Research Article:

FACTORS INFLUENCING THE CHOICE OF AGRICULTURAL INFORMATION SOURCES AMONG BANANA FARMERS IN CHITWAN DISTRICT, NEPAL

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ABSTRACT

Agricultural information is essential to improve the farming practices in the developing countries like Nepal. However, the farming communities are still devoid of access to timely and accurate information making agriculture solely rely on traditional knowledge and practices. An investigation was carried out during 2021 in the Chitwan district of Nepal to identify the factors influencing the choice of agricultural information sources among banana farmers. To gather primary data, a household survey was carried out with 75 banana farmers using pretested semi structured questionnaire, followed by a Focus Group Discussion (FGD) and Key Informant Interview (KII) with selected individuals. Descriptive statistics and multivariate probit model were used to present the findings. Results revealed that gender, age, education, income, farm size and membership in farmer's organization were statistically significant in influencing the choice of agricultural information sources. Hence, the study suggests that information providers should tailor their working mechanism through the specification of farming communities. Farming communities should no longer be treated as homogeneous group by the extension agencies in the flow of agricultural information.

Key words: Extension, gender, ICT, organization

INTRODUCTION

Bananas hold significant economic value as a commercial agricultural product in Nepal, with the Chitwan district being a key contributor to the country's banana production (Bhatta et al., 2023; MoALD, 2023). Farming communities are lacking access to timely, accurate and adequate information resulting lower adoption of improved practices (GC & Hall, 2020; ILO, 2019; Mishra & Bhatta, 2021; Mishra et al., 2023). This situation is primarily due to low extension coverage and the failure of information providers to consider the diversities among farming communities when selecting information sources (Ghimire et al., 2021). In particular, banana farmers are facing various production challenges, marketing constraints and post-harvest losses resulting in lower productivity (Dave et al., 2016; Ghimire et al., 2019; Phularaet al., 2020). The Agriculture Development Strategy (ADS) (2015-2035) of Nepal highlighted a significant obstacle to productivity, attributing it to the absence of an efficient mechanism for connecting research, extension services, and farmers (MoAD, 2016). Additionally, it underscored the importance of a decentralized extension system that is adaptable to farmers' requirements, achieved through collaborative efforts involving various entities such as the private sector, cooperative sector, NGOs, and public sector in delivering agricultural extension services. Enhancing the production system through the application of appropriate technical knowledge is crucial for attaining self-sufficiency in banana production in Nepal (Joshi et al., 2017). Government prioritized information sources like extension workers, farmer's organization and ICT, along with agrovet shops (input shops) and fellow farmers are potential information sources to the farming communities (Mishra & Bhatta, 2021; Niraula et al., 2023). Previous studies

(Mishra & Bhatta, 2021; Niraula et al., 2023) restricted their focus to identifying information sources without delving into the factors that influence the choice of these sources. There is a lack of empirical evidence in this particular area. Therefore, this study aims to go beyond merely identifying information sources and seeks to understand the factors that influence the selection of agricultural information sources among banana farmers. The goal is to uncover these influencing factors to tailor mechanisms for the efficient dissemination of information to farming communities.

MATERIALS AND METHODS

We purposively selected Chitwan district for the study during 2021 as it is major hub of banana production in the country and has potential for further expansion. Prime Minister Agriculture Modernization Project (PMAMP) has its command area in selected wards of Bharatpur metropolitan, Ratnanagar municipality, Khairahani municipality and Kalika municipality, and has focused to increase the productivity under banana zone program. Total of 423 farmers were registered in PMAMP Chitwan and we considered them as population of the study. Within the command area, we purposively selected Ratnanagar municipality, Khairahani municipality and Kalika municipality as these areas has large number of farmers and access to multiple information sources. To calculate sample size, we used the formula by Daniel (1999):

$$n = N*X / (X + N - 1),$$

Where,

$$X = Z_{\alpha/2}^2 *p*(1-p) / MOE^2,$$

and $Z_{\alpha/2}$ is the critical value of the Normal distribution at $\alpha/2$, MOE is the margin of error, p is the sample proportion, and N is the population size.

Using simple random sampling, 75 farm household were selected. Later sample size was divided into two categories of users and non-users to different information sources. The household survey was carried out with household head using a pretested semi-structured interview schedule. Further, 1 Focus Group Discussion (FGD) and 1 Key Informant Interview (KII) among progressive farmers, executive members of farmer's organization, government and non- government officials, was carried out in each municipality to complement the information gathered through household survey. Secondary data was obtained from published reports of PMAMP Chitwan, Agriculture Knowledge Center (AKC) Chitwan, I/NGOs and research paper published in national and international journals by different authors.

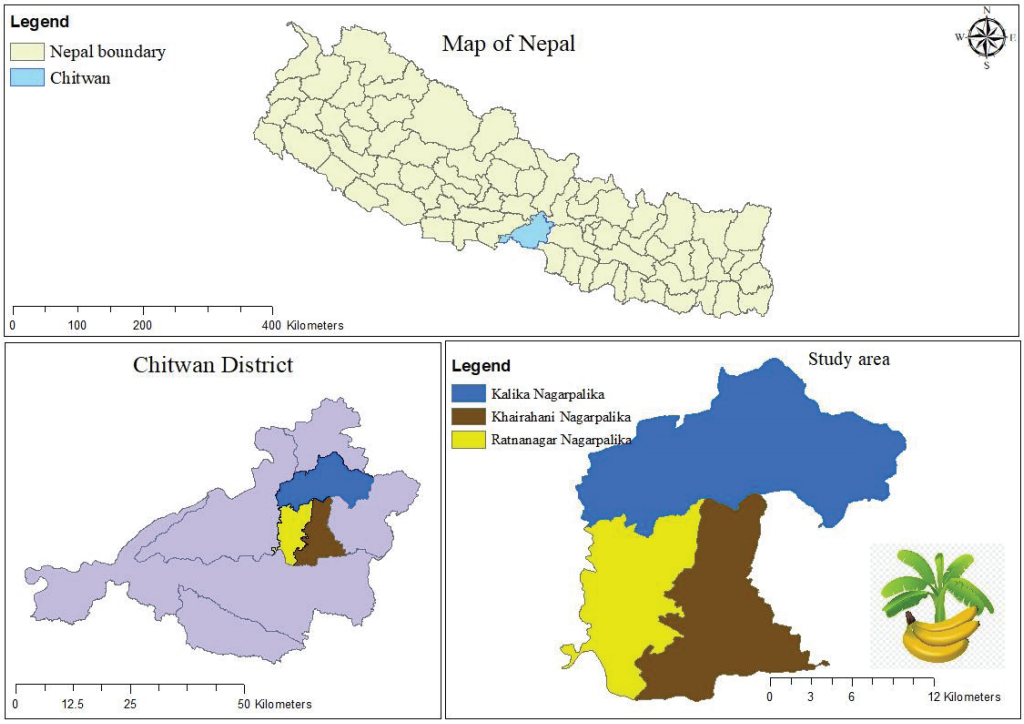

Fig. 1. Map of Nepal showing the study area

Data entry was carried out using Microsoft Office Excel 2007. Descriptive analysis and multivariate probit was employed using Stata/SE 12.1. Empirically, the model can be specified as (Mittal & Mehar, 2015);

$Y_{i1} = X'_{ij1}\beta 1 + \varepsilon_{i1}$; $Y_{i2} = X'_{ij2}\beta 2 + \varepsilon_{i2}$; $Y_{i3} = X'_{ij3}\beta 3 + \varepsilon_{i3}$; $Y_{i4} = X'_{ij4}\beta 4 + \varepsilon_{i4}$; $Y_{i5} = X'_{ij5}\beta 5 + \varepsilon_{i5}$

Where, i = farmer id, Y_{i1} = 1, if farmer acquire information from agrovet shops (0 otherwise), Y_{i2} = 1, if farmer acquire information from extension workers (0 otherwise), Y_{i3} = 1, if farmer acquire information from farmer's organization (0 otherwise), Y_{i4} = 1, if farmer acquire information from fellow farmers (0 otherwise), Y_{i5} = 1, if farmer acquire information from ICT (0 otherwise), X′i = Vector of factors affecting choice of information source, βj = Vector of unknown parameters (j = 1, 2, 3, 4, 5), and ε = is the error term.

A multivariate probit model of the following form is used to test the hypothesis;

$Y_{ij} = X'_{ij}\beta_j + \varepsilon_{ij}$

Where Y_{ij} ($_j$ =1, … ,5) represent the five different information sources faced by the $_i$th farmer, X'_{ij} is a 1 × k vector of observed variables that affect the choice decision of farmer, β_j is a k × 1 vector of unknown parameters (to be estimated), and ε_{ij} is the unobserved error term.

RESULTS AND DISCUSSION

Descriptive statistics

Table 1 presents summary statistics and variable explanations. It is noted that 53.30% of respondents acquired information from agrovet shops, while 29.30% acquired from extension workers, 25.30% from farmer's organizations, 45.30% from fellow farmers, and 40% from ICT. The average age of respondents was 49.320 years, with 68% being male and an average of 9.786 years of formal schooling. The average annual income for farm households was NPR 1809613, and the average farm size was 113.24 kattha. On average, 72% of respondents had regular contact with extension workers, and 53.30% participated in farmer's organizations. Additionally, an average of 2.706 household members was involved in farming, with respondents having a farming experience of 26.61 years. About 53.30% of respondents had access to credit. The

average distance of respondents' farm households from the nearest agrovet shops, ICT center, and agriculture center was 1.013 km, 1 km, and 2.160 km, respectively.

Table 1. Descriptive statistics of the variables used in the study

Variables	Description	Mean	SD
Dependent variables			
Agrovet shops	=1 if respondent acquire information from agrovet shops, 0 otherwise	0.533	0.502
Extension workers	=1 if respondent acquire information from extension workers of governmental and non-governmental agencies or INGO, 0 otherwise	0.293	0.458
Farmer's organization	=1 if respondent acquire information from agricultural cooperatives or farmer's group, 0 otherwise	0.253	0.437
Fellow farmers	=1 if respondent acquire information from fellow farmers, 0 otherwise	0.453	0.501
ICT	=1 if respondent acquire information from ICT tools, 0 otherwise	0.400	0.493
Independent variables			
Gender	Gender of the respondent (1-male, 0-female)	0.680	0.469
Age	Age of the respondent (year)	49.320	12.924
Education	Formal schooling of the respondent (year)	9.786	4.473
Income	Annual income of the farm household (NPR)	1809613	3035943
Farm size	Area under banana farming (kattha)	113.24	162.966
Contact with extension workers	=1 if respondent has regular contact with extension workers, 0 otherwise	0.72	0.452
Membership	=1 if respondent participate in agricultural cooperatives or farmer's group, 0 otherwise	0.533	0.502
Family involvement	Household members involvement in banana farming (number)	2.706	1.522
Farming experience	Farming experience of the respondent in banana subsector (year)	8.16	4.945
Credit	=1 if respondent have access to credit, 0 otherwise	0.533	0.502
Distance to agrovet shops	Distance to nearest agrovet shops (km)	1.013	0.575
Distance to ICT center	Distance to nearest ICT center (km)	1.000	0.513
Distance to agriculture center	Distance to nearest agriculture center; any of teaching, research and extension (km)	2.160	0.546

Source: Field survey, 2021

Correlation coefficient

The pair-wise correlation coefficients, as presented in Table 2, demonstrate statistically significant relationships. This supports our hypothesis that the error terms in selection decision equations are correlated, justifying the choice of a multivariate probit model over an independent probit model. Positive correlation coefficients indicate that selecting a particular information source increases the likelihood of choosing another related source. Conversely, negative correlation coefficients imply that opting for one associated source decreases the likelihood of selecting the other. The positive correlation between agrovet shops and extension workers

suggests a complementary relationship, indicating they enhance each other or work together. Similarly, the positive correlation between agrovet shops and ICT, as well as the substitutability relationship between agrovet shops and farmer's organization, suggests collaboration or partial interchangeability. Additionally, the substitutability relationships between extension workers and farmer's organization, and extension workers and fellow farmers, indicate they can replace each other to some extent.

Table 2. Correlation coefficient of agricultural information sources (from the multivariate probit model)

Agricultural information sources	Correlation coefficients	Std. Err.
Agrovet shops and extension workers	0.562***	0.171
Agrovet shops and farmer's organization	-0.591***	0.178
Agrovet shops and fellow farmers	0.178	0.187
Agrovet shops and ICT	0.498***	0.159
Extension workers and farmer's organization	-0.420**	0.207
Extension workers and fellow farmers	-0.487***	0.175
Extension workers and ICT	-0.037	0.223
Farmer's organization and fellow farmers	-0.079	0.223
Farmer's organization and ICT	-0.279	0.236
Fellow farmers and ICT	0.258	0.233

Likelihood ratio test of rho21=rho31=rho41=rho51=rho32=rho42=rho52=rho43=rho53=rho54=0: chi2(10)=33.4123: Prob>chi2=0.0002. Note: ** and *** indicate significant at 5% and 1% level of significance, respectively.

Factors influencing the choice of agricultural information sources

Table 3 highlights the multivariate probit regression model outputs on factors influencing the choice of agricultural information sources in the study area. The model had good explanatory power at the 1% level.

Table 3. Multivariate probit regression model outputs on factors influencing the choice of agricultural information sources

Variables	Agrovet shops	Extension workers	Farmer's organization	Fellow farmers	ICT
	Coef. (Std. Err.)	Coef. (Std. Err.)	Coef. (Std. Err.)	Coef. (Std. Err.)	Coef. (Std. Err.)
Gender	0.212(0.416)	-1.072(0.451)**	-1.311(0.536)**	2.048(0.569)***	-0.043(0.414)
Age	-0.030(0.016)*	0.001(0.016)	0.010(0.017)	-0.010(0.016)	-0.030(0.015)*
Education	0.020(0.052)	0.061(0.055)	0.125(0.061)**	0.094(0.052)*	0.010(0.050)
Income	1.687(0.479)***	0.932(0.476)*	1.196(0.517)**	-0.513(0.421)	0.828(0.474)*
Farm size	-0.005(0.001)***	-0.0006(0.001)	-0.001(0.001)	-0.002(0.001)*	-0.0009(0.001)
Contact with extension workers	0.393(0.394)	-0.420(0.378)	0.251(0.463)	-0.008(0.380)	0.438(0.384)
Membership	-0.200(0.387)	0.192(0.364)	1.385(0.452)***	-1.451(0.465)***	0.633(0.385)
_cons	-8.090(2.592)***	-5.744(2.630)**	-9.327(3.188)***	2.077(2.517)	-4.286(2.604)
Summary statistics					
Number of observation=75					
Wald chi2(35)=83.34					
Prob>chi2=0.0000					
Log likelihood=-166.85149					

Source: Field survey, 2021

Note:*, ** and *** indicate significant at 10%, 5% and 1% level of significance, respectively.

The significant variables are discussed below:

Gender: Probability of choice of extension workers and farmer's organization as information sources increases with female household head. Balayar and Mazur (2022) highlights government and development agencies support in women's group formation and capacity development programs to promote their active participation in agricultural system. Similarly, probability of choice of fellow farmers increases with male headed household. The result is in line with Katungi et al. (2008), which indicated males exhibit higher participation in civic activities and other social institutions compared to females. This aspect of social capital facilitates an increase in the acquisition of information.

Age: Probability of choice of agrovet shops and ICT as information sources increases with decrease in age of the respondent. Agrovet shops appeal to young people due to their provision of comprehensive and personalized assistance, incorporating technology. Result is in line with Chen and Lu (2020), which reported younger farmers have a preference for enterprises and specialized information service agencies. ICT adoption is less likely among elderly farmers due to a decrease in their learning behavior, and a fear of risk associated with new technology (Mishra et al., 2023). This is in line with previous studies (Tadesse et al., 2017; Tadesse & Bahiigwa, 2015; Daniso et al., 2020), which indicated that younger individuals tend to adopt ICT more rapidly.

Education: Probability of choice of farmer's organization and fellow farmers as information sources increases with increase in education of the respondent. A formal education background could emphasize the importance of teamwork and learning within a community setting. Cooperatives provide structured avenues for information sharing, and interacting with fellow farmers allows individuals to acquire practical, hands-on insights and experiences. Result is in line with Chen and Lu (2020), which reported farmers possessing a higher level of education are more inclined to receive information through their friends.

Income: Probability of choice of agrovet shops, extension workers, farmer's organization and ICT as information sources increases with increase in income of the farm household. Result is in line with Chen and Lu (2020), which highlighted farmers with higher income have stronger demand for agricultural information. With higher income, farmers are more resourceful, this enables them to invest in technology, attend training programs and access information through various paid sources.

Farm size: Probability of choice of agrovet shops and fellow farmers as information sources increases with decrease in household farm size. Farm size serves as an indicator of economic status, with larger farms typically associated with higher economic status (Mittal & Mehar, 2015). Households with smaller farm sizes often require access to credit (Mishra, 2021), and agrovet shops fulfill this need by providing credit for purchasing farm inputs along with desired agricultural information (Niraula et al., 2023). As a result, there is a tendency towards choosing agrovet shops. Similarly, information obtained from fellow farmers is freely available and sought after to gather a pool of information for farming practices.

Membership: Probability of choice of farmer's organization as information sources increases if respondent have membership in farmer's organization and probability of choice of fellow farmers as information sources decreases with increase in membership in farmer's organization. Niraula et al. (2023) reported agricultural cooperatives play a crucial role in enhancing communication channels; ensuring farmers have easy access to agricultural information. Furthermore, extension agencies collaborate with farmer's organization to adopt a group-oriented approach, conducting

training programs and workshops that establish an organized platform for the exchange of information. The acquisition of reliable information from farmer's organization thus decreases their dependency on fellow farmers.

Respondent's choice to agricultural information sources

Table 4 highlights the distribution of the respondents in their choice of agricultural information sources. A combination of information sources was used by the majority of the respondents. Mittal and Mehar (2016) reported that the majority of farmers are using information sources in combination with others. Niraula et al. (2023) reported limitations of one source in providing all the information needed by farmers, thus promoting a behavior of seeking information from multiple sources.

Table 4. Distribution of the respondents in their choice of agricultural information sources

Agricultural information sources	Frequency (n=75)
None of the sources	18 (24)
All of the sources	0 (0)
Agrovet shops, fellow farmers and ICT	9 (12)
Agrovet shops, extension workers and ICT	8 (10.67)
Agrovet shops and fellow farmers	7 (9.33)
Fellow farmers	3 (4)
Agrovet shops, extension workers and fellow farmers	4 (5.33)
Agrovet shops, extension workers and farmer's organization	3 (4)
Extension worker and farmer's organization	3 (4)
Agrovet shops, farmer's organization, fellow farmers and ICT	3 (4)
Fellow farmers and ICT	2 (2.67)
Farmer's organization and ICT	2 (2.67)
Extension workers	2 (2.67)
Fellow farmers and farmer's organization	3 (4)
Agrovet shops, farmer's organization and ICT	2 (2.67)
Farmer's organization, fellow farmers and ICT	1 (1.33)
Agrovet shops, farmer's organization and fellow farmers	1 (1.33)
Agrovet shops and ICT	1 (1.33)
Agrovet shops, extension workers, fellow farmers and ICT	1 (1.33)
Extension workers and ICT	1 (1.33)
Agrovet shops and farmer's organization	1 (1.33)

Source: Field survey, 2021

Note: Fig. in the parentheses indicates percentage.

CONCLUSION

Agrovet shops can enhance the likelihood of choosing extension workers and ICT as agricultural information sources while replacing the choice of farmer's organization. Extension workers can replace the choice of fellow farmers as information sources. The probability of choosing farmer's organization and extension workers increases with female headed farm household, choice of agrovet shops and ICT increases with younger farmers, and choice of farmer's organization increases with higher formal education. Similarly, probability of choosing agrovet shops, extension workers, farmer's organization and ICT increases with increase in farm household income, choice of agrovet shops and fellow farmers increases with small farm size,

and choice of farmer's organization increases with participation in such organization. On the other hand, choice of fellow farmers increases when there is no participation in a farmer's organization. Combination of agricultural information sources is utilized by majority of the farmers. Agrovet shops can be established as a local support system to promote agricultural practices. This can be achieved through the provision of capacity-building training for agrovet shops. Information providers should primarily focus on multiple specifications within farming communities, such as female-headed farm households, young farmers, those with higher formal education, households with higher income, those with small farm sizes, and respondents who are members of farmer's organizations, to enhance the utilization of agricultural information. Agricultural information flow through multiple sources is more appropriate in the current context for efficient utilization.

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