Understanding Farmers' Continuance Intention To Use The Electronic National Agriculture Market (E-NAM): A Theory Of Planned Behaviour Perspective

Toffan Sahu[1], Dr. Vilas[2]

[1]Research Scholar, Department of Commerce, School of Commerce and Business Management
Central University of Tamil Nadu, Thiruvarur, India – 610 005. toffansahuu@gmail.com https://orcid.org/0009-0002-7959-152X
[2]Assistant Professor, Department of Commerce, School of Commerce and Business Management
Central University of Tamil Nadu, Thiruvarur, India – 610 005. vilas@cutn.ac.in, https://orcid.org/0000-0003-0319-4050

Abstract
The Electronic National Agriculture Market (e-NAM) was introduced to enhance transparency, efficiency, and market integration in agricultural marketing in India; however, sustained participation by registered farmers remains a critical concern. This study examines the factors influencing farmers' continuance intention to use e-NAM by applying the Theory of Planned Behaviour (TPB) in a post-adoption context. Using a quantitative research design, primary data were collected through a structured questionnaire from 120 registered e-NAM farmers across four regulated market committees in Odisha. The data were analysed using Partial Least Squares–Structural Equation Modelling (PLS-SEM) with Smart-PLS, following a two-stage evaluation of the measurement and structural models. The results indicate that attitude toward e-NAM and perceived behavioural control have significant positive effects on farmers' continuance intention, whereas subjective norm does not exert a statistically significant influence. These findings suggest that farmers' continued engagement with e-NAM is driven primarily by favourable evaluations of the platform and their perceived ability to use it effectively, rather than by social pressure. The study extends the application of TPB to digital agricultural marketing in a continuance setting and provides empirical evidence from a rural, developing-economy context. From a practical perspective, the findings highlight the need for policymakers and implementing agencies to move beyond registration-focused metrics and prioritise user experience, digital capability enhancement, and infrastructural support to ensure the long-term sustainability of e-NAM and similar digital agriculture initiatives.

Keywords: Electronic National Agriculture Market (e-NAM), Theory of Planned Behaviour, Continuance Intention, SmartPLS-SEM, Digital Agriculture Marketing.

1. INTRODUCTION

Digital transformation has affected agricultural marketing systems in both developed and developing economies increasingly, with digital channels being advanced as the means of market efficiency, the elimination of non-value-added intermediaries, the increased efficiency in price discovery, and the alleviation of information asymmetry among farmers (Kumar et al., 2024; Singh et al., 2021). Traditionally, agricultural marketing in India has been facing fragmented markets, multi-intermediate markets, low levels of transparency, and restricted access to broader trading networks (Chaudhary and Suri, 2021a, 2022; Ivanova et al., 2020; Suri, 2018). Such structural constraints have tended to limit farmers' bargaining power and the realisation of their income (Saini et al., 2023a). The Government of India responded with the Electronic National Agriculture Market (e-NAM) in 2016 as a national digital system to bring physical agricultural markets together into one electronic trading platform (Singh et al., 2021). E-NAM has been developed to establish a national market of agricultural commodities by connecting Agricultural Produce Market Committee (APMC) mandis with online auctions, quality tests, and real-time price distribution (Kumar et al., 2024). The platform aims to increase price transparency, lower transaction costs, and increase the involvement of farmers in formal agricultural markets by encouraging inter-market competition and providing the latter with a wider range of buyers (Ashalatha et al., 2022; Chaudhary and Suri, 2021a, 2022; Suri, 2018). Since its inception, e-NAM has grown very fast in mandi integration and farmer registration, which has made it an institutionally significant part of the agricultural marketing reforms in India (Karmakar et al., 2023). Registration on a digital platform is, however, not always connected to successful or continued usage. According to findings of research on digital platforms, it is possible that many users abandon their use after the early adoption because of cognitive, social, and capability-related limitations (Mehta et al., 2019). In the framework of e-NAM, many farmers registered, but their active and sustained involvement in the online trading is not stable (The Hindu Business Line, 2019). Low

awareness, lack of digital skills, poor internet connection, insufficient infrastructure, and lack of institutional support, etc., may deter farmers from keeping trading under e-NAM, even after the introduction (Ivanova et al., 2020; Kazembe, 2021; Suri, 2018). As a result, the continued adoption is not the only factor that plays a crucial role in e-NAM's success in the long term, but also the continuance intention of farmers using the platform. Although the policy significance of this problem is apparent, most of the information on e-NAM is devoted to adoption, awareness, benefits, and challenges, and the role of behavioural predictors of further use among registered farmers has rather limited attention (Chaudhary and Suri, 2021b; Kumar et al., 2024; Saini et al., 2023b). This is a major gap, since continuance behaviour is the post-adoption assessments and experience of farmers, which plays a key role in determining the sustainability of digital agricultural market reforms.

To address this gap, the current research uses the Theory of Planned Behaviour (Ajzen, 1991), which is a widely tested behavioural model in explaining intentional behaviour (Shih and Fang, 2004). TPB assumes that the intention to execute a behaviour is shaped by three fundamental constructs, which are attitude toward the behaviour, subjective norm and perceived behavioural control (Ajzen, 1985, 1991). Although developed to describe general behaviour intentions, TPB could also be used in post-adoption, continuance situations such as use of e-services, online learning systems, digital communities and information systems (Ajzen, 1991; Armitage and Conner 2001; Taylor and Todd, 1995; Venkatesh et al. 2003). The findings indicate that subsequent outcomes (attitude), perceived social pressure (subjective norm), and perceived ability and control (perceived behavioural control) remain influential even after initial adoption. The theoretical soundness of this concept for the application of TPB to the exclusive e-NAM setting will allow us to view the psychological and social assessments of the registered farmers about their desire to remain using the service. Social pressure among other farmers, institutional forces, and perceived capacity of farmers to cope with electronic systems could be a decisive factor in continuing to participate in electronic markets in agricultural settings. These behavioural mechanisms can be used to understand how to design specific interventions, capacity-building, and policy actions that can be used to enhance the sustained participation of farmers in e-NAM (Chidanand Patil & Meena, 2021; Mehta e al., 2019; Saini et al., 2023b).

Accordingly, this study aims to empirically examine the determinants of farmers' continuance intention to use e-NAM by employing the Theory of Planned Behaviour. By focusing on registered farmers and their post-adoption intentions, the study contributes to the emerging literature on digital agricultural marketing in three important ways. First, it extends TPB to the context of agricultural e-market continuance, a setting that remains underexplored. Second, it shifts the analytical focus from adoption to sustained usage, offering deeper insights into the long-term effectiveness of digital market reforms. Third, it provides evidence-based implications for policymakers and practitioners seeking to enhance farmers' continued participation in e-NAM and similar digital agricultural platforms.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Theory of Planned Behaviour and Continuance Intention

The Theory of Planned Behaviour (TPB), introduced by Ajzen (1991), is one of the most popular socio-psychological theories of human behaviour that can be applied in situations where human behaviour is open to volitional control. TPB holds that behavioural intention is the significant predictor of actual behaviour and intention is affected by three major factors in combination, including attitude to behaviour, subjective norm and perceived behavioural control (Ajzen, 1985, 1991). The theory has been discussed as highly successful in a large variety of settings, such as the utilisation of technology, consumer behaviour, and pro-social behaviour (Ajzen, 1991; Armitage and Conner, 2001; Taylor and Todd, 1995; Venkatesh et al., 2003). Though TPB was originally designed to explain the general behavioural intentions, subsequent research has shown the usefulness of TPB in post-adoption and continuance situations, especially in the field of information systems research (Taylor and Todd, 1995). Continuance intention refers to how much the users are willing to continue to use a system after having made prior experience with that system and is a more significant indicator of system success compared to initial adoption (Bhattacherjee, 2001; Delone and McLean, 2003; Limayem et al., 2007). In digital platform environments, users' continued engagement depends on their evaluation of outcomes, social influences, and perceived capability to sustain usage over time (Venkatesh et al., 2003). Registration of farmers is just one of the initial steps of interaction in the framework of the digital environment of the agricultural industry, e-NAM. The success of these platforms heavily relies on the fact that farmers will be engaged in trading activities on the internet. Since the usage of e-NAM is voluntary and involves the frequent decision-making process, TPB is a suitable theoretical framework to analyse the continuance intention of farmers to use the platform (Ajzen, 1991; Bhattacherjee, 2001; Taylor and Todd, 1995).

Attitude towards e-NAM and Continuance Intention

Attitude refers to an individual's overall evaluation of performing a particular behaviour, encompassing both favourable and unfavourable assessments (Ajzen, 1985, 1991). Within the TPB, attitude is a concept that defines how pleasant or unpleasant the consequences of a behaviour are to the person (Ajzen, 1991; Davis, 1989). Previous studies indicate that attitude has been a very good indicator of behavioural intention in marketing and technology-based research (Ajzen, 1991; Davis, 1989; McKnight and Chervany, 2001). In post-adoption contexts, attitude is shaped by users' accumulated experiences rather than expectations alone (Bhattacherjee & Premkumar, 2004). Research on information systems and digital services has shown that those users who feel that the continued use of the system is effective and worthwhile are more likely to sustain their use over a long period of time (Bhattacherjee, 2001; Lee, 2010). On the other hand, poor experiences may undermine the positive attitudes and cause discontinuous behaviour. Conversely, negative experiences can weaken favourable attitudes and lead to discontinuance behaviour. For registered e-NAM farmers, attitude toward continued usage reflects their evaluation of the platform's role in facilitating agricultural marketing activities. Farmers who perceive e-NAM as a valuable and advantageous mechanism for selling produce are expected to develop a positive attitude toward its continued use **(Chen et al., 2024)**. Therefore, attitude is likely to play a crucial role in shaping farmers' continuance intention.

H1: Attitude toward e-NAM has a significant positive influence on farmers' continuance intention to use e-NAM.

Subjective Norm and Continuance Intention

The subjective norm can be defined as the perceived social pressure by the significant referent groups to engage or to abstain from a certain behaviour (Ajzen, 1985, 1991). This referent can be peers, family members, colleagues or institutional actors to whom the individual attaches importance to their opinion. Subjective norm also indicates the social aspect of decision-making in TPB (Bhattacherjee, 2000; Gangwal and Bansal, 2016; Shih and Fang, 2004; Venkatesh et al., 2012). Empirical evidence on the role of subjective norm has been mixed in its effects in different contexts, where research done in collectivist and community-oriented contexts has always reported the importance of the subjective norm (Lee and Wan, 2010; Venkatesh and Davis, 2000). The decision made by farmers in rural and agricultural settings is usually affected by peer behaviour, experiences and institutional advice. People can be encouraged to decrease uncertainty to add legitimacy to the persistence of new practises or technologies by social endorsement (Venkatesh et al., 2003; Venkatesh and Davis, 2000). Subjective norm can be a result of the stimulation or anticipation that
is voiced by other farmers, agricultural extension agents, and market authorities in the e-NAM setting. Farmers could get more motivated to continue using e-NAM when they believe that essential social actors are in favour of or demand further investment in the platform. Thus, the subjective norms will help with the intention of the farmers to continue.

H2: Subjective norm has a significant positive influence on farmers' continuance intention to use e-NAM.

Perceived Behavioural Control and Continuance Intention

Perceived behavioural control (PBC) is a perception of ease or difficulty of a behaviour considering the internal capabilities and external enabling conditions (Ajzen, 1991; Davis, 1989; Venkatesh et al., 2012). PBC encompasses factors such as skills, confidence, access to resources, and perceived control over the behaviour (Bhattacherjee, 2000; Shih and Fang, 2004). PBC has been established to be pivotal in the intention and actual use of technology, especially in cases where the users are constrained in terms of skills and infrastructure (Ajzen, 1991; Fishbein and Ajzen, 2011). An increase in perceived control leads to low perceived barriers and confidence among the users to maintain system use. PBC is particularly applicable in post-adoption environments where further usage frequently leads to the need for independent functionality as well as problem-solving capacity (Bhattacherjee, 2000; Taylor and Todd, 1995). Online access to gadgets and internet availability, digital literacy of registered farmers, and knowledge of the online trading platforms can lead to their perceived control over their actions. Farmers would have better chances in utilising e-NAM when they are of the view that they possess the resources and expertise needed to do so. This is believed to be the positive effect of PBC on continuation intention.

H3: Perceived behavioural control has a significant positive influence on farmers' continuance intention to use e-NAM.

Based on the Theory of Planned Behaviour, the proposed research model posits that farmers' continuance intention to use e-NAM is influenced by their attitude toward continued usage, perceived social pressure (subjective norm), and perceived behavioural control, as shown in Figure 1. By focusing on registered farmers and post-adoption behaviour, the model provides insight into the behavioural mechanics underlying sustained engagement in digital agricultural markets.

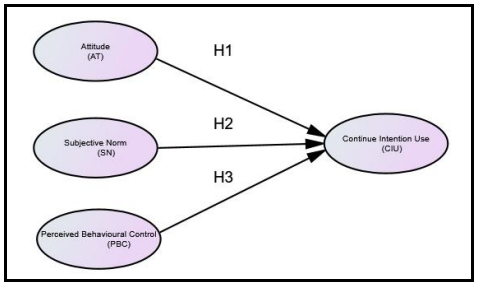

Figure 1. TBP Model

3. RESEARCH METHODOLOGY

Research Design

This study adopts a quantitative, cross-sectional research design to examine the determinants of farmers' intention to continue using the e-NAM. A structured survey approach was employed to collect primary data from registered farmers actively associated with selected e-NAM markets in the state of Odisha, India. The research design is explanatory research because it aims at testing hypotheses that are theoretically formulated based on the Theory of Planned Behaviour.

Study Area and Sampling Frame

The empirical context of the research entails four regulated market committees (RMCs) that are incorporated with the e-NAM platform in Odisha, i.e., RMC Hinjilicut, RMC Digapahandi, RMC Bhanjanagar, and RMC Tikabali. These markets were chosen deliberately because they are functional e-NAM mandis where farmers actively engage in them and offer an appropriate setting for the investigation of post-adoption behaviour. By targeting a variety of markets, the sample situation improves the contextual diversity and preserves institutional consistency. The sampling frame consisted of registered e-NAM farmers in these four RMCs, so that the responses obtained were on continuance intention as opposed to initial adoption intention.

Sample Size and Sampling Technique

A total of 120 respondents were selected for the study, with 30 farmers drawn from each RMC. This is a balanced sampling method that achieved fair representation of all four markets. PLS-SEM is said to be sufficient in terms of sample size since it is appropriate in both exploration and predictive research models with small to medium sample sizes. Following established PLS-SEM guidelines, the minimum sample size requirement was assessed using the ten-times rule, which suggests that the sample should be at least ten times the maximum number of structural paths directed at any construct in the model (Chin, 1998; Hair et al., 2019). Since the current model comprises three predictors of continuance intention, the sample size of 120 fulfils this criterion. The purposive sampling method was adopted to ensure that respondents possessed relevant experience in the use of e-NAM, which is central to the study of continuance intention.

Data Collection Procedure

The data were collected by a structured questionnaire, which was directly administered to the registered e-NAM farmers in the selected RMCs. The questionnaire was designed in a simple and farmer-friendly manner to facilitate accurate responses. Where needed, clarifications were made to the respondents to make them proper understanding of the questions. The survey instrument consisted of two sections. The first section captured demographic information, including variables such as age, gender, education level, and landholding size, etc. The second part incorporated the items assessing the latent constructs of the TPB model. The survey was voluntary, and the respondents were made aware of the academic nature of the research. The responses were ensured anonymity and confidentiality.

Data Analysis Technique

The collected data were analysed using PLS-SEM with the aid of SmartPLS software. PLS-SEM was selected because it can address complex models with latent constructs, and its robustness with relatively small sample sizes and non-normal data distributions. The analysis of the data involved two stages. First, the measurement model was evaluated to assess the reliability and validity of the constructs using indicators such as Cronbach's alpha, composite reliability, average variance extracted (AVE), and discriminant validity measures. Second, the structural model was evaluated using path coefficients, bootstrapped t-values, and explanatory power (R^2) to determine the hypothesised associations.

4. RESULTS

Profile of the Respondents

The demographic features show that the sample of registered e-NAM farmers in the chosen mandis is diverse. Table 1 shows that most of the respondents were men (66.67%), and female farmers were (33.33%). Most of the respondents belonged to the middle-aged category, 35-50 years old (49.16%), followed by older farmers above 50 years (30.00%) and younger farmers below 35 years (20.83%). The

most frequent ones were medium-sized families (5-7 members) (45.00%). The educational situation was low, with primary education (40.00%) and (29.16%) having no formal educational background, with a small percentage of secondary or higher education. Landholding distribution reveals a predominance of marginal (55.00%) and small farmers (33.33%), highlighting the relevance of e-NAM for smallholder agriculture. Annual income levels were fairly balanced across low, medium, and high categories. The majority of the farmers were into diversified cropping, specifically vegetable paddy and lentils (35.83%), which means multi-commodity involvement in the e-NAM trading. The distribution is in terms of caste, which has been represented in terms of social group with OBC farmers having the greatest proportion (43.33%), ST (23.33%), general (24.17%), and SC (9.16%), indicating inclusive representation in the platform.

Table 1. Demographic Characteristics of the Respondents

	Classification	Frequency
Gender	Male	80 (66.67)
	Female	40 (33.33)
Age	Younger age (< 35 years)	25 (20.83)
	Middle-aged (35-50 years)	59 (49.16)
	Older age (>50 years)	36 (30.00)
Family size	Small (1-4 members)	28 (23.33)
	Medium (5-7 members)	54 (45.00)
	Large (>7 members)	38 (31.66)
Education	No Schooling	35 (29.16)
	Primary Education	48 (40.00)
	Secondary Education	23 (19.16)
	Under Graduate	13 (10.83)
	Post Graduate	1 (0.84)
Land-hold Size	Marginal (< 1 ha)	66 (55.00)
	Small (1-2 ha)	40 (33.33)
	Medium (2-4 ha)	12 (10.00)
	Large (>4 ha)	2 (1.67)
Annual Income	Low (< 2.7 lakh)	43 (35.83)
	Medium (2.7 - 4.56 lakh)	42 (35.00)
	High (> 4.56 lakh)	35 (29.16)
Commodities	Vegetable	2 (1.67)
	Paddy	7 (5.83)
	Turmeric	20 (16.67)
	Cotton	1 (0.83)
	Cotton, Paddy	3 (2.5)
	Cotton, Vegetable, Paddy	20 (16.67)
	Vegetable, Paddy	24 (20.00)
	Vegetable, Paddy, lentil	43 (35.83)
Caste	SC	11 (9.16)
	ST	28 (23.33)
	OBC	52 (43.33)
	GEN	29 (24.17)

Measurement of Constructs

The constructs included in the study are attitude toward e-NAM, subjective norm, perceived behavioural control, and continuance intention to use e-NAM. The measurement items were reworded based on (Ali K. A. & Subramanian, 2024; Bhattacherjee, 2000; Gangwal and Bansal, 2016; Shih and Fang, 2004; Venkatesh et al., 2012) as illustrated in Table 2. All items were measured using a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). Attitude items elicited evaluative conviction of farmers with reference to further use of e-NAM. Subjective norm items determined perceived social pressure of significant referent groups, such as other farmers and institutional actors. The items of perceived behavioural control scales assessed the confidence, skill and the availability of resources among farmers in reference to the use of e-NAM. Continuance intention items showed the readiness and the determination of farmers to keep using the platform to make future agriculture transactions in the farming business.

Measurement Model

The measurement model was first assessed to examine the reliability and validity of the constructs included in the Theory of Planned Behaviour, namely Attitude (AT), Subjective Norm (SN), Perceived Behavioural Control (PBC), and Continuance Intention to Use e-NAM (CIU). As per the suggestions of Hair et al (2014). Convergent validity was tested through the study of the loading of the indicators, Average Variance Extracted (AVE), and Composite Reliability (CR). Besides, internal consistency reliability was determined using Cronbach's alpha. Factors loading greater than 0.70 are required, CR and Cronbach alpha more than 0.70, and AVE more than 0.50 are necessary to have an acceptable measurement model (Hair et al., 2014). Table 3 illustrates that the indicator loadings were more than the recommended value, which implies sufficient indicator reliability. CR and Cronbach's alpha of all constructs were above 0.70, which affirms the acceptable internal consistency.

Moreover, all constructs had higher values of AVE and more than 0.50, and this is shown to depict adequate convergent validity. Discriminant validity is a measurement that indicates how a construct is differentiated empirically from the rest of the constructs in the model. Discriminant validity was measured in accordance with (Hair et al., 2014), which includes the heterotrait-monotrait (HTMT) ratio, Fornell-Larcker criterion and cross-loadings. The square root of the AVE of every construct must be greater than the correlations with other constructs, as suggested by Fornell Larcker criterion (Fornell and Larcker, 1981). The square roots of AVE, reported in bold in Table 3, were positive compared to the inter-construct correlations, and all the HTMT values are less than 0.85, as reported in Table 4, which is a sufficient level of discriminant validity. Besides, the analysis of the cross-loadings in Table 5 showed that all items were more strongly loaded on their corresponding constructs compared to other constructs, which also affirmed the presence of discriminant validity. In general, the findings show that the measurement model has a sufficient level of reliability and validity and can be used in further structural model analysis.

Table 2. Measurement Item and Source

Constructs	Measurement Items	Source
Attitude (AT)		(Gangwal & Bansal, 2016), (Bhattacherjee, 2000)
AT1	I feel it is worthwhile after using e-NAM.	
AT2	Continuing to use e-NAM is a good idea for selling my agricultural produce.	
AT3	Using e-NAM regularly is a wise decision for farmers like me.	
AT4	Overall, I have a positive opinion about continuing to use e-NAM.	
Subjective Norm (SN)		(Gangwal & Bansal, 2016), (Venkatesh et al., 2012)
SN1	Most farmers important to me, think that I should continue using e-NAM.	
SN2	Most of the farmers I interact with encourage me to use the e-NAM platform.	
SN3	Agricultural extension officers or e-NAM officials encourage me to use e-NAM.	
Perceived Behavioural Control (PBC)		(Bhattacherjee, 2000), (Shih & Fang, 2004)
PBC1	I realised it's easy for me to use the e-NAM platform considering my skills and knowledge.	
PBC2	I am able to use the e-NAM system without the assistance of others.	
PBC3	I have a smartphone or laptop and internet access to use e-NAM.	
	I have basic digital literacy to use the e-platform.	
Continuous Intention to Use (CIU)		(Venkatesh et al., 2012), (Ali K. A. & Subramanian, 2024)
CIU1	I intend to continue using the e-NAM platform.	
CIU2	I intend to use the e-NAM platform rather than using any alternative means.	
CIU3	I recommend that other farmers use the e-NAM platform.	
CIU4	I am committed to using the e-NAM platform.	

Table 3. Construct Reliability and Validity

	Cronbach Alpha	CR	AVE	AT	CIU	PBC	SN
AT	0.911	0.931	0.789	**0.888**			

CIU	0.857	0.865	0.703	0.68	**0.838**		
PBC	0.788	0.878	0.637	0.464	0.649	**0.798**	
SN	0.763	0.909	0.684	0.43	0.403	0.232	**0.827**

Table 4. Discriminant Validity (HTMT ratio)

	AT	CIU	PBC	SN
AT				
CIU	0.756			
PBC	0.523	0.766		
SN	0.478	0.455	0.316	

Table 5. Cross loadings

	AT	CIU	PBC	SN
AT1	0.872	0.607	0.475	0.373
AT2	0.934	0.62	0.406	0.413
AT3	0.813	0.452	0.312	0.295
AT4	0.929	0.699	0.436	0.427
CIU1	0.633	0.733	0.404	0.317
CIU2	0.494	0.861	0.555	0.223
CIU3	0.624	0.881	0.595	0.453
CIU4	0.52	0.869	0.61	0.331
PBC1	0.482	0.628	0.926	0.225
PBC2	0.493	0.591	0.899	0.263
PBC3	0.175	0.235	0.402	0.049
PBC4	0.25	0.522	0.849	0.143
SN1	0.422	0.386	0.238	0.939
SN2	0.41	0.398	0.178	0.946
SN3	0.166	0.143	0.183	0.526

Structural Model

After establishing the adequacy of the measurement model, the structural model was assessed to test the hypothesised relationships among the TPB constructs. A bootstrapping test (5000 resamples) was used, as suggested by Hair et al, (2014), to determine the significance of the path coefficients. The coefficient of determination (R^2) was used to determine the explanatory power of the model. The R^2 value of Continuance Intention to Use e-NAM was established to be significant with a greater value of above 0.26 as recommended by Cohen (1988) that Attitude, Subjective Norm and Perceived Behavioural Control jointly accounted for a significant percentage of the continuance intention among farmers.

Result of the path analysis, as shown in Figure 2, shows that Attitude is a positive and significant predictor of continuance intention to use e-NAM ($\beta = 0.43$, $p < 0.05$), supporting H1. This implies that farmers who have positive perceptions about e-NAM will tend to remain on the platform. Subjective Norm is not statistically significant in the continuance intention ($\beta = 0.119$, $p > 0.05$) and therefore H2 is not supported, which means that the social influence of fellow farmers and institutional actors does not contribute much to the continuance intention among farmers using e-NAM. The perceived behavioural control has a positive and significant correlation with continuance intention ($\beta = 0.420$, $p < 0.05$), which supports H3, indicating that the perceived ability, resources, and control are paramount towards the continuance usage behaviour among farmers. Also, Cohen's (1988) guidelines were used to investigate effect sizes (f^2), according to which 0.02, 0.15, and 0.35 are considered small, medium, and large effects, respectively. The effect size (f^2) analysis revealed that PBC ($f^2 = 0.361$) exerted a large effect on continuance intention to use e-NAM, followed by AT ($f^2 = 0.331$), which demonstrated a strong effect. SN exhibited only a small effect ($f^2 = 0.03$), indicating that social influence plays a limited role compared to individual perceptions and control factors. The findings show that the association among the variables in the model has a high effect of PBC and AT on CIU and a small to medium effect of SN on CIU, which supports the idea that all the predictors are significant in explaining the continuance intention. This predictive relevance of the model was also examined using the blindfolding procedure (Chin, 1998). In keeping with Hair et al (2014), an omission distance (d) of 5-10 was chosen. The values of Stone-Geisser Q^2 of the endogenous construct were larger than zero, and it is a good sign that the model has sufficient predictive relevance (Hair et al., 2014). In general, the findings of the structural model suggest a high level of empirical evidence about the application of the Theory of

Planned Behaviour in explaining the continuance intention of the farmers to use the e-NAM platform.

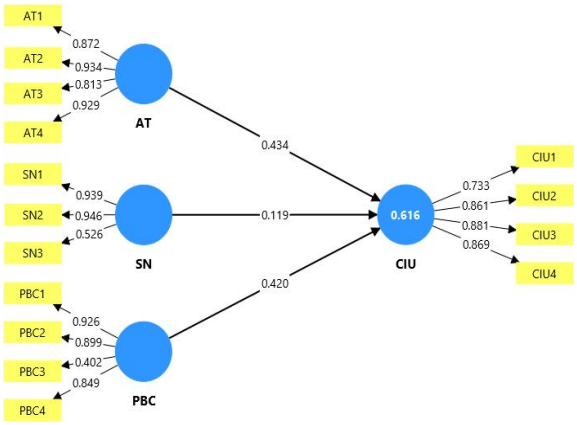

Figure 2. Path coefficient of the structural model

Attitude and Continuance Intention

As illustrated in Table 6. The findings suggest that the attitude toward e-NAM has a positive and strongly significant influence on the continuance intention of farmers, supporting Hypothesis H1. This finding suggests that farmers who perceive continued use of e-NAM as worthwhile, beneficial, and a wise decision are more likely to remain engaged with the platform. Attitude is also one of the strongest determinants of sustained e-NAM usage because its path coefficient and effect size (f^2) are relatively high. This finding aligns with the previous TPB-based research in the context of information systems and digital platforms, which have consistently found the attitude to be an important predictor of continuance intention (Hajli et al., 2015; Li et al., 2022). Attitudes in post adoption contexts are influenced more by cumulative usage experiences of users, as opposed to initial expectations, which explains the applicability of attitude in the prediction of long-term behaviour. Within the e-NAM context, favourable attitudes are likely to emerge from positive evaluations of the platform's outcomes, such as improved price discovery, enhanced market access, and satisfactory trading experiences. These findings reinforce the argument that farmers' favourable outcome evaluations play a crucial role in sustaining engagement with digital agricultural platforms beyond initial registration. From a policy perspective, the strong role of attitude suggests that enhancing farmers' positive experiences with e-NAM—through smoother transactions, transparent auction processes, and timely payments—can strengthen their willingness to continue using the platform.

Subjective Norm and Continuance Intention

Surprisingly, subjective norm is not statistically significant in terms of the continuance intention effect; as a result, Hypothesis H2 is rejected. Even

5. Discussion

This research aimed at investigating the determinants of the continuance intention of the farmers to utilise the e-NAM by applying TPB. Based on the data obtained using 4 RMCs of Odisha registered farmers, the study empirically assessed the influence of attitude, subjective norm, and perceived behavioural control on continuance intention. Its results offer valuable information on the post-adoption behaviour of farmers and are relevant to the accumulating body on digital agricultural marketing platforms.

though subjective norm is a positive coefficient, its effect is weak and statistically insignificant, and the effect is low, as seen in Figure 3. This result indicates that social influence has a weak impact that can affect the continuance intention of farmers who have direct experience with e-NAM. Whereas peer farmers, market officers and institutional actors might have some effect on the initial adoption decisions, they seem to have less effect on these decisions during the post-adoption phase. The individual judgements and perceived ability influence the choices that farmers make regarding their use of e-NAM more than this has been influenced by social pressure. The outcome can be compared to previous TPB and post-adoption studies, which indicate a decreasing effect of subjective norm in the long term (Hsieh et al., 2022). In voluntary usage contexts, especially where users accumulate hands-on experience, internal factors such as attitude and perceived control often outweigh normative considerations. Within the agricultural setting, the experienced farmers might be more inclined to make use of their personal intuition and real performance as opposed to the opinions of their peers or institutional encouragement.

Perceived Behavioural Control and Continuance Intention

As illustrated in Table 6. The results indicate that the perceived behavioural control has a strong and positive effect on continuance intention, supporting Hypothesis H2. Among the TPB constructs, PBC demonstrates the largest effect size, as shown in Figure 3, indicating that farmers' perceived ability, confidence, and access to resources are critical drivers of sustained e-NAM usage. This finding is in line with TPB theory, whereby, when people feel that they have more control over a behaviour, chances are high that they are more likely to intend to perform it (Bhattacherjee, 2001). In the context of e-NAM, continued usage requires farmers to independently navigate digital interfaces, manage

online transactions, and resolve operational issues. Farmers who believe they possess adequate digital skills, internet access, and necessary infrastructure are therefore more confident in continuing platform usage. The pre-eminence of PBC in this paper highlights the significance of capability-related aspects of digital agricultural initiatives. There are still chances that, despite the positive attitude of farmers, the lack of digital literacy or the infrastructure can act as barriers to continued involvement. The result resembles previous research on the topic of rural technology adoption and continuance, emphasising anticipated control as the determinant of technology adoption in resource-constrained settings (Rezaei et al., 2019).

Table 6. Result of Structural equation modelling and hypothesis testing

Hypotheses	Path	Beta	t-statistics	BC BI (L)	BC CI (U)	p-values	Decision
H1	AT -> CIU	0.434	5.471	0.279	0.593	0	Fail to Reject
H2	SN -> CIU	0.119	1.928	-0.005	0.242	0.054	Rejected
H3	PBC -> CIU	0.42	5.759	0.281	0.566	0	Fail to Reject

Overall Implications for TPB and e-NAM

Collectively, the findings provide partial but strong support for the applicability of the Theory of Planned Behaviour in explaining farmers' continuance intention to use e-NAM. Although the role of attitude and perceived behavioural control comes out as highly influential, subjective norm has a relatively low influence in the post-adoption phase. This trend brings out the dynamic nature of behavioural drivers at various levels of technology utilisation. The findings also provide valuable information on the sustainability of the digital agricultural market reforms. E-NAM registration or initial adoption does not ensure that the farmers will participate in the long term. Sustained usage depends largely on farmers' favourable evaluations of the platform and their confidence in using it effectively. These findings suggest that policy interventions should move beyond awareness creation and focus on strengthening farmers' digital capabilities and reinforcing positive usage experiences. Overall, the study advances understanding of post-adoption behaviour in agricultural digital platforms and demonstrates that TPB is a useful theoretical lens for analysing continuance intention in the context of e-NAM.

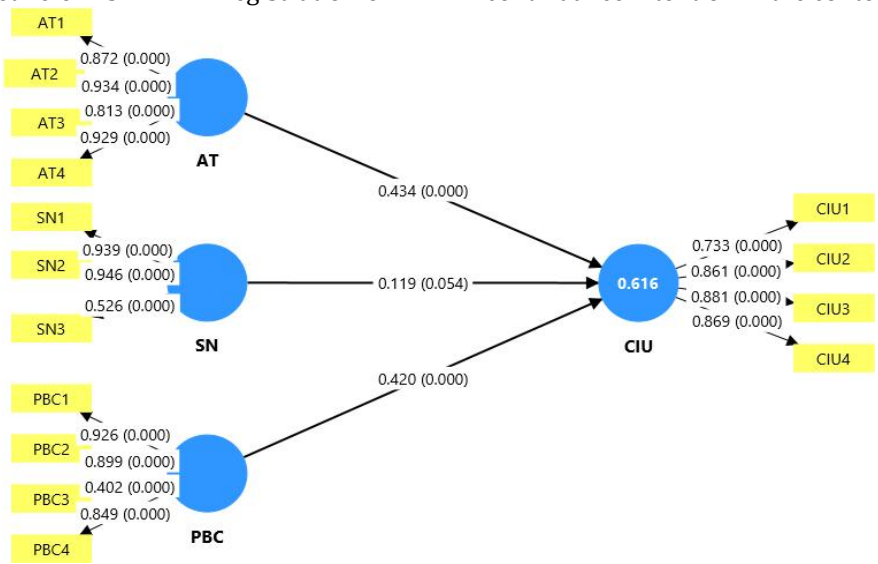

Figure 3. Structural model

6. THEORETICAL CONTRIBUTIONS

This study makes several important theoretical contributions to the literature on technology continuance, digital agricultural marketing, and the application of the Theory of Planned Behaviour (TPB). First, it generalises TPB to a post-adoption and continuance situation in digital agriculture. Although TPB has been broadly used to analyse the initial technology adoption, its use in explaining continuance intention among registered users—particularly farmers engaging with government-led digital platforms such as e-NAM—remains limited. By focusing on farmers with prior usage experience, the study demonstrates TPB's relevance for explaining sustained usage behaviour beyond initial registration. Second, the research contributes to the TPB literature by distinguishing the relative effect of the TPB constructs on a post adoption environment. The results demonstrate that attitude and perceived behavioural control have a significant impact on continuance intention, but subjective norm does not. This contributes to theory by suggesting that the

explanatory power of subjective norm may diminish in continuance contexts, where behavioural decisions are shaped more by personal evaluations and perceived capability than by social pressure. This is in favour of a contextual and stage-specific interpretation of the relationships of TPB. Thirdly, the research also contributes to TPB by offering context-specific findings of rural and developing-economy settings. By applying TPB to e-NAM mandis in Odisha, the research extends the theory beyond dominant urban and organisational contexts, highlighting the central role of capability- and resource-related perceptions in rural digital platforms. Fourth, the study contributes to digital agriculture and agri-marketing literature by shifting the analytical focus from adoption to the sustainability of platform usage. The conceptualisation of success in the continuance intention instead of registration enables the study to provide a behaviourally based explanation for the time gaps between enrolment and active participation. Lastly, the results also support TPB as a parsimonious but powerful framework, which shows that the original TPB constructs can be used to explain continuance intention in policy-based digital agricultural systems, without extended model specifications.

7. PRACTICAL IMPLICATIONS

The findings of this study offer several important practical implications for policymakers, market administrators, and implementing agencies involved in the e-NAM initiative. To begin with, the high dependency on the attitude of farmers on continuance intention implies that improving farmers' actual trading experience on the e-NAM platform is crucial. Market authorities should focus on ensuring smooth auction processes, timely price discovery, transparent transactions, and prompt settlement of payments to strengthen positive perceptions of continued e-NAM usage. Second, the high importance of perceived behavioural control demonstrates the necessity to increase the digital capability and confidence of farmers. Farmers can be trained online through targeted sessions on how to use the platform, trade through mobile devices, and process online payments to overcome the operational challenges. On-site technical support at mandis and that of enhancing internet connectivity will help to reduce perceived barriers to further participation. Third, the relatively weak influence of subjective norm implies that awareness campaigns alone may not be sufficient to sustain farmer engagement. Instead of relying solely on promotional efforts, policymakers should prioritise capacity-building and system reliability to encourage long-term usage. Lastly, the research suggests that the effectiveness of e-NAM cannot be determined based on the number of farmers registered, but on participation. . Implementing agencies such as SFAC and state marketing boards should monitor usage intensity and develop performance indicators that reflect actual trading behaviour. Such actions will be able to improve the effectiveness of digital agricultural marketing reforms over a long term.

8. LIMITATIONS AND FUTURE RESEARCH

Despite its contributions, this study has certain limitations that should be acknowledged and addressed in future research. First, the study is based on a cross-sectional research design, which limits the ability to capture changes in farmers' perceptions and continuance behaviour over time. Future research can take the longitudinal research design and investigate the changes in attitudes, perceived behavioural control, and usage behaviour over time, with a rise in experience with the e-NAM platform among farmers. Second, the sample consisted of four e-NAM mandis in Odisha, which might restrict the generalisability of the results to other areas or states with other infrastructural, institutional, and socio-economic characteristics. Future research could extend this study by incorporating a larger and more geographically diverse sample across multiple states or agro-climatic zones. Third, this research uses self-reported data, and this fact can be prone to response bias. The analysis can be enhanced in future by incorporating objective usage information on e-NAM transaction records to confirm the continuance intentions reported by farmers. Finally, the study employs the original TPB framework without incorporating additional contextual variables. Future research may extend the model by integrating factors such as trust, perceived risk, service quality, or institutional support to gain deeper insights into farmers' sustained engagement with digital agricultural platforms. Such extensions could further enrich the understanding of digital platform sustainability in agriculture.

9. CONCLUSION

This study examined the determinants of farmers' continuance intention to use the e-NAM by applying the Theory of Planned Behaviour in a post-adoption context. Using data collected from registered farmers across four regulated market committees in Odisha and analysed through PLS-SEM, the study provides empirical insights into the behavioural factors influencing sustained participation in digital agricultural marketing platforms. The findings reveal that farmers' attitude toward e-NAM and perceived behavioural control significantly influence their continuance intention, whereas subjective norm does not exert a significant effect. These results suggest that farmers' continued engagement with e-NAM is driven primarily by their personal evaluations of the platform and their perceived ability to use it effectively, rather than by

social pressure. This highlights the importance of capability enhancement and positive usage experiences in sustaining digital platform adoption in agriculture. By extending the application of the Theory of Planned Behaviour to a continuance setting, this study contributes to both behavioural theory and digital agriculture literature. The results underscore the need for policymakers to move beyond registration-focused metrics and prioritise active and sustained usage of e-NAM. Overall, the study provides valuable theoretical and practical insights for strengthening the long-term effectiveness of digital agricultural marketing reforms and promoting inclusive, technology-enabled market participation among farmers.

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