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Attributes of e-NAM associated farmers: An insight from Jharkhand, India

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Abstract

The present research study was conducted to assess the socio-economic and psychological characteristics of e-NAM associated and non-associated farmers. Three districts representing three agroclimatic zones of Jharkhand, India, were selected. From each district, 20 associated and 20 non-associated farmers with e-NAM were selected. The findings revealed that majority of the respondent farmers were middle-aged, marginal and had medium-sized families. The study indicated that associated farmers had low farming experience and intermediate education, while non-associated farmers had medium farming experience and high school education. Chi square values and discriminant function coefficients were found significant with respect to social participation, mass media exposure, extension contact, economic motivation, and achievement motivation, which indicated that e-NAM associated farmers had high values on these parameters in comparison to non-associated farmers.

Keywords: e-NAM, associated farmers, non-associated farmers, achievement motivation, economic motivation

Introduction

Agricultural marketing in India has evolved significantly over time, shaped by historical, economic, and policy-driven factors. Trade in ancient India emerged naturally due to the geographic dispersal of agricultural products (Aga, 2019) [1]. South Indian agriculture studies highlight the coexistence of petty production and capitalist accumulation in agricultural commodity markets, revealing complexities in post-harvest trade and market regulation (Hall, 1977) [7]. By the medieval period, commercial influences on agriculture were evident, and the nineteenth century further strengthened these influences through advancements like railways and road transport (Harriss-White, 2016) [8]. The globalization of Indian agriculture brought new challenges, impacting trade balances, cropping patterns, and the welfare of consumers and producers (Washbrook, 1994) [25]. Recognizing the need for a stronger marketing system, the Agricultural Produce Market Committee (APMC) Act was enacted in 2003 to enhance market efficiency and transparency. Traditionally, Indian farmers have relied on regulated marketplaces for selling their produce, but these markets have long been plagued by middlemen, inefficiencies, and reduced profit margins (Ahmed *et al.*, 2022; Chaudhari & Anute, 2022) [2, 6]. Even in the era of Industrialization 4.0, farmers struggle to access markets and secure fair prices.

The share of farmers in the consumer's rupee ranges between 28% and 78%, which remains unsatisfactory (Bhoi *et al.*, 2019). [4] The lack of education, market intelligence, and bargaining skills further exposes farmers to exploitation (Chand, 2016) [5]. Fragmented and inefficient markets, dominated by small-scale middlemen, have failed to improve price incentives for farmers.

To address these challenges, various digital solutions have emerged, offering market information, price transparency, and direct selling opportunities. Mobile applications and online platforms enable farmers to connect with buyers directly, leading to better price realization and increased income potential (Mayuri *et al.*, 2023; Vendasri & Mishra, 2022; Prathipa *et al.*, 2022) [12, 23, 14]. Additionally, the formation of Farmer Producer Organizations (FPOs) has helped farmers collectively manage their business enterprises, enhance market access, and boost profitability. The transition from traditional to digital platforms represents a crucial shift in empowering farmers and improving their marketing practices.

In recent years, Indian farmers have increasingly moved towards direct selling methods. Small farmers in states like Telangana, Andhra Pradesh, and Maharashtra have formed cooperatives, such as the Sahaja Aharam Producer Company Limited (SAPCO), to market their products

through retail outlets, the Internet, and mobile vans (Vicziány & Plahe, 2017) ^[24]. Some farmers maintain long-term relationships with brokers, allowing them access to credit and insurance without necessarily facing exploitation (Minten *et al.*, 2012) ^[13]. Producer companies have emerged as a means for smallholders to participate in high-value markets and navigate the challenges of liberalization (Trebbin & Hassler, 2012) ^[22]. E-commerce and online platforms are now considered promising tools for farmers to reduce reliance on intermediaries and enhance their competitiveness (Kotliarov, 2013) ^[10].

The electronic National Agriculture Market (e-NAM) is a major initiative aimed at integrating Agricultural Produce Market Committees (APMCs) into a unified national market (Samantaray *et al.*, 2024; Swain *et al.*, 2022) ^[18, 21]. Studies show that e-NAM has improved price realization, market access, and transparency in agricultural trading (Jatana & Goswami, 2022; Raju, 2022) ^[9, 15]. During the COVID-19 pandemic, e-NAM facilitated continued agricultural trade despite economic disruptions (Raju *et al.*, 2022) ^[16]. To further enhance e-NAM's effectiveness, policymakers must focus on improving infrastructure, training, and logistical support.

Despite its benefits, e-NAM faces challenges such as low awareness among farmers, traders, and commission agents (Bandhavya, 2022) ^[3]. Issues related to application processes, perishable produce management, and mandi storage remain significant barriers (Kumar *et al.*, 2024) ^[11]. Farmers often struggle with understanding registration procedures, lot IDs, and online bidding mechanisms. Additionally, dependence on commission agents, dissatisfaction with quality assaying reports, and inadequate infrastructure hinder wider adoption of e-NAM. Addressing these limitations requires stronger education and awareness programs, better grievance settlement mechanisms, and improved market infrastructure (Singh *et al.*, 2023) ^[20].

The success of e-NAM ultimately depends on the support of marketing functionaries and the willingness of farmers to adopt digital trading systems. Adoption is influenced by socio-psychological and economic factors, which are assessed in this study. By understanding these factors, policymakers and stakeholders can create targeted strategies to enhance the effectiveness and reach of e-NAM, ensuring better market access and profitability for Indian farmers.

Materials and Methods

The present study was conducted in Jharkhand state during 2022-2023, following an exploratory-cum-ex post facto research design. Snowball and random sampling techniques were used to select participants of associated (farmers who know/avail e-NAM services) and non-associated farmers, respectively. A total of 120 farmers were chosen, comprising 20 associated and 20 non-associated farmers from each of the three districts—Hazaribagh, Garhwa, and East Singhbhum. The study considered various socio-economic and psychological variables, including age, occupation, family size, farming experience, social participation, techno-savviness, mass media exposure,

extension contact, economic motivation, and achievement motivation. Data were collected by personal interviews using structured and pre-tested questionnaire and were measured using pre-existing scales and indices already developed or developed for this study. Descriptive (frequency, mean, median, standard deviation) and inferential statistical methods were applied to analyze the survey data using SPSS, providing insights into the relationship between farmers' socio-economic and psychological characteristics and their association with e-NAM. To test the independence of attributes at a 5% level of significance, the chi-square (χ^2) test statistic was computed using the following formula:

$$\chi^2 = \sum_{i=1}^m \sum_{j=1}^n \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

Where O_{ij} is the observed frequency in the contingency table of order $m \times n$,

E_{ij} is the expected frequency in the contingency table of order $m \times n$,

m and n represents the total no. of rows and columns in the contingency table

Discriminant analysis has been undertaken to assess the most contributing socio-economic and factors within farmers that plays important role for their association with e-NAM. The discriminant analysis model involves linear combinations of predictor variables in the following form known as discriminant function:

$$D = c + a_1X_1 + a_2X_2 + a_3X_3 + \dots + a_kX_k$$

where, D is discriminant score estimated by using discriminant function,

a 's are discriminant function coefficients or weights, and

X 's are predictor or independent variable used under model

Results

Profile of e-NAM and Non-e-NAM Farmers

The data, as presented in Table 1, reveals that majority of the respondent farmers in both e-NAM-associated (53.33%) and non-associated (45.00%) categories belonged to the middle-aged group. Similarly, 65% of associated and 75% of non-associated farmers were engaged in agriculture and allied enterprises. One critical observation in the study was that the majority of e-NAM-associated farmers (58.33%) had low farming experience, while the non-associated farmers had a medium level of experience (65.00%). More than half of the farmers in both associated and non-associated categories were found to be marginal and had medium-sized families.

Table 1: Socio-economic comparison of e-NAM associated and non-associated farmers

Socio economic characteristics	Categories	e-NAM associated (%)	Non-associated (%)	χ^2 Statistics
Age	Young(<35years)	33.33	30.00	2.65
	Middle (35-45years)	53.33	45.00	
	Old (>45years)	13.34	25.00	
Land holding	Marginal (<1 ha)	51.60	63.33	5.66
	Small (1-2 ha)	38.33	33.33	
	Semi medium (2-4 ha)	21.66	03.33	
	Medium (4-10 ha)	05.00	00.00	
Occupation	Agriculture	26.66	21.66	5.23
	Agriculture & allied enterprises	65.00	75.00	
	Agriculture and business	08.33	03.33	
Farming Experience	Low (<15years)	58.33	20.00	38.46*
	Medium (15-25years)	25.00	65.00	
	High (>25years)	16.66	15.00	
Family Size	Small (<4members)	18.33	25.00	2.19
	Medium (5-7members)	76.66	65.00	
	Large (>7members)	05.00	10.00	
Education	Illiterate	01.66	00.00	10.27
	Middle School	00.00	06.66	
	High School	35.00	51.66	
	Intermediate	38.33	25.00	
	Degree	23.33	16.66	
	Post Graduate and above	01.66	00.00	
Techno savviness	Low (<0.4)	10.00	83.33	70.69*
	Medium (0.4-0.6)	38.33	16.66	
	High (>0.6)	51.66	00.00	
Social Participation	Low (<0.4)	41.60	95.00	39.43*
	High (>0.6)	58.30	5.00	
Mass media exposure	Low (<0.4)	18.33	36.66	18.88
	Medium (0.4-0.6)	36.66	53.33	
	High (>0.6)	45.00	10.00	
Extension Contact	Low (<0.4)	13.33	78.33	55.71*
	Medium (0.4-0.6)	25.00	15.00	
	High (>0.6)	61.66	06.66	
Economic Motivation	Low (<0.4)	00.00	11.60	25.45*
	Medium (0.4-0.6)	00.00	65.00	
	High (>0.6)	100.00	23.30	
Achievement Motivation	Low (<0.4)	13.33	43.33	14.76*
	Medium (0.4-0.6)	31.66	28.33	
	High (>0.6)	55.00	28.33	

* Significant at 5% level of significance

Socio-Economic and Technological Differences in e-NAM associated Farmers

Table 1 also ascertains that majority of the farmers associated with e-NAM had a high level of social participation (58.30%), substantial mass media exposure (45.00%), significant extension contacts (61.66%), and strong economic motivation (100%). In contrast, farmers not associated with e-NAM predominantly exhibited low social participation (95.00%), moderate mass media exposure (53.33%), and moderate economic motivation (65.00%). Notably, more than half of the e-NAM-associated farmers showed high levels of techno-savviness, and the same trend was followed with high extension contacts (61.66%), and high achievement motivation (55.00%). Conversely, a majority of the non-associated farmers were characterized by low techno-savviness, low extension contacts (78.33%), and low achievement motivation (55.00%). These results reflect a distinct disparity between e-NAM-associated and non-associated farmers across various attributes. Chi-Square test was conducted to determine the relationship between

associated and non-associated farmers with the selected variables. Variables viz. Farming Experience, Technosavviness, Social Participation, Extension Contact, Economic Motivation and Achievement Motivation were found to be significant.

Table 2: Discriminant function coefficient of selected variables

Sl. No.	Variable	Discriminant function coefficient
1.	Achievement motivation	2.00
2.	Economic motivation	1.17
3.	Extension contacts	0.72
4.	Social participation	0.63
5.	Mass media exposure	0.43
6.	Occupation	0.25
7.	Techno savviness	0.04
8.	Education	0.04
9.	Age	0.02
10.	Farming experience	0.01
11.	Family size	-0.18
12.	Land holding	-0.26

Discriminant Coefficients of the Variables and Classification of Respondent Farmers

The discriminant coefficients (Table 2) were estimated to identify the variables that discriminated between the two groups of respondent farmers (associated and non-associated with e-NAM). The discriminant function coefficient for the variable, achievement motivation, was found to be the highest (2.00) followed by economic motivation (1.17), extension contact (0.72), social participation (0.63) and mass media exposure (0.43).

Table 3 depicts the original classification (surveyed farmers) and predicted classification (discriminant analysis) of a total of 120 respondent farmers. It was quite interesting to observe that out of 60 respondent farmers associated with the e-NAM category, 21.7% of respondent farmers were found to possess characteristics of non-e-NAM-like respondent farmers. Similarly, out of 60 non-associated farmers, 11.7% of respondent farmers were found to possess characteristics of e-NAM respondent farmers. Overall, 88.33 percent of original grouped cases were correctly classified after discriminant analysis.

Table 3: Classification of respondent farmers based on discriminant analysis

Association of Farmers → ↓		Predicted Group Membership		Total
		e-NAM associated	Non-associated	
Original Classification	e-NAM associated	47 (78.3%)	13 (21.7%)	60 (100.0%)
	Non-associated	7 (11.7%)	53 (88.3%)	60 (100.0%)

Discussion

The findings of the study indicate a clear distinction between farmers who are associated and not associated with e-NAM. Small and marginal farmers form the core segment of agricultural producers who are middle-aged and are more actively engaged in agricultural activities, allied enterprises, highlighting the importance of farming as the primary livelihood source. There is a greater propensity among less-experienced farmers to adopt and utilize technology-driven agricultural marketing platforms compared to their more experienced counterparts, who may prefer conventional marketing practices. The findings are in line with the findings of Bhausahab (2019). The findings related to education are in conformity with the findings of Shende (2019) and Shanmukh Raju *et.al* (2019)^[19]. The educational disparity suggests that farmers with relatively higher education levels may find it easier to navigate digital platforms, access online market information, and engage in e-NAM transactions.

The Chi-Square test reveals that higher aspirations, financial orientation, tech savviness, farming experience, social participation and extension contact play a crucial role in determining farmers' engagement with e-NAM. In addition to this, there is a robustness of the discriminant model in distinguishing between the two farmer groups, revealing that a subset of e-NAM users may not fully utilize the platform's benefits or may still rely on traditional marketing channels. At the same time, a potential group of non-associated farmers can be encouraged to adopt digital

market platforms.

Conclusion

The findings reinforce the idea that a combination of social and economic factors determines farmers' association with e-NAM. The analysis underlines the importance of fostering attributes like farming experience, social participation, techno-savviness, mass media exposure, extension contacts, economic motivation, and achievement motivation among farmers to encourage broader adoption of e-NAM and similar digital platforms. However, it is equally important to address the challenges faced by non-associated farmers, such as lower levels of social participation and techno-savviness, to bridge the gap and ensure inclusive growth. To enhance participation, policies should focus on improving digital literacy, strengthening extension services, and ensuring infrastructure access. Future research should explore the long-term impacts of e-NAM and investigate the platform's effectiveness across different regions and marginalized groups.

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