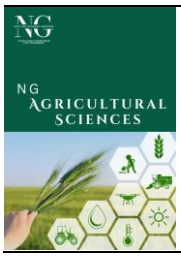

NG Agricultural Sciences

ISSN (Online): 3107-5053

Volume 1, Issue 1 (January-March), 2025, (1-7)

Original Research

Open Access

Participation of Farm Women in Extension Activities under ATMA in Nuapada District of Odisha

Lakhan Lal Meena[1], Madhumita Jena[2], Mayuri Sing Sardar[1] and Uma Pradhan[1]*

[1]Krishi Vigyan Kendra, Nuapada, Odisha University of Agriculture & Technology, Bhubaneswar, Odisha, India
[2]Krishi Vigyan Kendra, Nayagarh, Odisha University of Agriculture & Technology, Bhubaneswar, Odisha, India

*Corresponding author email ID: umapradhan07sst@gmail.com

HIGHLIGHTS

- Developing farm women's interest and motivation through participatory extension methods has immense scope for increasing farm productivity.
- Empowering farm women with increased decision-making authority in farm work is necessary, as seen from the need for targeted interventions.
- Greater contact and involvement through extension can provide farm women timely exposure to new practices and technology, to their great advantage.

ARTICLE INFO

Article History:
Received: 04 February 2025
Revised: 04 March 2025
Accepted: 09 March 2025
Published: 31 March 2025

Keywords:
Agricultural extension
Decision-making capacity
Farm women
Group cohesiveness
Social inclusion

ABSTRACT

Assessment of the role of farm women in agricultural extension is critical in rural development and food security. The current study was conducted among 120 farm women who were members of Women Interest Groups (WIG) of Nuapada District, Odisha, during 2023-2024, using a descriptive study with structured interviews and focus group discussions to assess dimensions such as interest, motivation, decision-making, cohesiveness, and extension contact. The research indicated that even though they exhibited moderate interest and motivation, they also indicated low levels of decision-making and cohesiveness and low levels of extension contact, which require greater awareness and more participatory interventions. Based on the findings, the study concludes that interventions such as awareness generation and capacity-building programs for participatory interventions are necessary to increase participation, which will be crucial to enhance agricultural productivity and sustainable rural development.

1. INTRODUCTION

Agricultural extension has been centuries old as a key avenue for the transmission of knowledge, skills, and technologies to farmers, enhancing agricultural productivity and rural development (Saha et al., 2025). The role of farm women in agricultural extension services has become an emerging area of focus. This is warranted, as farm women are typically the main players in farming households, and they make meaningful contributions to agricultural output and household food security.

https://doi.org/10.5281/zenodo.15109465

Farm women have had a diverse array of challenges in accessing and reaping the benefits of agricultural extension services. These challenges are typically grounded in social, cultural, and economic constraints that limit their participation and involvement (Chekol, 2024).

The Agricultural Technology Management Agency (ATMA) has launched extension reforms for empowering farm women and mitigating such challenges. The ATMA activities are focused on developing an enabling environment for farm women to engage productively in agricultural extension activities to enhance their knowledge, skills, and contribution towards farm development (Joshua et al., 2023). The present study attempts to assess the degree of participation of farm women in extension reforms activities under ATMA with specific reference to the interest and motivation, decision-making capacity, group cohesiveness, and extension participation and contact.

Interest and motivation are the internal drivers of active participation in any activity. For farm women, interest and motivation can be a deciding factor in their participation in extension reforms. Interest and motivation are influenced by a broad array of factors, from personal objectives, perceived benefits, and social support. High levels of interest and motivation can lead to increased participation in extension activities, while low levels can act as hindrances to participation (Charatsari et al., 2017). It is important to identify the prevalence of interest and motivation among farm women to formulate effective extension programs that can counter such hindrances and encourage their participation.

Decision-making capacity is also a determinant of farm women's involvement in extension reforms. In the majority of rural families, there are set gender roles that limit women from involvement in decision-making, particularly for farming activities and resource utilization (Saha et al., 2024). Higher decision-making capacity among farm women is crucial for empowering and motivating them to engage actively in agriculture (Mulema et al., 2019). Decision-making capacity depends on education, awareness, and social norms. With a proper understanding of the status of decision-making capacity of farm women, certain interventions can be framed to empower them and enhance their decision-making power for selecting agricultural activities.

Group cohesiveness is a prerequisite for effective operation of any collective undertaking, including agricultural extension programs. Farm women's involvement in group activities under ATMA can be affected by the degree of cohesiveness of the groups. Group cohesiveness refers to the degree of togetherness and cooperation among members of a group. High group cohesiveness may result in improved cooperation, mutual learning, and enhanced participation in extension activities (Mutonyi et al., 2020). It is necessary to know the degree of group cohesiveness among farm women for the development of strategies to improve group dynamics and the effectiveness of extension programs.

Extension contact and participation refer to the intensity and quality of interaction among farm women and extension agents, and among farm women and other stakeholders such as neighbors and members of the community. Regular contact with extension agencies facilitates timely delivery of new practices and technologies. Extension contact and participation are influenced by accessibility, awareness, and social networks (Daniso, 2022). Understanding the levels of extension contact and participation among farm women is critical in developing strategies to increase the intensity and quality of such interaction, such that farm women are empowered with the information and support required for their agricultural enterprises.

2. MATERIALS AND METHODS

The Nuapada district of Odisha, India, experiences a tropical climate with well-defined wet and dry seasons. It is situated in western Odisha, approximately 200 meters above sea level (Mahala, 2019). The district experiences high summer temperatures, typically above 40°C, and relatively mild winters with temperatures varying around 10°C. The monsoon season is marked by heavy rainfall, which contributes to overall humidity and water supply for agricultural needs. Nuapada geographically possesses undulating topography with plains and low hills, which define the vegetation pattern and agricultural practice (Mishra et al., 2024). Tropical deciduous forests and grasslands are the dominant vegetation types with a vast array of crops such as paddy, millets, and pulses being grown in the district. All these climatic and geographical factors have a significant impact on the agricultural situation and the livelihood of the farming communities, including the farm women surveyed in this study.

This research utilized a descriptive research design in measuring the level of participation of farm women in the extension reforms activities of the Agricultural Technology Management Agency (ATMA). The research was carried out in 2023-2024 in

a chosen location where extension reforms activities of ATMA are actively being implemented. The sample size was 120 farm women from the Women Interest Groups (WIGs) of ATMA. The respondents were chosen using purposive sampling, and this ensured the sample represented a diverse group of farm women with different levels of participation in extension activities.

Data were collected using a guided interview schedule with the objective to capture various aspects of the participation of the farm women in the extension reforms activities. The interview schedule comprised interest and motivation, decision-making capacity, group cohesiveness, and extension contact and participation. Focus group discussions (FGDs) were also conducted with the chosen WIG members to have a clearer picture of the participation of the WIG members and the issues they face. The FGDs acted as the platform for the respondents to open up and share their experiences, perceptions, and views on how extension services could be improved. The data gathered were analyzed using descriptive and inferential statistical methods. Descriptive statistics like frequencies, percentages, means, and standard deviations were employed to summarize and report the distribution of the responses by category. Inferential statistics like covariance analysis and correlation studies were employed to examine the association between various socio-economic variables and the degree of participation.

3. RESULTS

The study assessed farm women's involvement in extension reforms program under the Agricultural Technology Management Agency (ATMA) in Nuapada District, Odisha. The findings have particular significance in determining the interest and motivation, decision-making capacity, group cohesiveness, and extension participation and contact of farm women in the study area.

3.1. Interest and Motivation

Distribution of Women Interest Group (WIG) members based on interest and motivation was examined (Table 1). It was revealed that 5% of the respondents possessed a high level, 65% possessed a medium level, and 30% possessed a low level of interest and motivation. The highest percentage of WIG members (65%) belonged to the medium category of interest and motivation. It indicates that though a high percentage of farm women possess a medium level of participation, a high percentage possesses low levels of interest and motivation. It is a constraint towards the attainment of ATMA's goals. For its elimination, ATMA functionaries can organize more exposure visits, demonstrations, and awareness programs to generate high interest and motivation among the WIG members.

3.2. Decision-Making Capacity

Research evaluated the decision-making abilities of WIG members according to Table 1. The study revealed that medium decision-making capacity was present in 72% of respondents while low decision-making capacity applied to 48% of participants. All WIG members showed low decision-making abilities according to assessment results. Women usually play a minimal role in family decisions because Indian families normally follow patriarchal leadership structures. The combination of increased education and awareness has granted WIG members enough capability to decide at medium levels in the entrepreneurial activities of the ATMA project. The decision-making skills of farm women could be increased through specific interventions and training programs created by ATMA functionaries.

3.3. Group Cohesiveness

The analysis targeted the level of cohesion among members of the Women in Governance society as demonstrated by Table 1. None of the members demonstrated high group cohesiveness as investigation results showed that 67.5% had medium levels and 32.5% displayed low levels. Maintaining unity within a group depends heavily on the factor of group cohesiveness. Women must develop mutual understanding about their working skills and situations to improve group unity. WIG members would benefit from practical awareness programs that teach the power of unity because they would improve group functioning and performance outcomes.

3.4. Extension Participation and Contact

The research evaluated extension participation together with extension contact opportunities (Table 1). Research revealed that extension contact and participation reached high levels among 10% of participants alongside medium levels among 37.5% of respondents while the rest possessed low levels of participation. Almost half of the women participants (52.5%) involved themselves minimally with the extension activities. WIG farm women must maintain regular contact with extension agencies to receive timely new technologies and practices. The minority rate of participation from survey participants indicates that more education needs to be directed at showing them how their participation supports their development. The extension personnel at ATMA should motivate WIG farm women to enroll in various extension programs to build their skills and knowledge base.

3.5. Covariance Analysis

The study used Covariance analysis to determine both consistency levels and participation extent variability (Table 2). The research data indicated higher uniformity regarding group cohesiveness yet significant differences emerged regarding decision-making process and interest levels and motivational levels and contact with the extension service. Extension participation and contact showed the greatest amount of variability among all variables. The highest gap was observed in the extension participation and contact metrics followed by interest and motivation. The wide variation of participation levels within the respondent pool suggests important differences exist regarding their contact with extension services. ATMA functionaries need to concentrate their efforts on these areas because it will lead to better farm woman engagement. The pattern of farm women participation needs clear understanding through data covariance analysis to reveal the consistency and variability which exist within the data. Higher reliability values in group cohesiveness demonstrate successful implementation of group dynamics interventions but the inconsistent patterns of decision-making procedures and interest and motivation levels with extension participation and contact areas need further targeted interventions (Braun et al., 2020). The extension program developed by ATMA will achieve better equilibrium and effectiveness through programs that address various needs of farm women.

Table 1. Distribution of Farm Women's Participation in Extension Activities under ATMA in Nuapada District of Odisha.

Category	Score	Frequency	Percentage	Mean Score	Standard Deviation
Interest and Motivation					
High	>19.084	6	5		
Medium	16.716-19.084	78	65	17.900	1.184
Low	<16.716	36	30		
Decision-Making Capacity					
High	>17.695	0	0		
Medium	15.555-17.695	72	60	16.625	1.070
Low	<15.555	48	40		
Group Cohesiveness					
High	>19.884	0	0		
Medium	17.866-19.884	81	67.5	18.875	1.009
Low	<17.866	39	32.5		
Extension Participation and Contact					
High	>9.320	12	10		
Medium	7.530-9.320	45	37.5	8.425	0.895
Low	< 7.530	63	52.5		

Note: High= >Mean + SD; Medium= Mean - SD to Mean + SD; Low= <Mean - SD

Table 2. Covariance Analysis of the Extent of Participation in Extension Reforms Activities under ATMA in Nuapada District of Odisha.

Category	N	Min.	Max.	Mean	Std. error	Std. deviation	CV%	Gap%
Interest and Motivation	120	13	20	17.900	0.108	1.184	6.614	10.500
Decision-Making Procedure	120	13	18	16.625	0.098	1.070	6.433	7.639
Group Cohesiveness	120	17	20	18.875	0.092	1.009	5.345	5.625
Extension Participation and Contact	120	6	10	8.425	0.082	0.895	10.623	15.750

3.6. Pearson's Correlation Coefficient

A systematic overview of the connection between "Participation" exists in the correlation matrix concerning multiple socio-economic indicators. A strong positive relationship exists between "Income" and "Participation" since their correlation value reaches 0.91 making it the highest among all variables. The extremely tight relationship demonstrates that wealthier people show much stronger involvement in participating activities of choice. Higher income levels give people economic empowerment which provides them both ample opportunities and financial capacity to pursue different forms of participatory involvement (Cumbers et al., 2020). A membership to organizations shows minimal negative effects on

individual participation (r = -0.036) based on the examination data. The study indicates membership itself lacks power to increase participation because other motivational aspects and the characteristics of the groups remain more important. "Education" and "Family Type" also exhibit weak negative correlations with "Participation" (r = -0.1 and r = -0.088, respectively). These correlations indicate there may be some participation obstacles linked to education level and family structure but they do not show a strong negative relationship. Higher educated individuals along with those with particular family structures could choose different activities instead of the activities measured or encounter limitations to their measured activity participation.

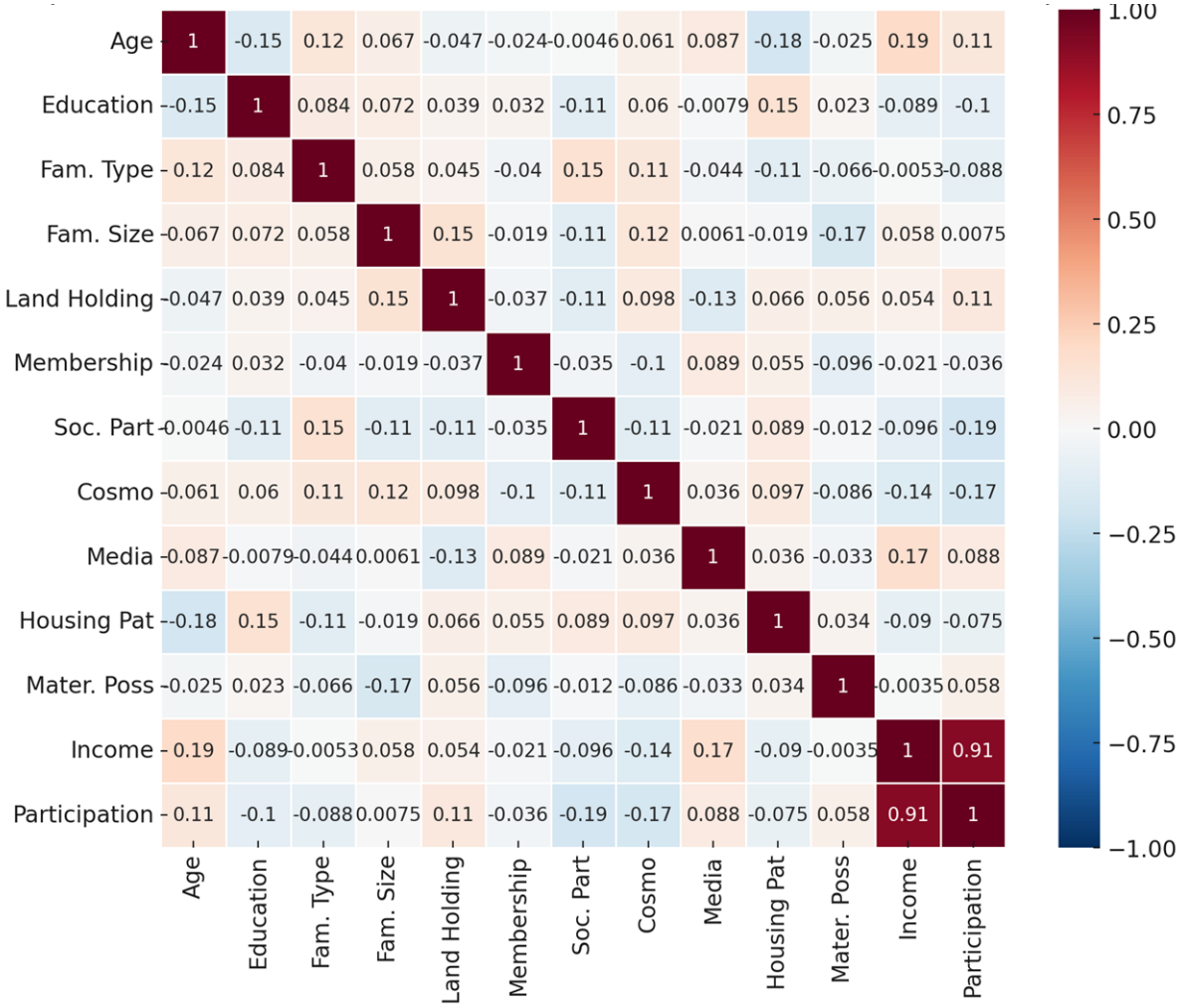

Figure 1. Correlation Matrix of Socio-Economic Variables Affecting Farm Women's Participation in ATMA Extension Activities in Nuapada District of Odisha.

4. DISCUSSION

The active involvement in any activity depends strongly on interests and motivation. Agricultural extension participation levels from farm women strongly relate to their interest and motivation factors regarding extension reforms. A wide range of elements such as personal aspirations and social support alongside perceived benefits affects interest and motivation in individuals according to Shin et al. (2016). Extension activity participation increases when people maintain high interest and motivation yet interest or motivation at low levels acts against participation (Suvedi et al., 2017). The distribution of interest and motivation levels among farm women requires study because it enables effective extension programs which eliminate their barriers to increase participation.

The degree to which farm women have control over making decisions influences their involvement in extension reforms. Traditional gender roles maintain the exclusion of women from decision-making processes in rural areas especially regarding agricultural practices and resource allocation (Acosta et al., 2020). Farm women require better decision-making ability to gain empowerment while

participating actively in agricultural work. The ability of decision-making depends on education levels together with societal customs and individual knowledge (Qanti et al., 2022). Research about farm women's current decision-making capacity allows developers to create specialized initiatives that strengthen their decision-making abilities as well as their capacity to make educated choices about farming activities.

Any collective endeavor needs group cohesiveness for successful operation which includes agricultural extension programs. The cohesiveness levels among farm women participation groups directly affects their involvement in ATMA activities. Group cohesiveness refers to the degree of unity and cooperation among group members (Forsyth, 2021). Extension activities together with shared learning experience higher collaboration among members and yield better group participation when group cohesiveness reaches optimal levels. Analysis of farm women group cohesiveness needs to occur before preparing strategies that boost group effectiveness and improve program execution.

The quality and frequency of interactions farm women maintain with extension agents as well as with their neighbors and community members comprise extension participation and contact levels. Farm women require consistent contact with extension organizations because it enables them to obtain breakthrough technologies and practices in a timely manner. The factors affecting extension participation and contact between farm women and extension agents include accessibility, awareness and social networks. Research on extension participation and contact levels among farm women enables strategists to create approaches for enhancing both frequency and quality of interactions thus guaranteeing agricultural support for these beneficiaries (Cadger et al., 2016).

The findings from the correlation matrix analysis offer valuable insights into the relationship between "Participation" and various socio-economic variables. Economic empowerment plays a crucial role because the strong positive correlation demonstrates "Income"'s essential function in enhancing "Participation". People with elevated income enjoy wider economic opportunities which enable them to face money-based obstacles and get involved in financially demanding practices. Economic resources remain essential for social participation according to traditional socio-economic ideas supported by Cumbers et al. (2020). Energy-related participation enhancement strategies need to focus on removal of economic barriers through efforts which ensure equal distribution of wealth and funding for disadvantaged social classes. The "Membership," "Education," and "Family Type" factors present weak negative correlations which demonstrate their moderate influence on participation but income has the highest impact. A comprehensive strategy needs development to boost participation because it should evaluate both monetary circumstances and organizational and demographic traits together with educational requirements and family distinctions (Suman et al., 2025). Research needs to examine how these variables affect participation directly and should create specific interventions to address challenges and boost social involvement.

5. CONCLUSIONS

The study examined how farm women in Nuapada District, Odisha participate in ATMA extension reforms through their engagement with interest factors plus motivation levels and decision-making potential together with social group cohesion and extension service outreach. Most farm women displayed medium levels of both interest and motivation yet multiple respondents demonstrated low levels and complete absence of high decision-making ability. People in the majority group showed weak participation in extension activities and displayed low inter-personal relationships among members. Tests of covariance showed distinct patterns of participation between respondents indicating differences among the respondents. Socio-economic aspects like social membership along with media exposure strengthen participation yet larger family sizes reduce it according to the correlation analysis. The research findings can direct ATMA toward developing specific intervention strategies for boosting farm women's participation which will result in higher agricultural productivity together with improved rural progress.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Conflicts of Interest: The authors declare no conflicts of interest.

Funding: This research received no external funding.

Acknowledgments: The authors would like to express their gratitude to the Krishi Vigyan Kendra (KVK) and the Odisha University of Agriculture & Technology (OUAT) for their support and assistance in conducting this research.

Author Contributions: Conceptualization, L.L.M. and M.J.; methodology, L.L.M.; software, L.L.M.; validation, L.L.M., M.J., and M.S.S.; formal analysis,

L.L.M.; investigation, L.L.M.; resources, L.L.M.; data curation, L.L.M.; writing—original draft preparation, L.L.M.; writing—review and editing, L.L.M., M.J., M.S.S., and U.P.; visualization, L.L.M.; supervision, M.J.; All authors have read and agreed to the published version of the manuscript.

REFERENCES

Acosta, M., van Wessel, M., Van Bommel, S., Ampaire, E. L., Twyman, J., Jassogne, L., & Feindt, P. H. (2020). What does it mean to make a 'joint'decision? Unpacking intra-household decision making in agriculture: Implications for policy and practice. *The journal of development studies*, *56*(6), 1210-1229. https://doi.org/10.1080/00220388.2019.1650169

Braun, M. T., Kozlowski, S. W., Brown, T. A., & DeShon, R. P. (2020). Exploring the dynamic team cohesion–performance and coordination–performance relationships of newly formed teams. *Small Group Research*, *51*(5), 551-580. https://doi.org/10.1177/1046496420907157

Cadger, K., Quaicoo, A. K., Dawoe, E., & Isaac, M. E. (2016). Development interventions and agriculture adaptation: a social network analysis of farmer knowledge transfer in Ghana. *Agriculture*, *6*(3), 32. https://doi.org/10.3390/agriculture6030032

Charatsari, C., Lioutas, E. D., & Koutsouris, A. (2017). Farmers' motivational orientation toward participation in competence development projects: A self-determination theory perspective. *The Journal of Agricultural Education and Extension*, *23*(2), 105-120. https://doi.org/10.1080/1389224X.2016.1261717

Chekol, F. (2024). Determinants of engagement of rural women in non-farm economic activities in rural Ethiopia. *Cogent Social Sciences*, *10*(1), 2329802. https://doi.org/10.1080/23311886.2024.2329802

Cumbers, A., McMaster, R., Cabaço, S., & White, M. J. (2020). Reconfiguring economic democracy: generating new forms of collective agency, individual economic freedom and public participation. *Work, Employment and Society*, *34*(4), 678-695. https://doi.org/10.1177/0950017019875935

Daniso, B. (2022). Factors affecting farmers' decision to participate in various agricultural related information sources in Ethiopia. *Cogent Food & Agriculture*, *8*(1), 2133347. https://doi.org/10.1080/23311932.2022.2133347

Forsyth, D. R. (2021). Recent advances in the study of group cohesion. *Group Dynamics: Theory, Research, and Practice*, *25*(3), 213. https://psycnet.apa.org/doi/10.1037/gdn0000163

Joshua, N. E., Ojha, S. N., Peter, R. M., & Gopan, A. (2023). Fisheries Extension Interventions: A Review. *Bhartiya Krishi Anusandhan Patrika*, *38*(4), 329-338. https://doi.org/10.18805/BKAP650

Mahala, S. C. (2019). *Geology, chemistry and genesis of thermal springs of Odisha, India*. Berlin: Springer International Publishing. https://doi.org/10.1007/978-3-319-90002-5

Mishra, A., Mishra, A. K., Maurya, P. K., & Sharma, S. (2024). Optimizing Soils for Regenerative Agriculture: A Case Study in Odisha. In *Key Drivers and Indicators of Soil Health Management: Transitioning from Conventional to Regenerative Agriculture* (pp. 33-54). Singapore: Springer Nature Singapore. https://doi.org/10.1007/978-981-97-7564-4_2

Mulema, A. A., Jogo, W., Damtew, E., Mekonnen, K., & Thorne, P. (2019). Women farmers' participation in the agricultural research process: implications for agricultural sustainability in Ethiopia. *International Journal of Agricultural Sustainability*, *17*(2), 127-145. https://doi.org/10.1080/14735903.2019.1569578

Mutonyi, B. R., Slåtten, T., & Lien, G. (2020). Empowering leadership, work group cohesiveness, individual learning orientation and individual innovative behaviour in the public sector: empirical evidence from Norway. *International Journal of Public Leadership*, *16*(2), 175-197. https://doi.org/10.1108/IJPL-07-2019-0045

Saha, P., Prusty, A. K., & Nanda, C. (2024). Extension strategies for bridging gender digital divide. *Journal of Applied Biology & Biotechnology*, *12*(4), 76-80. https://doi.org/10.7324/JABB.2024.159452

Saha, P., Prusty, A. K., & Nanda, C. (2025). An overview of pluralism in agricultural extension and advisory services. *International Research Journal of Multidisciplinary Scope,* 6(1), 131–138. https://doi.org/10.47857/irjms.2025.v06i01.02074

Shin, J., Seo, E., & Hwang, H. (2016). The effects of social supports on changes in students' perceived instrumentality of schoolwork for future goal attainment. *Educational Psychology*, *36*(5), 1024-1043. https://doi.org/10.1080/01443410.2015.1072135

Suman, S., Prusty, A. K., Deb, A., Kumari, A., & Reddy, G. S. (2025). Global Research Trends in Family Farming: A Bibliometric Insight. *Indian Journal of Extension Education*, *61*(1), 25-31. https://doi.org/10.48165/IJEE.2025.61105

Suvedi, M., Ghimire, R., & Kaplowitz, M. (2017). Farmers' participation in extension programs and technology adoption in rural Nepal: a logistic regression analysis. *The Journal of Agricultural Education and Extension*, *23*(4), 351-371. https://doi.org/10.1080/1389224X.2017.1323653

Qanti, S. R., Peralta, A., & Zeng, D. (2022). Social norms and perceptions drive women's participation in agricultural decisions in West Java, Indonesia. *Agriculture and Human Values*, *39*(2), 645-662. https://doi.org/10.1007/s10460-021-10277-z