



Factors Influencing the Perception of Farmers about Use of e-NAM And Digital Marketing Applications

Machapathri Praneeth¹, Shaik N Meera² and H.K Awasthi³

1. PG Scholar, 3. Prof., Dept. of Agril. Ext., IGKV, Raipur, Chhattisgarh, India,

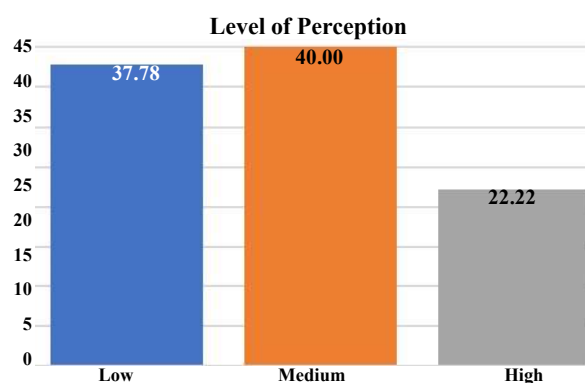
2. Pr. Scientist, ICAR-IIRR, Rajendranagar, Hyderabad, India

Corresponding author's e-mail: mpraneeth95@gmail.com

HIGHLIGHTS

- Transparency, efficiency, and improved price, discovery for farmers and merchants are all facilitated by e-NAM, which makes it easier to trade agricultural commodities online.
- The research examines the ways in which various factors influence farmers' perceptions of e-NAM and digital marketing apps.
- Training programs, allocation of resources, and policy decisions can all be influenced by an understanding of these factors in order to improve farmers' participation in e-NAM and digital marketing

GRAPHICAL ABSTRACT



ARTICLE INFO

Editor:

Dr. Mahesh B. Tengli

Key words:

e-NAM, Digital marketing applications, Pan-India, Agricultural marketing,

Received : 29.02.2024

Accepted : 10.05.2024

Online published : 01.07.2024

doi: 10.54986/irjee/2024/jul_sep/96-103

IRJEE METRICS

Google citations - 8695

h-index - 43

i10-index - 291

NAAS rating - 4.99

ABSTRACT

Context: e-NAM is a nationwide electronic trading platform integrating APMC mandis, fostering a single, nationwide market for agricultural products, enabling farmers to secure optimal prices across the country. Digital marketing apps complement this by equipping farmers with market analysis instruments, pricing strategies, and direct communication with buyers, empowering them to maximize profits and market reach in real-time.

Objective: The study aimed to identify the factors influencing perception of farmers about use of e-NAM and digital marketing applications by farmers.

Methods: Three districts were included in the study, namely Nizamabad, Karimnagar and Warangal, of Telangana with the objective of examining the factors influencing the perception of farmers about e-NAM and digital marketing applications covering a random sample of 90 farmers.

Results & Discussion: Determining the correlation coefficient between independent factors and farmers' perspective leads to the conclusion that age, education, annual income, credit acquisition, extension contact, source of information, innovativeness, decision making ability, training received, mobile inclination, market orientation and risk orientation were the major factors influencing the use of e-NAM and digital marketing applications. On estimating regression coefficient, it was found that R^2 value for this case stands at 0.730. Thus Therefore, it may be said that independent variables explain 73 per cent variability in Perception of farmers about e-NAM and digital marketing applications.

Significance: Understanding these factors aids in tailoring interventions, policies, and training programs to enhance farmers' adoption of e-NAM and digital marketing, thus fostering transparency, efficiency, and improved access to markets for farmers.

Food security and inclusive national growth are facilitated by agricultural marketing, which is essential for boosting and maintaining agricultural productivity and output. (Acharya S. 2004). Indian agriculture has historically prioritized solving productivity problems, and the country's policies have been severely unbalanced, treating post-harvest difficulties in an almost stepmotherly manner. (Jamaluddin, 2013). Ensuring equitable farm harvest prices is significantly more important than increasing production as a means of increasing a farmer's earnings. Otherwise, a farmer's worst nightmare could result from a glut of supply when prices plummet. (Paty and Gummagolmath, 2015).

A limitation prevents a system from accomplishing its aim. (Goyal *et al.*, 2014). Agricultural marketing in India has fostered tremendously since independence, many challenges prevail like low farmers literacy level and present of large number channels eats away the pockets of both farmers and consumers (Rajendran, 2014 & Singh, *et al.*, 2015), many issues related to regulated markets like prohibiting direct sale outside the market yard, poor availability of infrastructure in the markets, panels overseeing the agricultural produce markets do not hold regular elections for members and inefficient disposal of farmers produce (Acharya S. 2004), restricted access to market data, limited accesses of agriculture produce markets, less farmers price realization, licensing barrier, lack of market infrastructure in Agricultural market (Aggarwal *et al.* 2017), high wastage in supply chain and high incidence of market charges, long gestation period of infrastructure Projects and seasonality of Agriculture (Tripathi and Prasad, 2009), lack of National Agricultural Market (Yadav and Sharma, 2017).

A system for agricultural marketing should include features like price information, the sharing of marketing technology, and forward and backward links to expand market access. This necessitates increased effort on marketing policy research, market intelligence, and trade programme mission, centers of excellence, style of operations, and new approaches to develop suitable marketing technology (Marbaniang *et al.*, 2020).

It is expected that ICT-driven extension services will play a pivotal role in enabling the exchange of information and knowledge among diverse stakeholders involved in the systemic production, distribution, acquisition, and utilization of knowledge. (Pradhan *et al.*, 2018 & Jha *et al.*, 2021). The use of ICT

is the only way to bypass several stages and sequences in the process of agricultural development (Rajneesh and Sisodia, 2020). To make the most of current technology to improve agricultural marketing, exchange platforms and other electronic markets are designed to enhance competition by connecting the largest number of buyers and sellers in the most cost-effective, transparent and regulated way (Mukherjee *et al.*, 2016). The idea behind the electronic market is to provide transparency in pricing by removing the information asymmetry between buyers and sellers and enable farmers to benefit from price discovery (Chand, R. 2016).

A number of reform initiatives have been implemented in the nation's agricultural markets with the goal of improving market accessibility, promoting transparency in market operations, and giving farmers fair pricing (Raju *et al.*, 2022). The idea behind the e-Platform for National Agricultural Market (e-NAM) originated with the Unified Online Agricultural Market, which was started in Karnataka as the Unified Market Platform (UMP). (Chand, R. 2016). For the Indian farming community, the National Agriculture Market (e-NAM) would be a game changer. Through warehouse-based sales that eliminate the need to carry the goods to the Mandis, e-NAM will give farmers additional options for selling their products and boost their market accessibility (Yadav and Sharma 2017).

e-NAM is such an e-commerce platform integrating physical markets and creates a unified national market by drawing buyers from around the nation through electronic auction. This eliminates the multiple physical handlings at various levels and with multiple market fees (Gupta and Badal, 2018). Reduced information asymmetry between buyers and sellers, real-time price discovery, auction process transparency, farmers' access to a national market, produce quality-appropriate pricing, and the introduction of an online payment system are all anticipated benefits of e-NAM. (Sekhar and Bhatt, 2018). The value and effectiveness of any scheme can only be judged through perception and response of the beneficiaries (Badodiya *et al.*, 2010). Success of this scheme largely depend upon the knowledge possessed and effectiveness perceived by the farmers towards various features, and functioning of the e-NAM (Raju *et al.*, 2022). Examining electronic trading for the national agricultural market is crucial in this context since it is an attempt to use technology to improve the agricultural marketing system. The current investigation was carried out to look at the

factors (personal, socio-economic, psychological and communication characteristics of farmers) influencing the use of e-NAM and other digital marketing applications by farmers with following objectives:

- To study the profile characteristics of the farmers
- To study the perception of farmers about e-NAM and digital marketing applications
- To identify the factors influencing the use of e-NAM and digital marketing applications by farmers.

METHODOLOGY

Three districts were included in the study, namely Nizamabad, Karimnagar and Warangal of Telangana state (between 15° 46' N to 19° 47' N latitude and 77° 16' E to 81° 43' E longitude) which were purposively selected, as the three districts have effectively linked the APMC mandis with the e- NAM and also substantial farmers were found using digital marketing mobile applications. To gain a thorough understanding of the issue, the exploratory design was employed for the current investigation.

For the current study, two villages were purposefully chosen from each district. Six villages in all were chosen from the three districts. The villages of Ankapur and Velpoor were chosen from the Nizamabad district. Karimnagar district's Nagunuru and Timmapuram, as well as Warangal district's Atmakur and Khanapur villages, were chosen for the study. A total of 90 farmers were picked at random from three districts, with 15 farmers from each village ($6 \times 15 = 90$).



Location of study area of Telangana State

Perception of farmers about e-NAM and digital marketing applications (Y) is the dependent variable. To know the perception of respondents, a structured schedule was developed with 25 statements after a discussion with the concerned scientists and from review of literature and responses were collected 3-point categories of agree, undecided and disagree with a scoring pattern of 3, 2 and 1 respectively. The respondents were classified into three categories by using mean and standard deviation.

Age (X_1), Education (X_2), farming experience (X_3), land holding (X_4), annual income (X_5), training received (X_6), Extension contact (X_7), credit acquisition (X_8), innovativeness (X_9), social participation (X_{10}), source of information (X_{11}), mobile inclination (X_{12}), decision making ability (X_{13}), market orientation (X_{14}) and risk orientation (X_{15}) are the independent variables. Data on 15 personal, socio-economic, psychological and communication characteristics (independent variables) were collected and tabulated using a structure schedule. The data were analyzed using mean, standard deviation, frequency, and percentage method. To determine the key factors affecting farmers perception about use of e-NAM and digital marketing applications, the correlation and regression analysis were performed using SPSS tool.

Correlation: The correlation co-efficient was used to measure determine the extent of variability between independent and dependent variables. The correlation co- efficient ranges from -1.0 to +1.0 the formula is used as follows.

$$r = \frac{n(\Sigma xy) - \Sigma(x)\Sigma(y)}{\sqrt{\{n\Sigma x^2 - (\Sigma x)^2\}\{n\Sigma y^2 - (\Sigma y)^2\}}}$$

Where,

r = Correlation co-efficient

x = Scores of independent variables

y = Scores of dependent variables

n = Number of observations

Regression: The relationship between the independent and dependent variables may be expressed as a function. Such relationship between two variables is termed as regression and is calculated using the formula

$$Y_1 = a + b_1X_1 + b_2X_2 + \dots + b_nX_n$$

Where,

Y_1 = Dependent variable

$X_1 \dots X_2$ = Independent variable

a = Constant

$b_1 \dots b_n$ = Regression coefficient of respective independent variables

RESULTS

The data in the Table 1 illustrate that majority of

Table 1. Respondents profile characteristics (N=90)

Categories	No.	%
<i>Age</i>		
upto 33 years	21	23.33
34 to 53 years	50	55.56
54 years and above	19	21.11
<i>Education</i>		
Illiterate	17	18.89
Primary (Up to 5th class)	23	25.56
Middle (6 th to 8th class)	24	26.67
High School (9th to 10th class)	16	17.78
Higher Secondary (11th to 12 th class)	8	8.89
Graduate and above	2	2.22
<i>Farming experience</i>		
upto 10 years	24	26.67
11 to 20 years	49	54.45
20 years and above	17	18.88
<i>Land holding</i>		
Marginal (upto 1 ha)	33	36.67
Small (1.1 to 2 ha)	29	32.22
Medium (2.1 to 3 ha)	19	21.11
Large (4 ha and above)	09	10.00
<i>Annual income</i>		
Upto Rs. 60,000	31	34.44
Rs. 60,000 - Rs. 1,20,000	35	38.89
Above Rs. 1,20,000	24	26.69
<i>Training received</i>		
Training not received	15	16.67
Training received	75	83.33
<i>Extension contacts</i>		
Lower (upto10)	16	17.78
Moderate (11 to 13)	55	61.11
Higher (14 and above)	19	21.11
<i>Social participation</i>		
No membership / participation	9	10.00
Membership in one organization	22	24.44
Membership in more than one organization	49	54.44
Holding position in an organization	10	11.12
<i>Source of information</i>		
Hardly access (upto10)	20	22.22
Frequently access (11 to 13)	44	48.89
Regularly access (14 and above)	26	28.89
<i>Innovativeness</i>		
Low (upto 2.13)	24	26.67
Medium (2.14 to 4.06)	38	42.22
High (4.07 and above)	28	31.11
<i>Credit acquired</i>		
Acquired	51	56.67
Not acquired	39	43.33
<i>Mobile inclination</i>		
Low (upto 37)	15	16.67
Medium (38 to 47)	61	67.78
High (48 and above)	14	15.55
<i>Decision making ability</i>		
Low (upto 10)	20	22.23
Medium (11 to 13)	39	43.33
High (14 and above)	31	34.44
<i>Market orientation</i>		
Low (upto 16)	26	28.89
Medium (17 to 22)	45	50.00
High (23 and above)	19	21.11
<i>Risk orientation</i>		
Low (upto11)	27	30.00
Moderate (12 to 16)	40	44.44
Higher (17 and above)	23	25.56

farmers (55.56%) fell within the age range of 34 to 53 years, with education levels typically up to middle school (26.67%), and possessing farming experience spanning from 11 to 20 years (54.45%). Additionally, most farmers were found to have marginal-sized land holdings (36.67%) and medium annual income (38.89%). Approximately 43.33 per cent of farmers had received a moderate level of training and maintained moderate levels of extension contact (61.11%). Furthermore, 54.44 per cent of farmers held memberships in more than one organization. While a significant portion (48.89%) frequently accessed information sources and displayed a medium level of innovativeness (42.22%). Additionally, 56.67 per cent of farmers accessed credit and showed a medium level of inclination towards mobile technology (67.78%). Moreover, the majority of farmers exhibited a medium level of decision-making ability (43.33%), market orientation (50.00%), and risk orientation (44.44%).

It is evident from the Table 2 that majority

Table 2. Distribution of farmers according level of perception about use of e-NAM and Digital marketing applications (N=90)

Level of perception	No.	%
Low (upto 51)	34	37.78
Medium (52 to 55)	36	40.00
High (56 and above)	20	22.22
Total	90	100.00
Mean = 53.06 S.D = 2.50		

Table 3. Correlation analysis between independent variables and perception of farmers about e-NAM and digital marketing applications

Variables	'r)
Age (X ₁)	-0.214*
Education (X ₂)	0.559**
Farming experience (X ₃)	0.019 NS
Land holding (X ₄)	0.071 NS
Annual income (X ₅)	0.266**
Training received (X ₆)	0.492**
Extension contact (X ₇)	0.522**
Credit acquisition (X ₈)	-0.248**
Innovativeness (X ₉)	0.515**
Social participation (X ₁₀)	0.204NS
Source of information (X ₁₁)	0.249*
Mobile inclination (X ₁₂)	0.422**
Decision making ability (X ₁₃)	0.619**
Market orientation (X ₁₄)	0.325**
Risk orientation (X ₁₅)	0.250*

* Significant at 5 % level of significance NS – Non-significant, ** Significant at 0.01 % level of significance

Table 4. Multiple regression analysis between independent variables and Perception of farmers about e-NAM and digital marketing applications

Variables	“b” value	“t” value
Age (X_1)	-0.047	-2.312*
Education (X_2)	0.435	2.838**
Farming experience (X_3)	0.073	1.880 ^{NS}
Land holding (X_4)	0.007	0.039 ^{NS}
Annual income (X_5)	0.527	2.468*
Training received (X_6)	0.330	2.250*
Extension contact (X_7)	0.267	2.721**
Credit acquisition (X_8)	-0.047	-0.541 ^{NS}
Innovativeness (X_9)	0.490	2.735**
Social participation (X_{10})	-0.019	0.092 ^{NS}
Source of information (X_{11})	0.176	2.032*
Mobile inclination (X_{12})	0.020	0.581 ^{NS}
Decision making ability (X_{13})	0.300	3.098**
Market orientation (X_{14})	0.054	1.117 ^{NS}
Risk orientation (X_{15})	0.008	0.158 ^{NS}

*Significant at 0.05 % level of probability; R^2 value: 0.730

**Significant at 0.01% level of probability

(40.00%) of the farmers were having medium level of perception, followed by low level of perception was observed with 37.78 per cent and high-level perception with 22.22 per cent of the farmers respectively.

Factors influencing the use of e-NAM and digital marketing applications: In this section an attempt was made to find out the different factors i.e., independent variables which effect the perception of farmers about the use of e-NAM and digital marketing application. Accordingly, the statistical tools, i.e., correlation analysis and regression analysis were used to unearth the significant factors

The data presented in the Table 3 provides an insight towards the relationship between independent variables ($X_1 - X_{15}$) and Perception of farmers about e-NAM and digital marketing applications (Y).

Multiple regression analysis between independent variables and Perception of farmers about e-NAM and digital marketing applications: The Multiple regression analysis was carried out between 15 selected independent variables ($X_1 - X_{15}$) and Perception of farmers about e-NAM and digital marketing applications (Y) which is presented in the Table 4.

DISCUSSION

Correlation analysis: It is evident the data presented in the Table 3 that out of 15 variables, only 10 variables i.e. education, annual income, training

received, extension contact, innovativeness, source of information, mobile inclination, decision making ability, market orientation, risk orientation was found positive and significantly correlated with Perception of farmers about e-NAM and digital marketing applications. Out of these variables, eight variables i.e. education, annual income, training received, extension contact, innovativeness, mobile inclination, decision making ability, market orientation were found correlated at 0.01 level of probability or 1 per cent level of significance and two variables i.e. source of information and risk orientation was found correlated at 0.05 level of probability or 5 per cent level of significance. While two variables i.e. age and credit acquisition were found negative and significantly correlated with perception of farmers about e-NAM and digital marketing applications, out of which credit acquisition was found correlated at 0.01 level of probability or 1 per cent level of significance and age was found correlated at 0.05 level of probability and 5 per cent level of significance. The remaining three variables i.e. farming experience, land holding and social participation did not indicate significant relationship with dependent variable. The elaborate discussion is given below.

Age and perception: Age was found negative and significantly correlated with the way farmers perceive about the e-NAM and digital marketing applications. Lesser the age, farmers are likely to have favorable perception. Study by Moshe *et al.*, (2021) proved that younger farmers were more likely to use mobile phones for accessing agricultural marketing information than older farmers. Barnes *et al.*, (2019) found that younger farmers are more likely to adopt ICT tools due to a greater adaptive capacity to new technologies.

Education and perception: Education was found positive and significantly correlated with perception of farmers about e-NAM and digital marketing applications. This means higher the level of education higher is the perception. This outcome could be explained by the fact that education broadens one's horizons and increases one's knowledge. A farmer when educated learns how to acquire, analyze, synthesize, evaluate, and understand the new technology in marketing their agriculture produces (Poushter. 2016 and Alampay. 2006). This in turn helps them in judging the benefits and risks associated with the e-NAM and other digital marketing applications. This result is consistent with the work of Mittal and Mehar (2016)

who found out that farmers with higher education tended to use ICT tools for marketing than those with a lower education level.

Farming experience and perception: Farming experience was found positive and non-significant with perception of farmers about e-NAM and digital marketing applications. Thus, the study established the fact that farming experience did not influence on perception of the farmers about e-NAM and digital marketing applications.

Land holding and perception: Land holding was found positive and non-significant with perception of farmers about e-NAM and digital marketing applications. This indicates that perception of farmers about e-NAM and digital marketing applications was found similar among them with small, marginal, medium as well as big size of land holding.

Annual income and perception: Annual income was found positive and significantly correlated with perception of farmers about e-NAM and digital marketing applications. It indicates that perception level increase with the increase in the income level. Income plays an important role on the behavior of person. High income emerged as a pivotal factor influencing farmers to adopt new technologies, facilitating risk-taking and exposure to novel ideas (Samaan, 2003). Farmer who wants to bring improvement in the agriculture income tries to accept new methods of marketing their agriculture produces where the farmer feels will get a good price.

Training received and perception: Training received was found positive and significantly correlated with perception of farmers about e-NAM and digital marketing applications which indicates that with the increase in number of trainings received, perception also increases. Increase in the number of trainings undergone will help to enhance the inbuilt abilities of farmers on decided aspect which may help to change the behavior of farmer in marketing their agriculture produce. It means, by availing a training the change can be brought in one's knowledge, skill, attitude, understanding which helps to enhance the capabilities (Prashanth, P *et. al.*, 2012).

Extension contacts and perception: Extension contact was found positive and significantly correlated with perception of farmers about e-NAM and digital marketing applications. It indicates that perception of farmers about e-NAM and digital marketing applications will increase with the increase in extension contact. Extension agents are important

sources of information with regard to new agricultural technology and innovation; therefore, guidance from extension agents improves competence in utilizing new technology and innovation (Prashanth, P *et. al.*, 2012).

Credit acquisition and perception: Credit acquisition was found negative and significantly correlated with perception of farmers about e-NAM and digital marketing applications. Less credit acquisition correlates with a more favorable perception of e-NAM and digital marketing. Farmers may avoid excessive credit to prevent distress sales, potentially leading them to hesitate with e-NAM facilities (Bandhavya *et al.*, 2022). Educating them on e-NAM's benefits is crucial.

Innovativeness and perception: Innovativeness was found positive and significantly correlated with perception of farmers about e-NAM and digital marketing applications. It indicates that perception of farmers increases with the increase in their innovativeness. This trend might be since farmers with high innovativeness desire to seek and introduce changes in marketing their agricultural produce (Raja Madhu Shekar *et al.*, 2023).

Social participation and perception: Social participation was found positive and non-significant with perception of farmers about e-NAM and digital marketing applications. This indicates that perception of the farmers about their role was influenced by their level of social participation. Higher the level of social participation more was their perception about their role. Social participation provides an opportunity to the farmers to see that what other people do and thereby motivate or helps them to gain, perceive, understand and accept ideas more quickly.

Source of market information and perception: Source of market information was found positive and significantly correlated with perception of farmers about e-NAM and digital marketing applications. The possible reason for this result may be that more sources of market information more likely that farmer perceives digital marketing interventions. If farmers are able to get information related to marketing i.e. market prices, about where to sell the produce that he has grown etc., farmer can get good price for his produce sold. (Raja Madhu Shekar *et al.*, 2023)

Mobile inclination and perception: Mobile inclination was found positive and significantly correlated with perception of farmers about e-NAM and digital marketing applications. This might be due to fact that information related to marketing of produce can

be easily know by using mobile phone. Nyagango *et al.*, (2023) highlighted that farmers can get the market prices prevailing in different places by using mobile application and how mobile phones improve smallholder farmers ability to engage with various stakeholders, leading to better marketing decisions.

Decision making ability and perception: Decision making ability was found positive and significantly correlated with perception of farmers about e-NAM and digital marketing applications. It indicates that higher is the decision-making ability higher is the perception. This might be due to fact that farmers having high level of decision-making pattern had access to a greater number of sources, so as to know about the most profitable markets prevailing in the area. A farmer oriented towards taking risk and uncertainties in applying ICT tools was certain to have high decision-making ability (Hansen *et al.*, 2004a)

Market orientation and perception: Market orientation was found positive and significantly correlated with Perception of farmers about e-NAM and digital marketing applications. It indicates that perception of farmers about e-NAM and digital marketing applications increases with the increase in market orientation. The possible reason for this result may be that, one of the key indicators to get good price to their agriculture produce depends to a greater extent on the ability of a farmer to make intelligent buying of inputs and selling of the produce. Farmers well-informed about market trends, facilities, and networks seek the latest marketing information, focusing on prices in various areas to sell where they can maximize income. (Nyagango *et al.*, 2023).

Risk orientation and perception: Risk orientation was found positive and significantly correlated with Perception of farmers about e-NAM and digital marketing applications. It can that the level of perception of farmers about e-NAM and digital marketing application was more among those, who had high degree in encountering well planned risk and uncertainty in farming. Tankodara and Gohil (2020) reported that farmers who want to take more risks to earn profit adopted new innovations in farming.

Multiple regression analysis: the data in the Table 4 illustrates the regression coefficient of independent variables with perception of farmers about e-NAM and digital marketing applications. It can be said by estimating the regression coefficient that R^2 value in this case is 0.730. Thus, it can be said that independent

variables explain 73 per cent variability in Perception of farmers about e-NAM and digital marketing applications. All the variables put together shown 73 per cent variation in Perception of total respondents.

CONCLUSION

The findings indicate that age, education, annual income, credit acquisition, extension contact, source of information, innovativeness, decision making ability, training received, mobile inclination, market orientation and risk orientation were the major factors influencing the use of e-NAM and digital marketing applications by farmers. The coefficient of determination (R^2) revealed that 73 per cent of the total variation in the perception of farmers about e-NAM and digital marketing applications was explained by the selected independent variables. It is important that there is need to create awareness, increase knowledge and educate the farmers as how the e-NAM and digital marketing applications brings advantages to the marketing of their produce which will help them improve their livelihood and income level. Regular training programs on digital marketing in agriculture are to be conducted, so that farmers can create a favorable perception towards e-NAM and digital marketing applications.

Funding: No source of financing was found to carry out the study.

Declaration of competing interest: The authors have no competing interests.

Data availability: Data would be made available on request.

Acknowledgement: The authors are thankful and acknowledging the help, support from staff of Transfer of Technology, IIRR, Rajendranagar, Hyderabad and Department of Agricultural Extension, IGKV, Raipur.

Author's contribution: The first and second authors worked together to conceptualize and operationalize the study. The final draft of the manuscript was authorized by the second and third authors.

REFERENCES

- Acharya S. (2004). Agricultural Marketing in India, volume 17 of State of the Indian Farmer: A Millennium Study. Academic Foundation, New Delhi and Dept. of Agriculture and Cooperation, MoA, Govt. of India.
- Aggarwal, N.; Jain, S. and Narayanan, S. (2017). The long road to transformation of agricultural markets in India: Lessons from Karnataka. *Eco. and Pol. Weekly*, 52(41): 47-55.

- Alampay, E. (2006). Analyzing socio-demographic differences in the access & use of ICTs in the Philippines using the capability approach. *Electron. J. Inf. Syst. Dev. Count.* **27**: 1–39.
- Badodiya, S.K.; Daipuria, O.P.; Shakya, S.K.; Garg, S.K. and Nagayach, U.N. (2010). Perceived effectiveness of farm telecast in transfer of agricultural technology. *Indian Res. J. Ext. Edu.*, **10** (1): 109-111.
- Bandhavya, M.; Singh A. K.; and Lal, S. P. (2022). Procedural impediments in e-NAM system faced by stakeholders in Guntur mandi of Andhra Pradesh. *Indian Res. J. Ext. Edu.*, **22** (4): 106-111.
- Barnes, AP.; Soto, I.; Eory, V.; Beck, B.; Balafoutis, A.; Sánchez, B.; Vangeyte, S.; Van, der Fountas T Wal and Gómez Barbero, M. (2019). Exploring the adoption of precision agricultural technologies: a cross regional study of EU farmers. *Land Use Policy*, **80**:163–174.
- Chand, R. (2016) E-platform for National Agricultural Market. *Eco. and Pol. Weekly*, **51**(28): 15-18.
- Goyal, N. and Goyal S.K. (2022). Major constraints in production and marketing of onion in Haryana. *Indian Res. J. Ext. Edu.*, **22** (2):38-48
- Gupta, S. and Badal, P.S. (2018) e-National Agricultural Market (e-NAM) in India: A review. *BHU Mngt. Rev.* **6**(1): 48-57.
- Hansen, J.; Dilley, M.; Goddard, L.; Ebrahimian, E.; and Ericksen, P. (2004b). Climate variability and the millennium development goal hunger target, IRI Technical Report, 04-04
- Jamaluddin, N. (2013) Adoption of e-commerce practices among the Indian farmers, a survey of Trichy district of Tamil Nadu, India. *Proc. Eco. and Finance*, **7**: 140-149.
- Jha, S.; Kashyap, S. K., and Ansari, M. A. (2021). Attitude of farm women towards ICT tools-based extension services. *Indian Res. J. Ext. Edu.*, **21**(1): 96-98
- Marbaniang, E.K.; Pasweth, D. and Chauhan, J.K. (2020). Marketing behavior of tomato growers in West Khasi hills district of Meghalaya. *Indian Res. J. Ext. Edu.*, **20** (2&3): 22-26.
- Mittal, S. and Mehar, M. (2016). Socio-economic factors affecting adoption of modern information and communication technology by farmers in India: Analysis using multivariate probit model. *J. Agric. Edu. Ext.*, **22** (2), 199–212.
- Moshe, I.; Terhorst, Y.; Opoku Asare; K., Sander, L.B.; Ferreira, D.; Baumeister, H.; Mohr, D. C., and Pulkki-Raback, L. (2021). Predicting symptoms of depression and anxiety using smartphone and wearable data. *Front. in Psych.*, **12** : 625247.
- Mukherjee, A.; Bahal, R.; Burman, R.R.; Dubey, S.K. and Jha, G.K. (2016). Effectiveness of TATA kisan sansar in technology advisory and delivery services in Uttar Pradesh. *Indian Res. J. Ext. Edu.*, **11**(3): 8-13.
- Nyagango, A. I.; Sife, A. S. and Kazungu, I. (2023). Factors influencing the use of mobile phone for accessing agricultural marketing information by grape smallholder farmers in Tanzania. *Cogent Bus. Mngt.*, **10** (3).
- Paty, B.K. and Gummagolmath, K.C. (2015) A handbook on agricultural marketing extension for extension functionaries. MANAGE, Hyderabad, India.
- Poushter, J. (2016). Smartphone ownership and internet usage continues to climb in emerging economies. *Pew. Res. Center*, **22**, 1–44.
- Pradhan, K.; Panda, S. and Prasad, C.V. (2018). Perceiving the behavioral change of farmers through modern information communication technology (ICT) tools. *Indian Res. J. Ext. Edu.*, **18** (2): 46-53.
- Prashanth, P. and Reddy, M.M. (2012). Factors influencing the adoption of organic farming by the farmers of Karimnagar district of Andhra Pradesh. *Int. J. Farm Sci.*, **2** : 123–128.
- Raja Madhu Shekar, B.; V., Sudha Rani; Padmaveni, C.; Reddy, M. Malla and Anil Kumar, B. (2023), Analysis of farmer's perception and usage of social media in agriculture, *Int. J. Bio-reso. and Stress Mngt.*, **14**(12):1646-1653.
- Rajendran G. Karthikesan P. (2014), Agricultural marketing in India-an overview, *Asia Pacific J. Res.*, **I** (XVII) : 2320-5504.
- Rajneesh, S.M., and Sisodia, S.S. (2020). Impact of mobile phone based services on rice crop management. *Indian Res. J. Ext. Edu.*, **20**(1): 51-54.
- Raju, M. S.; Devy, M. R. and Gopal, P.S. (2022). Farmers' perceived effectiveness of e-NAM. *Indian Res. J. Ext. Edu.*, **22**(3): 43-48
- Samaan, M. (2003). The effect of income inequality on mobile phone penetration. Bost. Coll. Honor. Theses–Department Econ. Dissertations. Bc. Edu/Cgi/Viewcontent. Cgi, 1- 39.
- Sekhar, C.S.C. and Bhatt, Yogesh (2018). Electronic National Agricultural Market (e-NAM): A review of performance and prospects in Haryana, Agricultural Economics Research Centre, University of Delhi.
- Singh, S.S; Kushwah, S; Singh, V.B. and Daipuria, O.P. (2015). Factors affecting the role of women in farming and allied activities, *Indian Res. J. Ext. Edu.*, **15**: 81-83.
- Tankodara, K.D. and Gohil, G.R. (2020). Level of adoption of chickpea growers about chickpea production technology. *Indian Res. J. Ext. Edu.*, **20** (4): 85-88
- Tripathi, A. and Prasad, A.R. (2009). Agricultural development in India since in determinants: a study on progress, progress, performance and determinants. *J. Emerg. Knowl. on Emerg. Markets*, **1**(1), 63-92.
- Yadav, A. and Sharma J. (2017). National agriculture market: The game changer for Indian farming community. *Int. J. Scient. Res. and Mngt.*, **5**(7): 5810-5815.

