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Assessment of E-Training in Developing Resilience to AdoptE-Nam Technology: A Case Study of Farmers' Development in Odisha, India

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Abstract

Technology advancements in the business markets create a volatile, uncertain, complex, and ambiguous situation for any business entity as well as agricultural sector. To survive in such asituation, farmers must plan tactfully to adapt to technological advancements and meet challenges in order to compete in the market. This would be possible through e-Training to farmers to enhance their resilience to adopt to latest technology. This would necessitate a 'flexible', 'tactically trained', 'resilient farmers’. To adapt to new technological advancements in agricultural business market, a systematic study is required to improve farmers resilience through e-Training programs in adopting e-NAM. Farmers in developing countries such as India rely heavily on agriculture for a living. To achieve the goal of doubling farmers' income,new revenue sources and improved opportunities must be identified. Farmers and other stakeholders can use the online digital market to reduce transaction costs, bridge information gaps, and gain market access. Farmers must receive e-Training in order to achieve this goal. Farmers must stay at their farms 24 hours a day, seven days a week. Because internet technology is now available throughout the country. Especially in times of disruption and to save farmers' time, e-training is a convenient way to learn the latest technology in the market and is beneficial in bringing resilience to adopt e-NAM. The e-NAM is a mandatory delivery-based trading platform that, by increasing marketing efficiency and bringing transparency to agriculture marketing, may help lower the cost of intermediation and increase farmers' price realization. It provides broader marketing coverage by identifying farmer concerns and perspectives in the overall marketing of various goods, as well as facts about farmers having difficulty marketing their output via e-NAM. The current study was carried out in six E-NAM mandis located in three districts of Odisha in order to assess the efficiency of e-NAM to improve farmers resilience through e-Training, specifically on farmer participation and the online pricing value system as a result of e-NAM. Data was obtained from farmers, merchants, and mandi authorities during a field survey, as well as live trading on e-NAM commodities prices. The analysis was done by using PLS-SEM. The study shows positive significant results through e-Training in enhancing resilience in farmers in adopting e-NAM.

Key Words: E-Nam, E-Training, Farmers Development, Resilience, Technology.

Introduction

Technological advancements, changes, and market competition all have an impact on survival.Farmers must adapt to changing technological advancements in order to remain viable in the market (Cosgrove, W. J.,2015). Technology has an impact on both business entities, agricultural sector and society (Bryan, E.,2009). Electronic-Training play an important role to enhance resilience by imparting training on various skills and resilience in farmers to keep them ever ready with competitive spirit in order to handle turbulence situations in the market (Gillham et al., 2013). Farmers' knowledge, flexibility, motivation and health awareness/fitness contribute to farmers' ability to adapt to e-Training and use of technological advancements especially in disruptive situations. The farmers need to be flexible to deal the changes with a positive and creative manner. They need to have confidence, purposefulness, and adaptability. Resilience is defined as a "common phenomenon arising from everyday human adaptive processes" (Masten, 2001). Resilience is the process of positive adaptation in the face of adversity caused by routine stressors and common life changes (Gillham et al., 2013).

Figure: - 1 *E-Training To Farmers*
Source: *google images* https://www.google.co.in/

E-NAM, or the Electronic National Agriculture Market, is an online trading platform that waslaunched by the Government of India in 2016 (Chand, R. 2016). The platform was designed to connect farmers directly with traders and buyers, enabling them to sell their produce at competitive prices and access a larger market than traditional local markets (Bisen, J., & Kumar, R. 2018). E-NAM has the potential to be a game-changer for farmers, particularly small-scale farmers, who often struggle to access markets or get fair prices for their produce. In this essay, I will discuss the impact of E-NAM on farmers' development and its potential for the future. Firstly, E-NAM has significantly improved farmers' access to markets (Raju, M. S.,2022). Through the platform, farmers can sell their produce to buyers from across the country, including large retailers and processors, who they may not have been able to reach before. This has helped to increase farmers' income and profitability, as they are able to sell their produce at better prices than they would have received in local markets. Additionally, E-NAM has reduced the number of intermediaries in the supply chain, which has further increased farmers' profits (Chand, R. 2016). Secondly, E-NAM has improved transparency in the agricultural market. Farmers can now view prices and demand for their produce in real-time, enabling them to make informed decisions about when and where to sell. The platform also provides information about market trends and prices, which can help farmers to plan their crop production and marketing strategies more effectively (Raju, M. S.,2022). This has helped to reduce the information asymmetry that often exists between farmers and traders, ensuring that farmers are able to get a fair price for their produce. Thirdly, E-NAM has improved the quality of agricultural produce. The platform provides a grading and certification system, which ensures that only high-quality produce is sold on the platform. This has encouraged farmers to focus on improving the quality of their produce, which has helped to increase their competitiveness and profitability. However, there are some challenges that need to be addressed to ensure the success of E-NAM. Firstly, many farmers, particularly in rural areas, still lack access to the internet and may not be able to use the platform. Therefore, there is a need to improve internet connectivity and infrastructure in rural areas to ensure that all farmers can access the platform (Gupta, S., & Badal, P. S. 2018). Secondly, there is a need to increase awareness and education about E-NAM among farmers, particularly small-scale farmers, who may not be aware of the platform's benefits or how to use it effectively. In lastly, E-NAM has had a significant impact on farmers' development, improving their access to markets, transparency, and quality of produce. However, there is a need to address the challenges and ensure that all farmers can benefit from the platform (Singh, P.,2021). With further investment and support, E-NAM has the potential to transform the agricultural sector in India, improving the livelihoods of millions of farmers and contributing to the country's economic growth.

Rationale of the study

Aim of this study is to analyse developing resilience in farmers to successfully overcome negative impacts of VUCA in the market and adaptability to technology through e-Training programs. The present study is to understand attitudes and beliefs about change before and after learning programs and motivation; whether it leads to more positive behaviours in response to technological advances and during VUCA situations or not. This study would assist agricultural sector to understand: by enhancing resilience levels through e-Training leads to adaptability to e-NAM (new technology in the agricultural market) to compete in the business market (Mereu, V.,2018). e-NAM performance, according to Venkatesh, P.(2021), an important phenomenon that should not be overlooked. Many agricultural markets are primarily concerned with improving their performance and service delivery, necessitating close scrutiny. Farmers' growth performance is measured using a variety of criteria (Van Passel, S., 2007); however, the emphasis on farmer qualifications and expertise in training e-NAMs executive officers appears to be an untapped resource (Mishra, G.,2019). Why is this factor so critical in research? There are a number of reasons for all of this, which would include the necessity of offering viable returns as well as advantages to farmers and agricultural laborers in a nation such as India, under which agriculture is valuable to the economy and agriculture communities employ a significant portion of the workforce. Farmers' housing conditions will not improve if they are unable to obtain a fair price for their products and are the victims of market fraud. Market committees are responsible for ensuring that agricultural products are traded smoothly and transparently (Mahendra Dev, S. 2014). A well-functioning market advisory board would focus on ensuring that farmers in that geographical area reap the full benefits of their labour in the disciplines (Sugden, F.,2021, Derpsch, R.,2010, Baumann, P.2000). The APMC's role asa genuine representative and standard bearer of a market advisory council is critical. Qualification and experience in the APMC are critical factors in market committee effectiveness. As a result, this study is relevant in this context and should be given equal weight (Sugden, F.,2021, Derpsch, R.,2010,). This study will also help governments at network operator institutes develop rules that ensure maximum benefits in the real world.

Research problem statement

The researchers found that most existing training effectiveness measures consist of self-reportsthat do not focus on the effect of learning programs on adaptability with technological changes.E-Training contributes in enhancement of learners for smooth adoption of technology. In current history, the growth rate in farmer revenue flow has lagged behind that of wages, pensions, and other expenses (Sasmal, J. 2015). Market committees' efficiency falls below what was anticipated. This increases AMCPs' obligations in terms of currently awaiting pensions, gratuities, and employees' wages (Jan, M. A., 2012). The APMC is also unable to provide facilities to farmers, farm owners visiting markets, and agricultural production businesses in their designated region (Chand, R. 2012). This provides the justification for looking into the various factors that influence a market committee's income (Acharya, S. S. 1998). The current study is an attempt to address this e-training issues by comprehensively assessing the variables that impact the success of e-NAM market committee.

Farmers e-NAM training programs are an important way to help farmers learn new skills and improve their knowledge in order to increase productivity, efficiency, and profitability. However (Mistri, B.2020, Srivastava, A. 2018), there are several challenges that farmers training programs face, including:

Access to training: Many farmers live in rural areas that are difficult to reach, which makes it challenging for them to attend training programs that are often held in urban areas (Qadir, M.,2010). Lack of transportation infrastructure, poor roads, and long distances also make it difficult for farmers to attend training programs.

- Language and literacy barriers: (Medhi-Thies, 2015) many farmers may not be literate or may not speak the language in which the training program is being conducted (Kaur, E. G., 2013). This can make it difficult for them to understand the material being presented, which reduces the effectiveness of the training program.
- Time and cost constraints: Many farmers have limited time and resources (Grabowski, P.P., 2014), which makes it difficult for them to attend training programs that require a significant investment of time and money. The need to travel to attend training programs also increases the cost and time required.
- Lack of relevance: Training programs may not be relevant to the specific needs of farmers(Rivera, W. M., 2008). Programs that are not tailored to local conditions, crops, or farmingpractices may be less effective and may not be taken seriously by farmers.
- Resistance to change: According to Khachatourians, G. G. (1998) some farmers may be resistant to changing their traditional farming practices, particularly if they have been passed down through generations. This can make it difficult to convince farmers to adopt new techniques and technologies.
- Lack of follow-up: Even after attending training programs, farmers may not receive follow-up support to help them implement what they have learned (Kantamara, P., Hallinger, P.,& Jatiket, M. 2006). This reduces the effectiveness of the training program and may leadto frustration and disillusionment among farmers.

In order to address these challenges, farmers training programs need to be designed to be more accessible, relevant, and effective. This can be achieved through innovative approaches such as using technology to deliver training programs, providing language and literacy support, offering training programs that are tailored to specific crops and farming practices, and providing follow-up support to farmers after they have completed the training program. Governments, NGOs, and other organizations can also work together to address the challengesof farmers training programs and ensure that they are more effective in improving the lives offarmers.

Review of literature

E-Training is a new approach to impart training to farmers using the internet technology. Digital technologies are vital for training, adult education and human resource development in many organizations (Gegenfurtner et al., 2018; Thalhammer, 2014). E-learning is also referred to as online learning or electronic learning. Teaching-learning process adopted by making use of electronic technologies and used as substitute of traditional classroom (Sapkota & Narayangarh,2020). Computer-Mediated Communication (CMC) systems (Kerr & Hiltz, 1982) have been an important support to online learning. The forms of CMC are usually defined in two categories: asynchronous (delayed time) communication and synchronous (real- time) communication (Romiszowski & Mason, 2004). Synchronous-communication technologies include voice-over-internet protocol (VoIP), instant messaging, and video conferencing, whereas asynchronous-communication technologies rely mainly on e-mails, bulletin boards, and blogs. According to the authors, in order to develop resiliency in oneself, one must approach adversity with a positive attitude. One must be resilient in order to grow when confronted with challenges and adversity. Human beings' resilience can be observed in relation to their current situation and role, as well as the society in which they live and the organisations in which they work. The process of adapting to adversity, shock, disaster, pressures, or significant sources of stress - such as family problems, serious health problems, or workplace and financial stressors (The American Psychological Association, 2017). Southwick et al. (2014) proposed that "resilience is not only bouncing back from adverse situations, but also moving forward with dedicated team work by keeping in mind learning aspect from experiences of adverse situations faced" (Naswall et al.,2013); resiliency is the ability to face and thrive in turbulent situations, adjust to the situation with resiliency, and scan the environment/anticipate (Gligor et.al, 2019). Enhancing citizens' and communities' resilience is critical to adapt successfully to ongoing challenges faced by communities, as well as acute shocks resulting from disasters. Researchers suggested categories for improvement:

(1) Improve the evidence base; (2) Develop Competencies/Training; (3) Facilitate Organizational Structures; (4) Cultivate Leadership Models. (Madrigano et al., 2017). The dimensions of resiliency are ability to face and counter the turbulent situations, adjust according to situation with tactics and operations (resiliency) and scan the environment/ anticipate) (Gligor et.al, 2019).

Farmers and rural youth receive a variety of training exercises from Krishi Vigyan Kendra's (KVKs) within every district (Sajeev, M. V.,2012). The KVK training programmes begins with identifying training needs, which is the most essential milestone in the establishment of any training programme. The current study on the training requirements of farmers and rural youths was carried out in partnership with the KVKs in Manipur State by the Indian Council of Agricultural Research (ICAR) Zonal Project

Directorate (Zone III) (Sajeev, M. V.,2012). Farmers' brucellosis knowledge was significantly associated with procedures such as using cleaning solution while cleaning farms (p 0.05), animal movement (p 0.01), introducing new animals (p 0.05), and drinking raw milk (p 0.05). There was no link discovered among both brucellosis knowledge and methods of disposing of aborted material properties, hygienic practices, or quarantine practices in the study (Deka, R. P.,2020). According to Zakaria, A. (2020) Farmers' rice cultivation experience, availability to mass communication, training, and a perceived reduction in rainfall all greatly affect the intensity with which they adopt climate- smart agricultural technologies. Farm size, proximity between farmers' homes and farm sites, destination, and the observed increase in temperatures all influenced farmers' intensity of technology adoption (Zakaria, A.,2020). The research determined that technical training in smaller, more regionalized groups can result in originally unobserved heterogeneity spillover effects, providing scientific, conceptual, and empirical substantiation for agricultural technology extension that can ultimately led to a rapid, fulfill a specific of implementing different agricultural technologies in an environmentally sensitive and economically sustainable manner (Zhou, L., 2020).

Objectives of the study

The objective of present study is to analyse the conceptual relationship between e-training andresilience of farmers. The study is descriptive in nature and will help to describe the concept.

- To Explore The E-Training Factors Of E-Nam On Development Of Farmers' Resilience In Odisha.
- To Assess The Effectiveness Of E-Training On Farmers' Adoption Of Agricultural Technologies And E-Nam Functions.
- To Analyze The Effectiveness Of E-Training In Adoption Of ProductionManagement And Farming Techniques.

Methodology

The study was conducted in Jajapur district of Odisha during 2022- 2023 by adopting Exploratory and Ex-post facto research designs **(Giuffre, M. 1997)**. The e-NAM platform integrated APMCs in Odisha was chosen on purpose for the study. Six APMC mandis (Sakhigopal and Nimapara from Puri district, Banki, Kendupatana and Narsinghpur from Cuttack district and Jajpur from Jajapur district) are selected randomly purposively from three districts of Odisha. From each of the selected APMC mandis, 45 e-trained farmers by e-NAM platform were selected randomly, making total **270** respondents. The farmers who registered and traded with e-NAM in the above APMCs of Odisha were operationally defined as respondents for the study. The information was gathered through personal interviews with a pre-structured interview schedule that included closed-ended questions. An export-made exam was developed in collaboration with mandi authorities and agricultural marketing specialists to assess respondents' understanding of the operation and characteristics of e-NAM. Farmers' e- NAM growth factors were classified into five phases: Farmer's development through e-Training (FD), e-Training on e-NAM functions (ETEF), e-Training on production management (ETPM), e-Training on advanced farming techniques and skills (ETFS), and e-Training on agricultural technologies (ETAT). It consists of 35 items in total, presented in the form of a five-point Likert-scale format, and covers various new e-NAM factors. The responses were then summarized and analyzed statistically using techniques such as frequency, percentage, standard deviation, and smart-PLS.

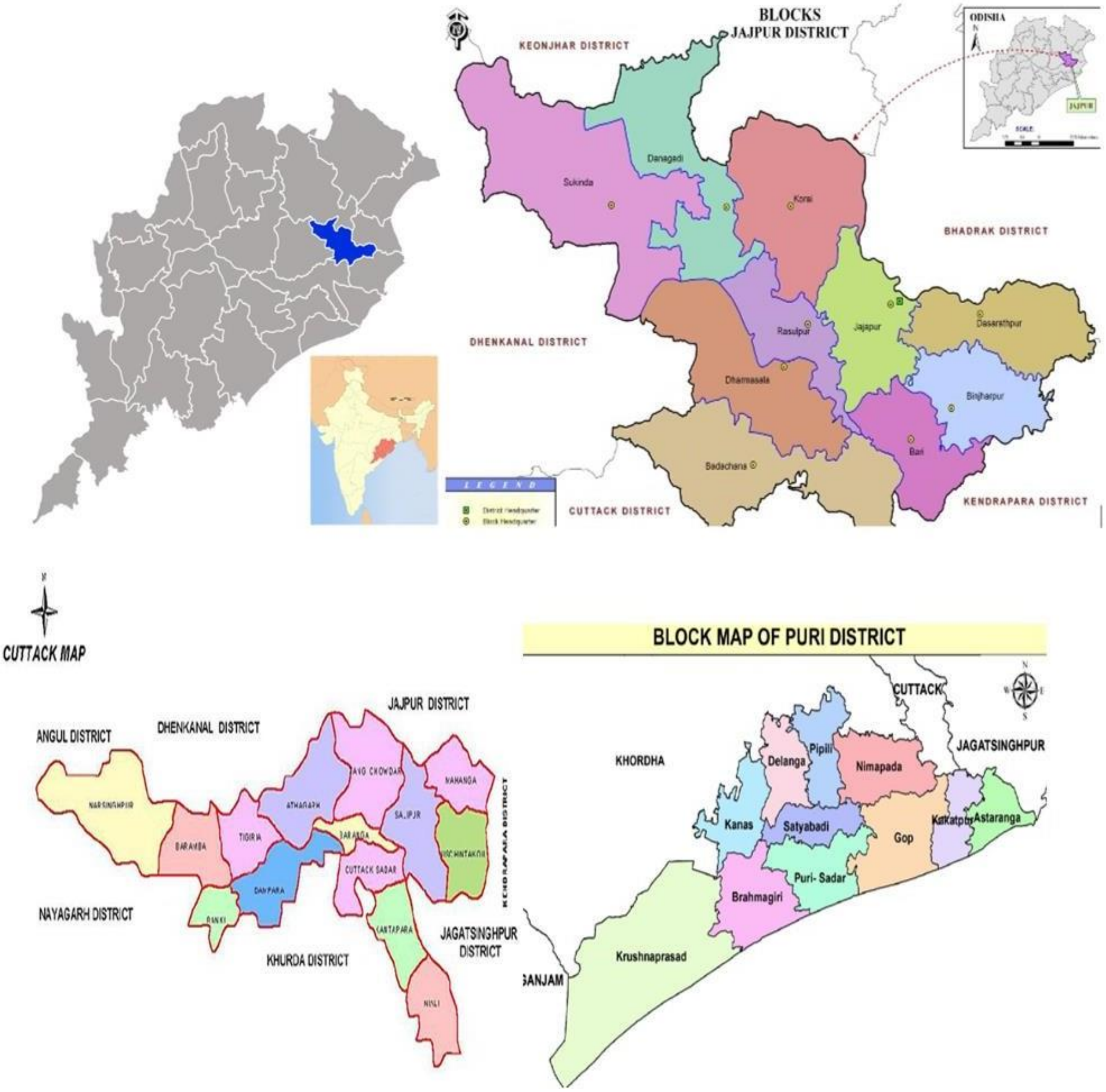

Figure: - 2 *Map of Jajapur, Puri and Cuttack districts*

Measurement of Constructs

Throughout this study, the PLS3-SEM method is used. Using this method involves deciding whether the particular variable is contextual or reflective. The predictor variable is not inherently contextual or reflective; the analytical technique determines this. Constructions are being measured. The biggest distinction between taking measurements reflective and formativeconstructs is that the reflective construct causes different variants in its indicators, whereas theprocess and finished does not; thus, the causality direction in confirmatory factor analyses is completely reversed in reflective constructs (Bollen, 2007). The introspective variable is a regression model that operates independently of the consequences of its indicators and is the starting point of its measured values. The commonality between both the surviving indicators and the latent variable stays consistent when an indicator is stripped away (indicator manufacturability effects) (Simonetto, 2012). The formative variable, on the other hand, is a latent variable that would be established by its predictors and is a function of its observed measures (Edwards & Bagozzi, 2000). In important developmental models, each demonstrated indicator indicates an alternate aspect of both the latent construct. As a result ofremoving one or more observed provisions from the multidimensional concept, a specific partof the construct is removed (Wilcox et al., 2008). The causality direction in formative constructs is completely reversed in observed variables (Bollen, 2007).

Conceptual framework

Farmers capable to thrive in technological advancements and VUCA situations with their skills in advance farming techniques, resilience imbibed through e-training achieve success and survive in the situations.

The research design is illustrated visually in Fig. 2, making it easier to grasp the hypothesizedassociation of variables. Each arrow begins with the independent variable and ends with the dependent variable. The research design's graphical depiction demonstrates that two variablesexperience of farmers (EF) and qualification of farmers (QF) are mediators in the model.

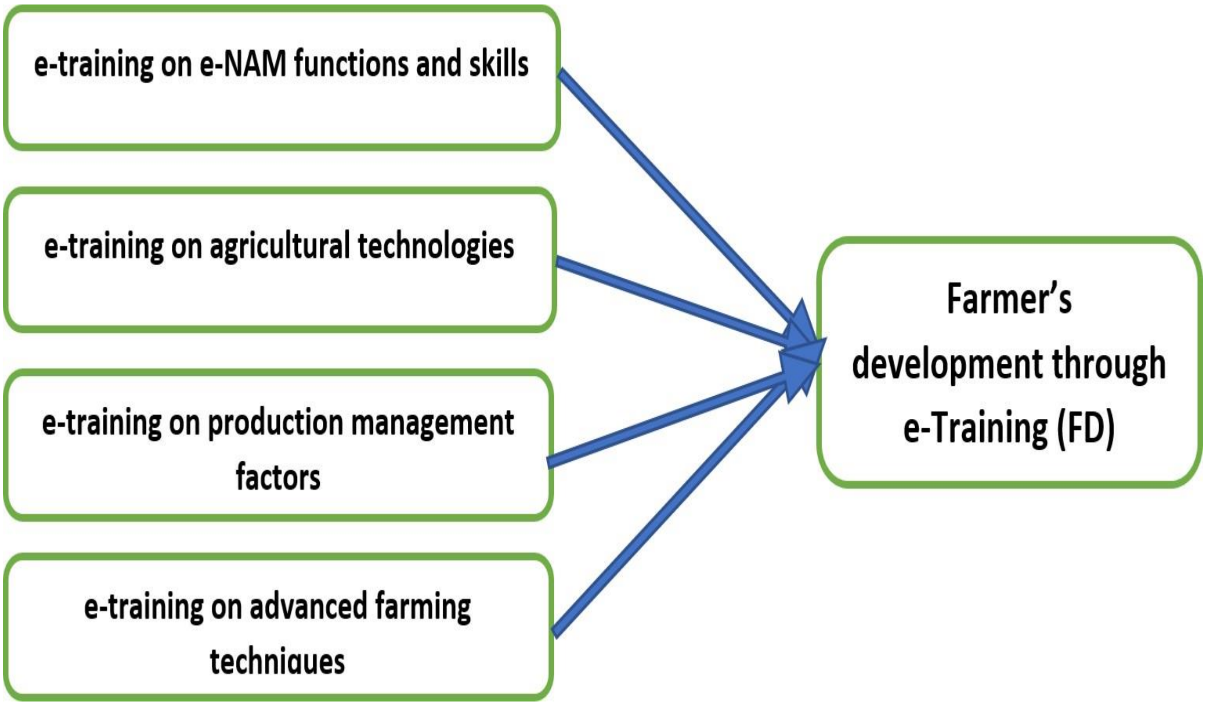

Figure: - 3 *Conceptual Framework of Farmers Development through E-Training*

The model we selected contained five latent variables and every variable was measured throughstructured questionnaires, just like the first latent variable was Farmer's development throughe-Training (FD) and it had eight factors for measurement, 2nd latent variable e-Training on e- NAM functions (ETEF) and it had five factors for measurement, 3rd latent variable e-Trainingon production management (ETPM) and it had eight factors for measurement, 4th latent variablee-Training on advanced farming techniques and skills (ETFS) and it had seven factor for measurement, and 5th latent variable e-Training on agricultural technologies (ETAT) and it hadseven factors for measurement. The details are:

Table: 1 *Latent Variable and Their Source*

Sl. N.	Factors	Code	Source
Farmer's development through e-Training (FD)			
1.	Access to credit	FD1	Awotide, B. A., 2015
2.	Access to market	FD2	Shiferaw, B., 2011
3.	Agricultural extension services	FD3	Anderson, J. R.,2007
4.	Adequate infrastructure	FD4	Patel, A. (2014)
5.	Land tenure security	FD5	Alban Singirankabo, U.,2020
6.	Climate-resilient practices	FD6	Srivastav, A. L.,2021
7.	Government policies and programs	FD7	Iwuchukwu, J. C.,2012
8.	Education and training	FD8	Eicher, C. K. (2006)
e-Training on e-NAM functions (ETEF)			
9.	Familiarize with the e-NAM platform	ETEF1	Meena, G. L.,2019
10.	Hands-on training	ETEF2	Poudel, D. D.,2005
11.	Practice of the e-NAM innovation	ETEF3	Nederlof, E. S.,2011
12.	Learn about online payment systems	ETEF4	Pandey, T.,2010
13.	Stay up-to-date on platform updates	ETEF5	Meena, G. L.,2019
e-Training on production management (ETPM)			
14.	Understanding production processes	ETPM1	Lawlor, D. W. (2002)
15.	Production planning	ETPM2	Lawlor, D. W. (2002)
16.	Resource management	ETPM3	Bryan, B. A.,2011
17.	Quality control	ETPM4	Tzouros, N. E.,2001
18.	Safety and environmental management	ETPM5	Bachev, H. (2014).
19.	Lean manufacturing	ETPM6	Dora, M.,2015
20.	Production cost management	ETPM7	Singla, S., & Sagar, M. (2012).
21.	Supply chain management	ETPM8	Borah, M. D.2020
e-Training on advanced farming techniques and skills (ETFS)			
22.	Precision agriculture	ETFS1	Shafi, U.,2019
23.	Vertical farming	ETFS2	Benke, K., (2017).
24.	Aquaponics	ETFS3	Dos Santos, M. J. P. L. (2016).
25.	Controlled environment agriculture	ETFS4	Ragaveena, S.,2021
26.	Digital farming	ETFS5	Shang, L.,2021
27.	Integrated pest management	ETFS6	Dara, S. K. (2019)
28.	Organic farming	ETFS7	Singh, M. (2021)
e-Training on agricultural technologies (ETAT)			
29.	Use of Agricultural drones	ETAT1	Van der Merwe, D.2020
30.	Use of Precision agriculture technologies	ETAT2	Shafi, U.,2019
31.	Use of Farm management software	ETAT3	Kaloxylos, A.,2012
32.	Use of Smart irrigation systems	ETAT4	Darshna, S.,2015
33.	Use of Agricultural robots	ETAT5	Duckett, T.,2018
34.	Use of crop genetics and plant breeding	ETAT6	Vogel, K. P., & Sleper, D.A,1994
35.	Climate-smart agriculture technologies	ETAT7	Taylor, M. (2018)

Hypothesis of the study

- H1: There is a direct association of e-Training on e-NAM functions to farmers' and farmers development.
- H2: There is a direct association of e-Training on production management and farmers development
- H3: There is a direct association of e-Training on farming techniques and farmers development.
- H4: There is a direct association of e-Training on agricultural technologies and farmers development.

Socioeconomic characteristics of farmers

Table: 2 *Socioeconomic characteristics of farmers*

Variables		Farmers (N = 270)		t-test
	Frequency		%	
Sex	Male	207	76.67	-14.017
	Female	63	23.33	
Marital status	Single	52	19.25	2.225
	Married	218	80.74	
Age	18-35	56	20.54	5.022
	36-45	93	34.44	
	46-55	67	24.81	
	56-65	42	15.56	
	65 and above	12	4.44	
Monthly income	Less than 20,000	58	21.49	-4.625
	20,000 – 50,000	81	30.00	
	50,000 – 70,000	71	26.30	
	70,000 – 1,00,000	45	16.67	
	Above 1,00,000	15	5.56	
Family size	Less than 5	35	12.97	0.958
	6 – 10	78	28.89	
	10 – 15	92	34.04	
	16 and above	65	24.07	
Farming experience	Less than 5 years	44	16.30	2.501
	6 – 10 years	76	28.14	
	10 – 15 years	84	31.11	
	15 – 20 years	52	19.25	
Educational level	More than 20 years	14	5.18	
	Primary education	38	14.07	-0.421
	Secondary education	85	31.48	
	Graduate education	110	47.70	
Land holding	PG education	37	13.70	
	Own land	139	51.48	6.778
	Rented land	75	27.78	
	Borrowed land	33	12.22	
		23	8.52	
Member of FPO	Contracted land Yes	86	30.37	3.045
	No	184	68.15	

Measurement model result assessment

Table: 3 *Measurement Model Result Assessment of Reliability and Validity*

Construct	Items	Loading	Cronbach's alpha	Composite Reliability	Average Variance Extracted (AVE)
		0.951			
		0.682			
	FD1 FD2	0.755			
	FD3 FD4	0.861			
	FD5 FD6	0.856			
	FD7 FD8	0.969			
	ETEF1	0.754			
	ETEF2	0.650			
FD	ETEF3	0.840	0.809	0.855	0.741
ETEF	ETEF4	0.814	0.769	0.871	0.612
ETPM	ETEF5	0.641	0.836	0.828	0.734
	ETPM1	0.798			
	ETPM2	0.753			
	ETPM3	0.726			
	ETPM4	0.801			
	ETPM5	0.842			
	ETPM6	0.774			
		0.817			
		0.864			
	ETPM7	0.907			
	ETPM8	0.958			
	ETFS1	0.716			
	ETFS2	0.732			
	ETFS3	0.735			
	ETFS4	0.665			
	ETFS5	0.804			
ETFS	ETFS6	0.853	0.750	0.911	0.609
ETAT	ETFS7	0.748	0.716	0.827	0.745
	ETAT1	0.722			
	ETAT2	0.637			
	ETAT3	0.699			
	ETAT4	0.748			
	ETAT5	0.753			
	ETAT6	0.718			
	ETAT7	0.738			

The goal of testing reliability is to determine the material's internal consistency. Cronbach's Alpha is a popular reliability test. According to Taber (2016), a decent reliability test numberis more than 0.7. Meanwhile, a composite dependability value greater than 0.6 was consideredreliable (Hair et al., 2019; Crandall et al., 2011). According to Table 4, all of the items weredependable and met the value given by the scholar. Hair et al. (2019) suggested that the factorloading threshold be set between 0.5 and 0.7. The loading factor was all greater than 0.5. Moreover, the average variance extracted (AVE) (dos Santos, P. M., & Cirillo, M. Â. 2021) is defined as the overall weighted mean of such construct-related components' squared loadings, and it is a common metric for assessing convergent validity. Whenever the AVE is 0.5 or above, it suggests that the construct explains more than half of its component variation (Hair et al., 2019). Table 4 shows that Cronbach's Alpha and composite reliability values are larger than 0.7, while AVE values are greater than 0.5. As an outcome, the convergent validity of such constructs is established.

The value of Cronbach's alpha for Farmer's development through e-Training (FD), e-Trainingon e-NAM functions (ETEF), e-Training on production management (ETPM), e-Training on advanced farming techniques and skills (ETFS), and e-Training on agricultural technologies (ETAT) were 0.809, 0.769, 0.836, 0.750, and 0.716 respectively. All the values are greater than 0.7. The value of CR was also measured to check the internal consistency and reliability of constructs. The results shows that the values for FD, FTEF, ETPM, ETFS, and ETAT are 0.855,0.871, 0.824, 0.911, and 0.945 All the values of CR are greater than 0.7. The results of CR indicates that the model possesses acceptable level of reliability (Purwanto, A., & Sudargini, Y. 2021). The AVE values of the latent variables were also computed and reflected in table 4.The AVE value for FD, FTEF, ETPM, ETFS, and ETAT are 0.741, 0.612, 0.734, 0.609, and 0.745 respectively. All these values are greater than 0.5 which shows that there existsacceptable level of convergent validity (Purwanto, A., & Sudargini, Y.2021).

Composite Reliability (CR) and Average Variance Extracted (AVE)

A value of CR = 0.70 or higher is recommended for adequate composite or construct reliability(Nunnally & Bernstein, 1994, Considine, J., Botti, M., & Thomas, S. (2005)). Table 4 showsthat all of the constructs had composite reliabilities greater than the recommended 0.70. The results also show that the AVE estimate for all of the constructs is greater than or equal to the recommended threshold of 0.50. (Fornell and Larcker, 1981). This demonstrates good composite or construct reliability for the constructs in this study (strong tie, weak tie, and opportunity recognition).

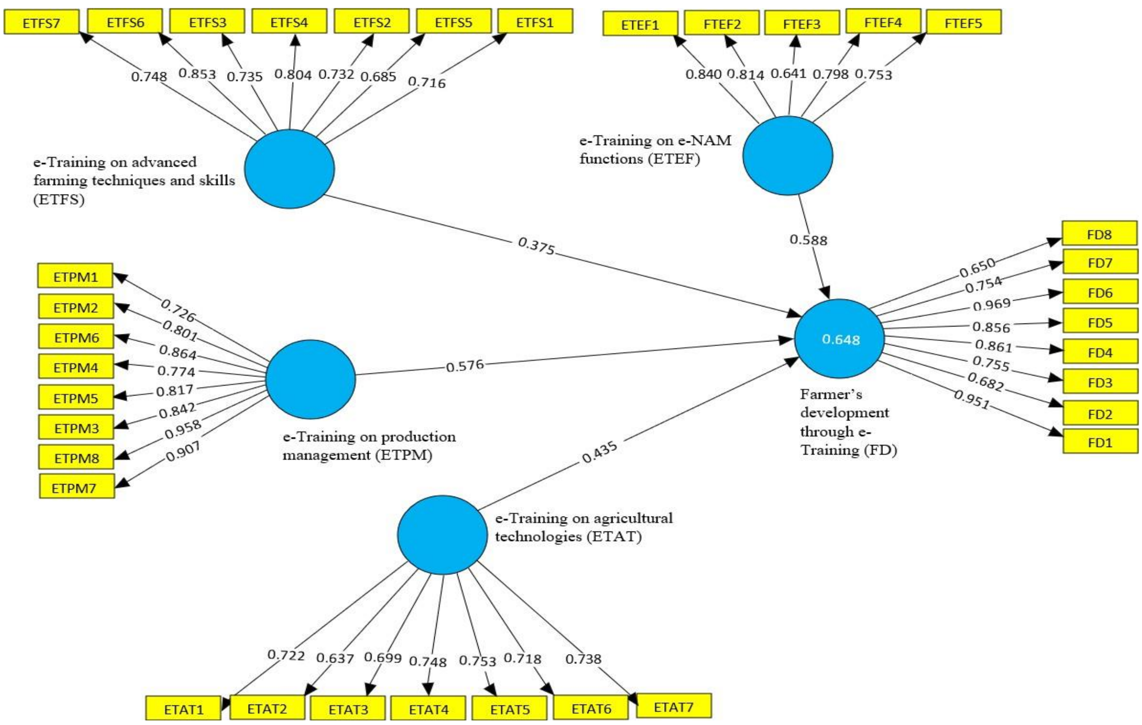

Figure: - 3 *The Structural Model With Estimated Parameters*

Discriminant Reliability

The Fornell-Larcker criterion was used to verify and confirm discriminant validity by assessingthe extent to which each latent variable was distinct from other constructs (Yusoff, A. S. M., Peng, 2020). Table 5 displays the results of this criterion.

Table: 4 *Fornell-Larcker Criterion*

	FD	FTEF	ETPM	ETFS	ETAT
FD	0.786				
ETEF	0.325	0.846			
ETPM	0.300	0.271	0.753		
ETFS	0.278	0.132	0.423	0.819	
ETAT	0.212	0.104	0.345	0.453	0.779

Fornell, C., and Larcker, D.F. (1981) According to the recommendation, each latent constructshould have a stronger correlation with its indicators than other latent variables. To ensure discriminant validity, the AVE for every construct should really be greater than just the highestreliability coefficient of the latent variable with any other latent variable. The AVE values forall factor loadings in our case are: FD is 0.786, FTEF is 0.846, ETPM is 0.753, ETFS is 0.819, and ETAT is 0.779. The values all indicate that the self-AVE of each latent variable is greaterthan the other variables. (Chin, W.W., 1998; Götz, O., et al., 2009).

The Heterotrait-Monotrait Ratio (HTMT)

Table: 5 *The Heterotrait-Monotrait Ratio (HTMT)*

	FD	FTEF	ETPM	ETFS	ETAT
FD	1.000				
ETEF	0.626	1.000			
ETPM	0.125	0.746	1.000		
ETFS	0.140	0.241	0.643	1.000	
ETAT	0.128	0.352	0.243	0.609	1.000

The Heterotrait-Monotrait Ratio (HTMT) is a statistical method used to evaluate discriminantvalidity in structural equation models **Henseler, J., et al. (2016).** Discriminant validity refers to the degree to which constructs that are expected to be distinct from each other are in fact distinct. The HTMT ratio is calculated by dividing the average correlation between two constructs by the highest correlation between any construct and itself. The resulting ratio should be less than 1, with values closer to 0 indicating better discriminant validity. HTMT is considered to be a more conservative measure of discriminant validity than other methods, such as the Fornell-Larcker criterion or the cross-loadings approach. It is recommended that researchers use multiple methods to assess discriminant validity in their models.

Testing of hypothesis

Hair et al. (2017) The hypothesis confirmatory testing is shown in Tables 6 and 7. Bootstrapping results (with 5000 resampling) for the connection between its presumption in the envisaged study model revealed that the t-value of the H1, H2, H3, and H4, hypotheses was greater than 1.96, and these hypotheses were significant at the 5% level. As a result, these hypothesized relationships were proven correct.

Table: - 6 *Results of the Hypothesis Testing*

Linking	Path-coefficients	t-value	p-value	results
ETEF->FDETPM->FDETFS->FD ETAT->FD	0.588	14.751	0.075	Approved
	0.576	11.397	0.001	Approved
	0.375	9.754	0.000	Approved
	0.435	6.248	0.390	Approved

Table 7: *R^2, f^2, and Q^2 findings*

Linking	Path-coefficients	R^2	f^2	Q^2
ETEF->FDETPM->FD ETFS->FD ETAT->FD	0.588	0.648	0.225	0.566
	0.576		0.355	
	0.375		0.458	
	0.435		0.168	

R^2 (Explained Variance), F^2 (Effect Extent) and Q^2 (Predictive Relevance)

The structural model includes the primary assessment criterion R^2 (explained variance), f^2 (effect size), and Q^2 (predictive relevance) (Hair et al., 2017). The coefficient of determination R^2 served as the general effect extent measure for the structural model (Garson, 2016). The R^2 index ranges from 0 to 1, with higher levels indicating greater predictive accuracy. R^2 values of 0.19, 0.33, and 0.67, respectively, could be described as weak, moderate, and substantial (Chin, W.W. 1998). The (f^2) effect size allowed us to estimate the independent factor that contributed to the dependent variable. The f^2 estimate was 0.02 (small), 0.15 (medium), and

0.35 (high) (Cohen, 1988).

In this research, the Value of R^2 for the estimated model was 0.648 (Table 7), which is recognized a reasonable impact; we observed that e-training of farmers had the most significant influence on farmers development. The f^2 outcomes were displayed in Table 7. The link of FTEF->FD (0.225) and ETPM->FD had a substantial f^2 effect size (0.355). For the ETFS-

>FD relationship, the large f^2 effect size actually happened (0.458) and the relationship of ETAT->FD revealed a small f^2 effect size (0.168).

Conclusion

The findings of the study reveal that e-Training enhances resilience, skills in advanced farmingtechniques in farmers in adopting technology. It results in adopting e-NAM. E-training on modern technologies can have a significant impact on farmers, leading to a range of positive developments and outcomes. Some of the key developments that can occur after e-training on modern technologies for farmers are:

- Increased knowledge and skills: E-training provides farmers with access to the latest agricultural techniques, technologies, and practices. As a result, farmers can develop theirknowledge and skills, which can improve their productivity, reduce their costs, and increase their profitability.
- Improved crop yields: Through e-training, farmers can learn about crop management techniques that can help to increase crop yields. This can lead to better harvests, which can increase farmers' incomes and improve food security in their communities.
- Sustainable farming practices: E-training can help farmers to adopt sustainable farming

practices, such as soil conservation, water management, and pest control. By using sustainable practices, farmers can reduce their environmental impact, improve the healthof their land, and create more resilient agricultural systems.

- Access to markets: E-training can help farmers to understand market demands and develop marketing strategies that can help them to sell their products. This can lead to increased incomes and greater economic opportunities for farmers.
- Networking opportunities: E-training can provide opportunities for farmers to connect with other farmers, agricultural experts, and industry leaders. This can help farmers to share knowledge, exchange ideas, and develop partnerships that can benefit their businesses.
- Increased efficiency and productivity: E-training can teach farmers about modern technologies such as precision agriculture, drones, and sensors that can help them to manage their farms more efficiently and increase their and increase yields.
- Improved crop quality: Modern technologies can help farmers to produce crops of higherquality. For example, precision irrigation can help to provide crops with the exact amountof water they need, resulting in more consistent crop growth and higher quality produce.
- Cost savings: By adopting modern technologies, farmers can reduce their costs, improvetheir profitability, and become more competitive. For example, using drones for crop monitoring can reduce the need for manual labor and save time and money.
- Environmental sustainability: E-training can help farmers to adopt modern technologies that promote environmental sustainability, such as soil sensors that can help to optimize nutrient use and reduce fertilizer runoff. By using these technologies, farmers can reducetheir environmental impact and ensure the long-term health of their land.
- Access to new markets: By adopting modern technologies, farmers can produce higher-quality crops that meet the demands of new markets. For example, precision agriculture can help farmers to produce crops that meet the requirements of niche markets, such as organic or sustainable produce.

e-training on modern technologies can lead to a range of positive developments for farmers, including increased efficiency and productivity, improved crop quality, cost savings, environmental sustainability, and access to new markets. These developments can contribute to the growth and success of individual farming businesses, as well as to the overall sustainability and resilience of the agricultural sector.

Here are some policy recommendations for e-training to farmers:

1. Government subsidies: Governments can provide subsidies or financial incentives to farmers for participating in e-training programs. This can help to increase the uptake of e-training and improve the skills and knowledge of farmers.
2. Collaboration with agricultural institutions: Governments can collaborate with agricultural institutions such as universities, research centres, and agricultural extension agencies to develop and deliver e-training programs. This can ensure that e-training programs are based on the latest research and best practices in the agricultural sector.
3. Tailored e-training programs: E-training programs should be tailored to the specific needsand contexts of different types of farmers, such as small-scale farmers, women farmers, and farmers in different regions or countries. This can help to ensure that e-training programs are relevant and useful to farmers.
4. Multi-lingual e-training programs: E-training programs should be available in multiple languages, especially in regions where there are multiple local languages spoken. This can help to ensure that e-training programs are accessible to all farmers, regardless of

theirlanguage or literacy levels.

5. User-friendly e-training platforms: E-training platforms should be user-friendly and accessible, with simple and intuitive interfaces that are easy to navigate. This can help to ensure that farmers with limited computer skills can still participate in e-training programs.
6. Internet connectivity and infrastructure: Governments can invest in improving internet connectivity and infrastructure in rural areas to ensure that farmers have access to e-training programs. This can help to overcome barriers to e-training participation such as limited internet access or slow internet speeds.

By implementing these policy recommendations, governments can help to increase the uptakeof e-training programs among farmers and improve their skills and knowledge in the agricultural sector. This can lead to more sustainable and efficient farming practices, improved crop yields and profitability, and ultimately, better livelihoods for farmers.

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