

Exploring the Adoption of Agricultural Innovations in Rice Farming

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ABSTRACT

This study explores the adoption of agricultural innovations in rice farming in Dhemaji district, Assam, examining the influence of socio-economic factors and adopter categories on innovation uptake. The findings show that the majority of farmers (54%) are aged between 36–50 years, with a male-dominated farming community (66.5%). Educationally, 39 per cent of farmers have completed higher secondary education and most live in joint family structures (55.5%). Income-wise, 34 per cent fall into the middle-income group, earning between 2,00,001 and 4,00,000 annually. Using Rogers' Diffusion of Innovation Model, the study reveals that 91.6 per cent of farmers are classified as Laggards, indicating a cautious approach to adopting new technologies, while Innovators (7.6%) prefer to wait for others to validate innovations. The adoption of specific innovations varies, with Integrated Weed Management (96.8%) and hybrid rice varieties (91.6%) being widely adopted, while innovations like the Super Bag for drying and storage (8.4%) had the lowest adoption rate. Adoption levels were mostly moderate (47.2%), with low adoption at 25.2 per cent and high adoption at 27.6 per cent. Chi-square analysis highlights significant associations between socio-economic factors such as age, gender, education and income with innovation adoption. Factors influencing adoption differed by adopter category, with financial capacity, extension services and social influence playing key roles. A majority (98%) of farmers emphasized the importance of initiatives like education, improved extension services and the creation of FPOs to enhance innovation adoption. In contrast, 78 per cent highlighted the need for a mindset change to overcome resistance to new practices, recognizing it as a gradual process requiring sustained efforts. The study emphasizes the need for tailored interventions from policymakers and extension agencies to foster innovation adoption, particularly by addressing specific needs across different adopter groups.

Keywords: Agricultural innovations, Rice farming, Farmers, Adopter categories.

INTRODUCTION

Rice, the staple food of Assam, accounts for a significant portion of the state's cultivable land (Saikia *et al.*, 2023). As one of the most important crops in India, rice cultivation is known for its high labour and energy demands. To meet the rising demand, a rapid expansion of rice cultivation is necessary. With the access to modern agricultural inputs, farmers have been able to achieve increased income levels (Gogoi *et al.*, 2022).

In agriculture, innovation involves the introduction of new ideas, methods, practices, or techniques that result in lasting improvements in farm productivity and income. These advancements may come from agricultural research institutions or

be developed by farmers themselves (FAO, 2019). Farmer innovation specifically refers to the adaptation of indigenous knowledge, where farmers develop new methods, technologies, or organizational strategies using the resources at their disposal. Farmers trained by extension workers can also be considered innovators, especially when they modify and apply new knowledge or technologies to their farming practices (Ojiako-Chigozie, 2024).

Improving crop productivity through the adoption of advanced technologies is closely tied to understanding adopter categories in the context of innovation in rice farming. As Yadav *et al.* (2011) highlight, adopting new practices is essential for enhancing productivity, yet various challenges

hinder this process. These challenges impact adopter categories differently-innovators, early adopters, early majority, late majority and laggards-each with distinct attitudes and behaviours toward adopting innovations. Innovators and early adopters, being more open to new ideas and technologies, are typically better equipped to overcome barriers. In contrast, the early and late majority often face delays in adoption due to factors like socio-economic limitations, risk aversion and access to essential inputs. Laggards, who are generally resistant to change, encounter significant structural and psychological obstacles that further slow adoption. As Doley *et al.* (2015) suggest, systematically identifying and addressing these constraints can accelerate the diffusion of innovations, enabling all adopter categories to embrace improved technologies and achieve higher productivity in rice farming.

Factors specific to technology, Such as potential yield and user acceptance, are vital in influencing adoption behaviour. This highlights the importance of considering farmers' preferences for varietal characteristics when designing research and development programs. In the context of rice farming, these factors are particularly significant as they directly impact the willingness of farmers to adopt new technologies (Ghimire, R., *et al.*, 2015).

In Assam, it's important to understand the factors that affect adoption in different farmer categories to create effective agricultural policies and extension programs. Innovators and early

adopters can lead the way in using new technologies, while extension agencies should focus on reaching the early majority, late majority and laggards with strategies that address their specific challenges. By taking these factors into account, researchers and policymakers can encourage more farmers to adopt new practices, helping improve productivity and sustainability in rice farming for all categories. The specific objectives of the study are to:

1. Understand the Socio-Economic Characteristics of Rice Farmers.
2. Analyze the Innovations adopted by the Farmers in Rice Farming
3. Access the Adopter Categories among the Rice Farmers.
4. Examine the Factors Determining the Adoption of Innovation in Rice Farming among different Adopter Categories.

MATERIAL AND METHODS

An empirical study was conducted in Dhemaji district, Assam, focusing on two villages-Uriamguri and Kathal Guri-located under the Ming Mang Gram Panchayat of Bordoloni block. With assistance from the ward members of both villages, the investigator compiled an updated list of rice cultivators. From this list, 10 per cent of the farmers from each village were randomly selected, forming a sample of 250 farmers. The distribution of the population and sample of rice growers is presented in Table 1.

Table I
Distribution of Sample

Sl. No.	Name of the village	Total Population	Sample farmers (10 % of the total population)	Total no of sample
1	Uriamguri Village	1429	143	250 (Round off)
2	Kathal Guri Village	1032	103	

The researcher meticulously crafted a carefully organized questionnaire to conduct in-person interviews with 250 farmers. These interviews were aimed at gathering comprehensive data on the farmers' socio-economic backgrounds, land-related details and their categorization as adopters.

RESULTS AND DISCUSSION

A. Socio-economic Characteristics of Rice Farmers

The analysis of the socio-economic characteristics of the selected farmers revealed the following findings. 54 per cent of farmers fall within the age range of 36-50 years. This distribution suggests that middle-aged farmers constitute the largest proportion of the sample. The study's findings align with data from Khan et al. (2021), which revealed that 41.67 per cent of respondents were in the middle age group (36–55 years), followed by 30.00 per cent in the older age group (above 55 years) and 28.33 per cent in the younger age group (18–35 years). This distribution underscores the significant involvement of middle-aged farmers in rice farming. Similar trends have

been observed in earlier studies by Jamal *et al.* (2014) highlighting the integral role of this age group in driving agricultural adoption rates.

The data reveals a notable gender disparity among farmers, with males comprising the majority at 66.5 per cent. In terms of educational attainment, the highest proportion of farmers, at 39 per cent, have completed higher secondary education, indicating a substantial portion of the farming population achieving at least this level of schooling. Concerning family structure, the prevailing arrangement is joint families, representing 55.5 per cent of the total. Maritally, approximately half of the farmers are married, constituting 51 per cent. Ojo *et al.* (2023) found that 92 per cent of farmers were married, indicating that marital status may increase farmers' dedication to enhancing farm yields, as it is crucial for sustaining their families. Economically, the largest proportion of farmers, at 34 per cent, fall within the annual income range of 2,00,001 – 4,00,000 INR, suggesting a notable concentration within the middle-income bracket.

A. Adopter Categories Among the Rice Farmers

Table 2
Adopter Categories Among the Rice Farmers

n=250							
Sl. No.	Adopter categories	A		N		D	
		F	%	F	%	F	%
Innovators							
1	I am willing to try a product first	-	-	19	7.6	231	92.4
2	I welcome the opportunity towards new experiences and technologies	33	13.2	9	3.6	208	83.2
3	I am willing to take risks	23	9.2	47	18.8	180	72.0
4	I am curious to know about new innovations	77	30.8	12	4.8	161	64.4
Early Adopters							
4	I like to analyze and understand the different aspect of any innovation before adopting it	94	37.6	89	35.6	77	30.8
5	I do not like to take risks as innovator	98	39.2	77	30.8	75	30.0
6	I want to remain ahead in line for those people who like to adopt the new innovations that come in the market	45	18	37	14.8	168	67.2
Early Majority							
7	I do not buy the product immediately as it gets launched	114	45.6	87	34.8	49	19.6
8	They mostly adopt any innovation when it is in its growth phase	9	3.6	111	44.4	130	52.0

Late Majority							
9	I adopt any innovation after the early majority adopts it	121	48.4	78	31.2	51	20.4
10	I consider adopting any innovation just after the majority of the population adopted it	118	47.2	99	39.6	33	13.2
11	I am always more cautious before adopting any innovation	222	88.8	11	4.4	17	6.8
Laggards							
12	I am the last person to adopt any technology	79	31.6	99	39.6	72	28.8
13	I avoid taking a risk and prefer adopting a safer product/technology	221	88.4	12	4.8	17	6.8
14	I prefer traditional tools rather than latest technology/innovation	210	84	17	6.8	23	9.2
15	I am very much conscious about the price of any technology/innovation	199	79.6	11	4.4	40	16.0
16	I feel that it is safer to adopt any innovation last as others have already used it	229	91.6	10	4.0	11	4.4

The Table 2 presents data on attitudes and behaviours toward adopting innovations across five adopter categories-**Innovators, Early Adopters, Early Majority, Late Majority and Laggards**-based on Rogers' Diffusion of Innovation Model. Among the statements, the **highest percentage of agreement** is seen in the **Laggards** category for the statement "It is safer to adopt innovations last after others have already used it", with an agreement of majority (**91.6%**) of the farmers. This reflects that laggards prioritize safety, showing a strong preference to wait until an innovation is thoroughly tested and proven before adopting it. They are highly risk-averse and prefer the security of following others' experiences, ensuring they avoid uncertainty.

On the other hand, the **lowest percentage of agreement** is observed in the **Innovators** category for the statement "I am willing to try a product first",

where only 7.6 per cent farmers agreed. This indicates that very few respondents are willing to take the lead in experimenting with new products, suggesting a general hesitation to be pioneers in adopting innovations. This reluctance highlights a broader risk-averse behaviour among the population, where even the more adventurous groups, like innovators, display caution.

Overall, the findings emphasize that a majority of individuals prefer to wait until others adopt and validate innovations, with the highest resistance seen among laggards. Efforts to promote innovation adoption should therefore focus on building trust, minimizing perceived risks and demonstrating the benefits of innovations to encourage even the more hesitant groups to adopt.

C. Types of Innovation Adopted by the Farmers in Rice Farming

Table 3
Types of Innovation Adopted by the Farmers in Rice Farming

Sl. No.	Agricultural Operation	Name of the innovation adopted	n=250			
			Adopted		Not adopted	
			F	%	F	(%)
Machineries						
1	Seeding of rice	Mechanised Direct seeding of Rice	221	88.4	29	11.6
		Wet DSR: By seed cum Fertiliser Drill	99	39.6	151	60.4
		Rice-Wheat Seeder	27	10.8	223	89.2
2	Transplanting of rice	Walking Paddy Rice Transplanter	109	43.6	141	56.4
		Engine Operated Rice Transplanter	69	27.6	181	72.4

3	Weed management	Cono-Weeder	81	32.4	169	67.6
		Chemical Weed Control	111	44.4	139	55.6
		Intrigated Weed Management	242	96.8	8	3.2
		Power Operated Weeder	217	86.8	33	13.2
		Rotary Weeder	98	39.2	152	60.8
4	Irrigation	Battery Operated Sprayer cum Spreader	45	18.0	205	82.0
		Alternate Wetting and Drying	123	49.2	127	50.8
		Foot Operated Sprayer	222	88.8	28	11.2
		Power tiller OperatedSprayer	200	80.0	50	20.0
5	Threshing and Harvestingmachiner y	Mini Combine Harvester (for threshing, harvesting & winnowing of rice)	210	84.0	40	16.0
		Reaper	187	74.8	63	25.2
		Open Drum Thresher	156	62.4	94	37.6
6	Drying and storage	Solar Bubble Dryer	78	31.2	172	68.8
		Recirculating Batch Dryer	23	9.2	227	90.8
		Super Bag (Harmetic bag)	21	8.4	229	91.6
		Rice Ring Bin	55	22.0	195	78.0
Hybrid rice Varieties						
7	Kola Joha		229	91.6	21	8.4
8	CR Dhan 909		211	84.4	39	15.6
9	Keteki Joha		201	80.4	49	19.6
10	CR Dhan 310		199	79.6	51	20.4
11	Ranjit Sub 1		187	74.8	63	25.2
12	Kanaklata		181	72.4	69	27.6
13	Bokul Joha		167	66.8	83	33.2
14	DRR Dhan 46		111	44.4	139	55.6
15	BINA Dhan 11		98	39.2	152	60.8
16	Bahadur Sub 1		91	36.4	159	63.6
17	Swarna Sub 1		80	32.0	170	68.0

Table 3 presents the adoption of agricultural innovations among rice farmers, focusing on machinery and hybrid rice varieties.

In terms of machineries, Integrated Weed Management recorded the highest adoption rate at 96.8 per cent, indicating its effectiveness, ease of implementation and tangible benefits in enhancing crop productivity. Farmers likely find this method practical and efficient for addressing weed-related challenges, which are critical for rice cultivation. On the other hand, the Super Bag (Hermetic Bag) for drying and storage exhibited the lowest adoption rate at 8.4 per cent, signalling significant barriers such as high cost, lack of awareness, or limited perceived benefits. Farmers may not prioritize drying and storage technologies due to their focus on immediate production-related tools and practices.

The data reveals that among the hybrid rice

varieties, a majority of the farmers (91.6%) adopted In contrast, Swarna Sub 1 is adopted by only 32 per cent of the farmers. This difference in adoption rates could be attributed to factors such as yield potential, suitability to local agro-climatic conditions, pest and disease resistance and farmer preference based on market demand and grain quality. The high adoption of Kola Joha suggests its strong alignment with farmers' needs and preferences, whereas the low adoption of Swarna Sub 1 may indicate challenges in its adaptability or limited perceived benefits compared to other varieties.

A study conducted by Saikia and Barman (2013) supports the findings regarding the poor adoption of certain agricultural technologies, particularly in paddy cultivation. Their research emphasized the low uptake of innovative practices and tools, citing key challenges such as limited awareness among farmers, inadequate training and

financial constraints. Additionally, the study noted that farmers often lack access to quality inputs and extension services, further impeding the adoption of modern agricultural practices. This aligns with the low adoption rate of technologies like the Super Bag (Hermetic Bag) and specific hybrid rice varieties

such as Swarna Sub 1, highlighting the need for targeted interventions to improve awareness, accessibility and affordability of these innovations.

Level of Adoption of Innovation Among the Farmers in Rice Farming

Table 4
Level of Adoption of Innovation Among the Farmers in Rice Farming

Sl no	Level of Adoption	Frequency	Percentage	Mean	SD
1	Low	63	25.2	2.02	0.78
2	Moderate	118	47.2		
3	High	69	27.6		
TOTAL		250	100.0		

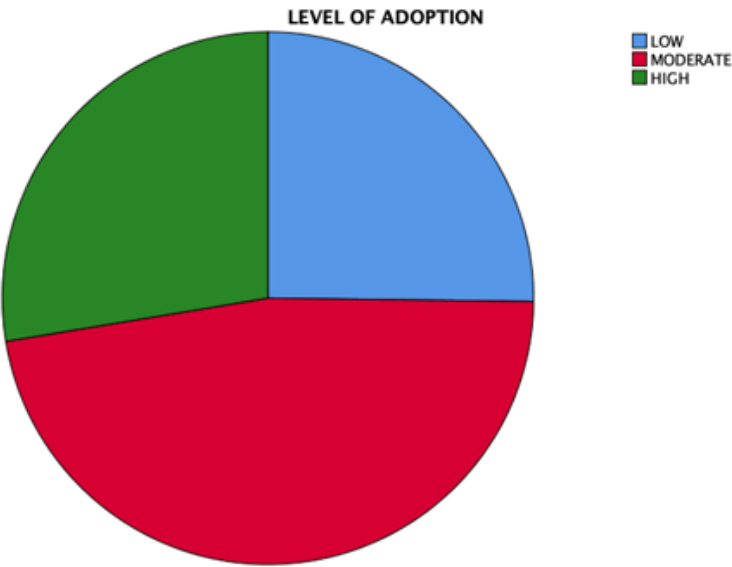


Fig. 1. Level of Adoption

The data shows the distribution of adoption levels among the farmers. The majority of farmers (47.2%) had a moderate level of adoption, while 25.2 per cent had a low level of adoption. The mean adoption score is 2.02, with a standard deviation of 0.78, indicating a relatively moderate spread of adoption levels among the farmers. This suggests

that while a significant portion of farmers have embraced new agricultural practices to a moderate extent, there is still a considerable gap in fully adopting these innovations.

H₁ :There is a significant association between the socio-economic characteristics of the farmers and adoption level towards innovation in rice farming.

Table 5
Association Between the Socio-economic Characteristics of the Farmers and
Adoption Level Towards Innovation in Rice Farming

Sl. No.	Attributes		Level of adoption			Chi-square value	P- value
			L	M	H		
1	Age (in years)	18-35	0	40	0	244.953	0.000**
		36-50	0	66	69		
		Above 50	63	12	0		
2	Gender	Male	0	97	69	172.625	0.000**
		Female	63	21	0		
3	Educational qualification	Illiterate	0	0	0	320.704	0.000**
		Primary school	0	14	0		
		Middle school	0	53	0		
		High school	0	29	69		
		Higher secondary	19	22	0		
		graduation	44	0	0		
4	Annual income (in rupees)	Less than 50,000	0	23	0	174.334	0.000**
		50,001-2,00,000	0	73	0		
		2,00,001-4,00,000	63	22	69		
		More than 4,00,000	0	0	0		

*L:Low, M:Moderate, H:High; ** denotes significant at 1% level, * denotes significant at 5% level*

Table 5 evaluates the relationship between various attributes (age, gender, educational qualification and annual income) and the level of adoption among rice farmers. Chi-square values are highly significant (P-value = 0.000**), indicating strong associations between these attributes and adoption levels. Younger individuals aged 18-35 years demonstrated medium levels of adoption, while older individuals above 50 years exhibited low adoption rates. In terms of gender, males had higher medium and high adoption rates, whereas females predominantly displayed low levels of adoption. Education played a crucial role, with individuals possessing higher education levels, such as high school or graduation, showing greater adoption rates, while illiterate farmers displayed no adoption at all. Income levels also influenced adoption, as farmers with higher annual incomes ranging between ₹2,00,001 and ₹4,00,000 were more inclined toward medium and high adoption levels. Conversely, those with lower annual incomes, particularly ₹50,000 or below, showed no tendency for high adoption.

The analysis revealed that demographic attributes such as age, gender, educational qualification and annual income significantly influenced the level of adoption of agricultural innovations. The Chi-square test results showed that all attributes had a statistically significant association with adoption levels, accepted at the 1 per cent level of significance ($P < 0.01$).

Hence the hypothesis "There is a significant association between the socio-economic characteristics of the farmers and adoption level towards innovation in rice farming" is accepted at 1 per cent level.

A. Factors Determining the Adoption of Innovation in Rice Farming Among Different Adopter Categories

Table 6
Factors Determining the Adoption of Innovation in Rice Farming
Among Different Adopter Categories

Sl. No.	FACTORS		Mean score	Ranking
1	Innovators	a. Financial capacity to invest in new innovations.	2.95	I
		b. Strong connections with extension services or research institutions.	2.66	II
		c. Access to technical knowledge and information.	2.29	III
		d. Financial capacity to invest in new innovations.	1.87	IV
2	Early adopters	a. Availability of financial assistance or loans.	2.87	I
		b. Availability of training programs and on -field demonstrations.	2.17	II
		c. Proven results of innovations on other farms.	2.03	III
		d. Strong awareness of new technologies.	1.92	IV
3	Early majority	a. Strong social influence from peers.	2.76	I
		b. Observed success of innovation among early adopters.	2.75	II
		c. Reduced risks after proven results.	2.65	III
		d. Affordable cost of innovations.	2.34	IV
4	Late majority	a. Widespread adoption of innovation in the community.	3.00	I
		b. Tangible evidence of benefits (e.g., yield improvement).	2.72	II
		c. Assurance of reduced risks and costs.	2.66	III
		d. Availability of simple and easy -to-use technologies.	2.12	IV
5	Laggards	a. Proven benefits for long-term sustainability.	2.74	I
		b. Immediate economic benefits like cost savings.	2.58	II
		c. Guaranteed success with no risks.	2.18	III
		d. Affordable or free access to innovations.	2.15	IV

Table III provides an analysis of various factors influencing the adoption of innovations by different adopter categories, namely Innovators, Early Adopters, Early Majority, Late Majority and Laggards. Each factor is associated with a mean score, indicating its relative importance to the respective adopter categories.

Widespread adoption of innovation in the community ranks the highest (Mean score: 3.00) for the Late Majority adopters. The fact that widespread adoption in the community is the most significant driver for this group indicates their tendency to adopt innovations only once they have become well-established and accepted by the majority. They require social proof and widespread consensus before making a move. This reflects a cautious, risk-averse nature typical of Late Majority adopters.

While financial capacity is important for Innovators, it ranks the lowest (Mean score: 1.87) in the Innovators' category. This indicates that while having the financial means is beneficial, it is not the primary motivator for Innovators. Innovators are more driven by the desire to experiment, take risks and embrace new technologies, rather than purely by financial factors. They are less concerned with the financial burden, focusing more on the potential and excitement of adopting innovative technologies.

E. Suggestions by the Farmers for Betterment of agriculture Development through Innovation in Rice Farming

Table 7
Suggestions by the Farmers for Betterment of Agriculture Development through Innovation in Rice Farming

Sl. No.	Suggestions	n=250	
		N Frequency	%
1	Education on innovation specifically in rice farming need to be given	245	98
2	Improving the extension services by integrating stakeholder feedback, enhancing personnel training and using digital tools.	245	98
3	Creation of FPOs among farmers	245	98
4	Use of video conferencing to impart knowledge among farmers	220	88
5	Regular Networking with Agriculture Officials	208	83
6	Training programs on innovative rice farming techniques specifically designed for tribal communities to enhance agricultural development in these areas can be given	208	83
7	Awareness creation on Innovation in Rice Farming	208	83
8	Mindset Change for Innovation Adoption in rice farming	195	78

A majority of the farmers (98%) recommended the critical importance of initiatives aimed at enhancing farmers' knowledge, support systems and collective organization. Suggestions such as providing education on innovation in rice farming, improving extension services and establishing Farmer Producer Organizations (FPOs) were identified as top priorities. Educating farmers equips them with the knowledge and skills to adopt advanced farming techniques, leading to increased productivity and sustainability. Enhancing extension services through stakeholder feedback, personnel training and digital tools ensures that farmers receive timely, relevant and accessible information, bridging gaps in the dissemination of innovations. Additionally, the creation of FPOs fosters collective efforts among farmers, enabling them to pool resources, access better markets and negotiate favourable terms, creating an enabling environment for innovation adoption. These suggestions address immediate and tangible needs, making them highly relevant for overcoming barriers to the adoption of agricultural innovations.

In contrast, a majority of the farmers (78%) emphasizes the need for a mindset change among farmers to adopt innovations in rice farming. Resistance to new practices often stems from entrenched traditional methods, fear of risks, or scepticism toward unproven techniques. Although

crucial for long-term innovation uptake, changing mindsets is a complex and gradual process requiring sustained efforts. Exposure to success stories, peer influence and consistent advocacy can play significant roles in fostering trust and openness toward innovations. However, the relatively lower prioritization of this suggestion suggests that it is viewed as less urgent compared to more structural and technical solutions. Addressing psychological and cultural barriers through tailored strategies can effectively complement other interventions, ensuring a holistic approach to improving innovation adoption.

CONCLUSION

The study investigates the adoption of innovation in rice farming in Dhemaji district, Assam, focusing on various socio-economic factors and adopter categories. The key findings of the study reveal important insights into the socio-economic characteristics and adoption behaviour of rice farmers. A majority of farmers (54%) fall within the age group of 36–50 years, with a gender imbalance where 66.5 per cent of participants are male. Education levels vary, but 39 per cent have completed higher secondary education and most farmers (55.5%) belong to joint family structures. Income-wise, a significant portion of the farmers (34%) falls into the middle-income group, earning between ₹2,00,001 and ₹4,00,000 annually.

When categorizing farmers according to Rogers' Diffusion of Innovation Model, the study found that the majority of farmers (91.6%) are in the Laggards category, exhibiting a risk-averse approach to adopting new technologies. In contrast, Innovators (7.6%) were not the first to adopt new innovations, as typically expected, but rather preferred waiting for the new products to be validated by others. The adoption of innovations varied, with Integrated Weed Management being the most widely adopted practice (96.8%), while the Super Bag for drying and storage had the lowest adoption rate (8.4%). Machinery such as Mini Combine Harvesters (84%) and irrigation tools like Foot Operated Sprayers (88.8%) were also widely accepted, emphasizing their practicality and relevance. Similarly, hybrid rice varieties like Kola Joha (91.6%) and CR Dhan 909 (84.4%) were adopted by a significant number of farmers.

The level of adoption among farmers was predominantly moderate (47.2%), with 25.2 per cent of farmers showing low adoption and 27.6 per cent demonstrating high adoption. Hypothesis testing through Chi-square analysis revealed significant associations between socio-economic factors such as age, gender, education and annual income with the adoption levels of innovations, indicating the importance of these factors in influencing adoption behaviour. Factors influencing adoption varied across the different adopter categories. Innovators were primarily motivated by financial capacity and strong connections with extension services, while Early Adopters valued financial assistance and training programs. The Early Majority was driven by social influence and the success observed in their peers, while the Late Majority adopted innovations once they were widely accepted by the community and had tangible benefits. Laggards, however, were primarily motivated by proven long-term sustainability and immediate economic benefits,

reflecting a cautious and practical approach to adoption. This study highlights the crucial role of socio-economic factors in determining the adoption of agricultural innovations in Assam's rice farming community. Financial capacity, education and age are significant drivers of adoption. Extension programs, social influence and the availability of financial support can improve adoption rates, especially among the early and late adopters. Therefore, policymakers and extension agencies should design targeted interventions to address the specific needs of each adopter category, focusing on building trust, reducing risks and providing financial and technical support. A majority of farmers emphasized the importance of initiatives like education, improved extension services and the creation of FPOs to enhance innovation adoption. These initiatives are seen as essential for equipping farmers with the necessary knowledge, resources and collective strength to effectively adopt agricultural innovations and improve productivity.

RECOMMENDATIONS

- Government should provide more subsidies or low-interest loans to farmers for adopting modern agricultural practices and equipment.
- Agricultural departments and other agricultural institutions should enhance agricultural extension services to reach more farmers, focusing on the benefits of new technologies.
- Banks and other financial institutions should implement incentive programs to encourage early adoption of new farming technologies, particularly for the Early Majority and Laggards.
- Farmers should participate in agricultural training programs to learn about new innovations and improve farm productivity.

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