity and income. Focusing on Assam, Das and Barua (2020) assessed the performance of state-led i.e., public provisioning of extension services and NGO-based extension systems. It found that districts with active ATMA and KVK interventions resulted clear improvements in income levels. However, it also noted challenges such as staffing shortages and uneven geographical coverage. Goswami & Bordoloi (2015) in a micro-level study in Nalbari district found that farmers who received regular extension advice through KVKs reported 15–20% higher farm income compared to non-beneficiaries. The study emphasized the role of field demonstrations, soil testing, and training programmes in yield improvement and cost reduction.

2.Objective: Based on the available literature, the study has formulated the following main objective- To examine whether access to extension service influences Farm Business Income across farm households in the field study area.

3.Methodology: Both primary and secondary data were analyzed to understand the status of extension service in the study area. Regression analysis and tabular presentation were made use of in the study. Various recent issues of -Economic Surveys (India & Assam), Statistical Handbook of Assam, Agricultural Census of Assam (2005-06, 2010-11), Planning Commission of India, Department of Agriculture and Cooperation, MANAGE, Directorate of Agriculture, Assam, District Agriculture Offices, NSSO Reports, Input Surveys and other relevant sources were the sources of secondary data. For the purpose of primary data a multi stage sampling technique was adopted to select the field study locations. Assam has six distinct agro-climatic zones and Kamrup district falls under North Bank. It has been selected purposively to conduct the sample survey. In the second stage, three Agricultural Development Officer's (ADO) circles has been selected purposively from the district and then from each ADO circle two villages were selected as field study locations. Thus a total of 6 villages have been selected in that process. The final unit of our sample i.e., the household owning and/or operating on agricultural land have been selected using random sampling technique. In each village, sample size ranged from 7 to 10 percent of farm households and thus a total of 153 sample households have been selected and interviewed in the process.

4.Findings and Discussions:

As it is discussed, how the extension services for various farm related knowledge and technicalities are working in the field study area, primary data were collected. Since secondary data are not available to draw conclusion, it was the necessity to go for primary data collection. A structured questionnaire was applied to get data on extension service, farm business income etc. in the field study area. In the following sections, we discuss the findings from field study locations.

4.1:Access to extension service for different farm knowledge by Sources: As mentioned earlier, generally two types of extension service sources are available to the farm households- public mode of extension and private mode of extension. Sub-categorisation is already discussed. Following table showcases the status of extension service for farm related knowledge acquisition by the farm households. It shows the distribution of the farmers accessing extension services from various sources for different purposes.

Table4.1:Percentage Distribution of Farmers Accessing Extension Service by Source for Different Purposes (All Crops)

Major Sources of extension services	Overall percentage	Sources within public and private extension services	Individual Source wise Overall percentage	Seed	VG	Fer.	PD	PM	Wee
PUBLIC	22	VLEW	9	29	12	11	16	13	15
		Extension officer/any govt. agents	2	5	4	2	1	1	0
		Training	2	10	7	2	2	1	0
		Radio	2	0	0	0	7	10	14
		KCC/ helpline	1	0	0	1	1	1	0
		VLEW+ extension officer/any govt. agents	2	7	2	0	3	4	0
		VLEW+ training	2	4	4	2	2	1	0
		VLEW+ radio	2	0	2	2	1	0	0
PRIVATE	78	Local input dealer/trader	60	18	34	57	40	48	50
		Fellow farmers	8	21	24	13	19	12	11
		FMC/progressive farmers	1	6	4	2	2	1	0
		Books/any other printed materials	1	0	0	2	2	2	0
		Input dealer/trader+ fellow farmers	5	0	4	2	4	6	10
		Input dealer/trader + FMC/ progressive farmers	3	0	3	2	0	0	0
TOTAL	100	TOTAL	100	100	100	100	100	100	100

Note: VG: variety to be grown; Fer.: fertilizer; PD: plant disease; PM: pest management; Wee: weedicides

Source: Field survey

Table 4.1 shows that 78 per cent of those who accessed extension services relied on private sources. As whole, local input dealers/traders is the dominant source of extension services. 60 percent of the farmers who had accessed extension services consulted local input dealers/traders. The next important source is VLEW (9 per cent) followed by fellow farmers (8 per cent). The striking finding from Table 5 is the overwhelming percentage of farmers relying on local input dealer/trader for almost all the purposes considered, except for seed. In case of seed, the farmers depend mostly on VLEW and fellow farmers. So it is evident that private mode of extension service occupies the main place for accessing extension service for various farm related knowledge. However, the actual impact and significance of extension service can only be measured through a thorough investigation and it is done through a regression analysis in the following section.

4.2 Impact of Extension Service on Farm Income:

Since extension service raises production and productivity, it helps in raising farm income of the farmers. An investigation was made in the present study whether extension service has impact on farm income or not. Here we calculated gross income generated through crop cultivation within the farm household during one agricultural year. We have accounted the Gross Income generated since data on depreciation could not be calculated due to lack of information to count Net Income.

Gross Income Generated = (Value of total farm output – total costs of purchased Intermediate inputs used);

Where, purchased intermediate inputs include fertilizers, pesticides, weedicides, fuel and irrigation charge. The value of total farm output is calculated by summing up the market values of the crops produced. Again, market value of a crop has been calculated by multiplying the total crop output and the average price received by the

farmers in their respective locality. Finally to obtain Income generated per hectare of operational holding of a farm household, we have divided total Income generated within the farm household during one agricultural year by total operational holding of the farm household. Now we run regression to find out the impact of extension service on farm income generated within a household.

Probable Variables which may influence Farm Income:

Independent variable

Access to extension service: We have formulated here the independent variable access to extension service as under overall access to extension service (ALEXT), access to public extension service (PUBEXT) and access to private extension service (PVEXT). Here we construct the forms of the independent variable as dummy depending on farmers' accessibility to the sources of extension and accordingly assigning dummy values 1 for access to the source and 0 for otherwise.

Control Variables

Farm Size (FS): Operational holding in hectare of the farm household is taken as Farm Size. Generally large farmers with higher operational holding may have higher farm income but they may not go for multiple cropping due to lack of management and wealthier positions. Again, due to subsistence, small farmers may produce more but they face credit constraint to raise more crops which need irrigation facility, better farm equipments, etc. So, the sign of the coefficient of the variable can not be predicted a priori.

Extent of Irrigation (IRGA): We have already found out in our empirical analysis that irrigation has played a significant role in raising production and productivity. Again, with larger production and productivity, farm income generated increases and so we may expect the coefficient of the variable IRGA to be a positive one. Here, proportion of irrigated area to total operational holding is taken as a measure of extent of irrigation.

Access to Finance (FIN): Finance is very much necessary to purchase inputs like fertilizers, pesticides and payment of irrigation charges which are again indispensable ingredients to raise production and productivity of various crops. So, access to institutional credit may influence positively in farm income generation.

We have the dependent variable (Y) i.e., gross income generated per hectare of operational holding as three different formulations since we have three forms of the independent variable, i.e., access to extension service, namely, overall access to extension service (ALEXT), access to public extension service (PUBEXT) and access to private extension service (PVEXT). The formulations are-

For overall access to extension service-

$$Y=f(\text{ALEXT}, \text{FS}, \text{IRGA}, \text{EDN}, \text{FIN})$$

For access to public extension service-

$$Y=f(\text{PUBEXT}, \text{FS}, \text{IRGA}, \text{EDN}, \text{FIN})$$

For access to private extension service-

$$Y= f(\text{PVTEXT}, \text{FS}, \text{IRGA}, \text{EDN}, \text{FIN})$$

Functional specification of the Model

Since the dependent variable takes only positive values, exponential model would suffice our purpose of estimation.

$$Y= \exp (\beta_0+ \beta_1\text{ALEXT} +\beta_2\text{FS}_i + \beta_3\text{IRGA}_i +\beta_4\text{EDN}_i + \beta_5\text{FIN}_i + U_i) \dots\dots\dots (1)$$

$$Y= \exp (\beta_0+\beta_1\text{PUBEXT}_i +\beta_2\text{FS}_i + \beta_3\text{IRGA}_i + \beta_4\text{EDN}_i + \beta_5\text{FIN}_i + U_i) \dots\dots\dots (2)$$

$$Y = \exp(\beta_0 + \beta_1 \text{PVEXT}_i + \beta_2 \text{FS}_i + \beta_3 \text{IRGA}_i + \beta_4 \text{EDN}_i + \beta_5 \text{FIN}_i + U_i)$$

..... (3)

Where U_i s are stochastic disturbance term which are assumed to be distributed with zero mean and constant variance. Since the formulations are non linear, estimations are done after making them linear by taking log on both sides.

$$\text{Ln}Y = \beta_0 + \beta_1 \text{ALEXT}_i + \beta_2 \text{FS}_i + \beta_3 \text{IRGA}_i + \beta_4 \text{EDN}_i + \beta_5 \text{FIN}_i + U_i$$

----- (1)

$$\text{Ln}Y = \beta_0 + \beta_1 \text{PUBEXT}_i + \beta_2 \text{FS}_i + \beta_3 \text{IRGA}_i + \beta_4 \text{EDN}_i + \beta_5 \text{FIN}_i + U_i$$

----- (2)

$$\text{Ln}Y = \beta_0 + \beta_1 \text{PVEXT}_i + \beta_2 \text{FS}_i + \beta_3 \text{IRGA}_i + \beta_4 \text{EDN}_i + \beta_5 \text{FIN}_i + U_i$$

----- (3)

The OLS estimates of the parameters are obtained using STATA software.

Before estimating the parameters of the model, Breusch-Pagan Test is performed to detect the problem of heteroscedasticity in the data set. The test confirms the absence of heteroscedasticity in all the three formulations in the model and so there is no need to correct it by estimating the White heteroscedasticity consistent Robust Standard Error.

It is found from the table 4.2 that coefficients of all the variant of extension service variables are significant at 1 percent. So it implies that overall access to extension service (ALEXT), access to public extension service (PUBEXT) and access to private extension service (PVEXT) have positive impact on raising the gross income generated within the farm household. So extension service has a role to play in rural development by uplifting the farm business income. Another notable fact is that though penetration of public extension service is very low (22 percent) among farm households, still its impact is highly significant in raising farm income. So, public extension services machinery need utmost importance in expanding its coverage. The coefficient of the control variable FS is found to be negatively significant at 1 percent in formulation1. It implies that farmers using any mode of extension services, their farm income have a negative relation with their farm size, i.e., farmers with low farm size have a higher farm income generated within the farm. As desired, the coefficient of the variable extent of irrigation (IRGA) is found to be positively significant at 1 percent. Again for farmers, having access to overall extension service and access to private extension service, institutional credit facilities raises their level of farm income. It is evident from the results as the coefficient of the variable FIN is found to be positively significant at 5 percent level for the formulation1 and formulation3.

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Table 4.2: Semi-Log regression Analysis of impact of extension service on Farm Income generated per hectare of Operational**Holding**

	Formulation1	Formulatiuon2	Formulation3
Test of heteroscedasticity	Breusch-Pagan test Chi2 [1] = 0.41 Prob. = 0.524 Result: Absence of heteroscedasticity	Breusch-Pagan test Chi2 [1] = 0.10 Prob. = 0.7579 Result: Absence of heteroscedasticity	Breusch-Pagan test Chi2 [1] = 0.12 Prob. = 0.7318 Result: Absence of heteroscedasticity
Variables	Estimates of coefficient/values	Estimates of coefficient/values	Estimates of coefficient/values
ALEXT	0.64 (0.12)***		
PUBEXT		0.35 (0.11)***	
PVEXT			0.37 (0.12) ***
FS	-0.09(0.044)***	-0.06 (0.041)	-0.07 (0.042)
IRGA	1.02 (0.13)***	1.01 (0.135)***	1.014 (0.14)***
FIN	0.24 (0.18)**	0.18 (0.19)	0.24 (0.14)**
EDN	0.027 (0.102)	0.038 (0.103)	0.06 (0.17)
CONSTANT	10.74 (0.2)***	11.1 (0.17)***	10.9 (0.19)***
R ²	0.388	0.368	0.366
F [5,150]	18.41***	18.73***	16.42***

Figures in () and [] represents Standard error and Degrees of freedom respectively
 (***, ** and * represents significant at 1, 5 and 10 percent level.)

5. Policy Implications and Conclusion:

We have found in our research study that small and marginal farmers are bypassed by the public extension machinery which is hampering those farmers and at the same time overall agricultural development. Since most of the farmers in the State are small and marginal farmers, Government should prioritise this section of the farmers. Unless the public extension machinery caters the need of the small and marginal farmers the existing system of extension service delivery can not achieve fully the desired goal of agricultural development in the State. In the current extension framework, VLEWs and other Government extension agents like ADOs percolate farm related information through field Management Committee (FMC) and through Progressive Farmers. Again as we have found in our study, training facilities lack adequate pervasion among farmers and it is very much limited to some segment of farm households with comparatively large holding. Field demonstrations are carried out with very limited farm households and it is unable to attract the mass farm households. All these loopholes in the public extension machinery are posing as serious bottlenecks in service delivery mechanism. Though ATMA mode of extension envisages participatory approach with 'farmer led extension' and 'demand driven extension', farmers merely get opportunities to state their preferences. Otherwise, the effectiveness of public extension service as a tool for agricultural transformation can not be ruled out. So the need of the hour is coordinated and compulsive effort on the part of the stakeholders with utmost care on better penetration among farm families, especially the resource poor families.

References:

- Anderson, J. R., & Feder, G. (2004). Agricultural extension: Good intentions and hard realities. *World Bank Research Observer*, 19(1), 41–60.
- Birthal, P. S., Joshi, P. K., Roy, D., & Thorat, A. (2007). Diversification in Indian agriculture towards high-value crops: The role of smallholders. *IFPRI Discussion Paper 00727*. International Food Policy Research Institute (IFPRI).
- Birthal, P. S., Jha, A. K., Tiongco, M., & Narrod, C. (2015). Assessing the impact of crop diversification on farm income in India. *Indian Journal of Agricultural Economics*, 70(1), 25–38.
- Chand, R., Prasanna, P. A. L., & Singh, A. (2011). Farm size and productivity: Understanding the strengths of smallholders and improving their livelihoods. *Economic and Political Weekly*, 46(26–27), 5–11.
- Das, D., & Barua, H. (2020). Agricultural extension services and farm income: Evidence from Assam. *Agricultural Economics Research Review*, 33(2), 181–190.
- Evenson, R. E., & Rosegrant, M. W. (1999). Determinants of productivity growth in Philippine agriculture. *Agricultural Economics*, 20(3), 229–240.
- Glendenning, J. C., Babu, S., & Asenso-Okyere, K. (2010). *Review of agricultural extension in India: Are farmers' information needs being met?* IFPRI Discussion Paper 01048. International Food Policy Research Institute.
- Goswami, R., & Bordoloi, R. (2015). Agricultural extension services and farm income: A study in Assam. *Assam Economic Review*, 8(1), 45–56.
- Government of India (GoI). (2007). *Report of the Working Group on Agricultural Extension for the Eleventh Five Year Plan (2007–2012)*. Planning Commission, Government of India.
- Government of India (GoI). (2015). *Raising agricultural productivity and making farming remunerative to farmers*. NITI Aayog, New Delhi.
- Satyasai, K. J. S. (2016). Farmers' income: Trend and strategies for doubling. *Indian Journal of Agricultural Economics*, 71(2), 397–405.
- Saxena, R., & Chand, R. (2017). Role of agricultural extension in enhancing farm income: A case study of farmers in Uttar Pradesh. *Agricultural Economics Research Review*, 30(1), 111–122.
- Swanson, B. E. (2008). *Global review of good agricultural extension and advisory service practices*. Food and Agriculture Organization of the United Nations (FAO).