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Driving organic farm success in India: The interplay of agripreneurial orientation and training

Raman, K.[1*], Rani, J.[1], Dwivedi, A.[2] and Mir, M. A.[3]

[1]Department of Management Studies, Sathyabama Institute of Science and Technology, Chennai, India; [2]EdMaestro Academy, Meerut, India; [3]Asian School of Business, Noida, India.

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Abstract Growing concern about the sustainability of the present system has necessitated farmers to show greater interest in `Organic cultivation' which is a safer alternative environmentally and socially. This study investigates the effect of the three major dimensions of agripreneurial orientation, namely, innovativeness, opportunity seeking, and risk taking on performance of smallholder organic vegetable farmers. Incorporating the interaction effect of training in the framework, the paper discusses how agripreneurial orientation can be critical in driving farm success. Innovativeness and opportunity seeking were found to be contributing significantly to the success of organic farms while risk taking did not exhibit a direct significant effect. However, it was interesting to note that training interventions strongly moderated the relationship between risk taking and farm performance demonstrating that taking risk with effective training led to positive farm performance while without training it may have an adverse impact due to reckless risk taking. Training also moderated the relationship between innovativeness and farm performance highlighting that with effective training, a less innovative organic farmer may also become successful. These findings highlight the synergetic effects of training and its imperativeness for customized and crop focused entrepreneurial training program for enhancing the adoption and success rates of organic farming practices by smallholder farmers in emerging economies. Actionable recommendations for organic farmers, policymakers and other stakeholders for fostering sustainable organic farming practices in India and other developing countries are given.

Keywords: Agripreneurship, Entrepreneurial Orientation, Innovativeness, Opportunity seeking, Risk taking

Introduction

The primary occupation of rural population in developing economies like India is agriculture and farm incomes constitute the source of livelihood for more than 60% of the population (CSE, 2020). As per Agricultural Census of 2019-20, nearly 17% to India's GDP and 85% of the country's farmlands are cultivated by small and marginal farmers, with landholdings of less than 2 hectares or less

[*]**Corresponding Author:** Raman, K.; **Email:** raman.k.dr@gmail.com

(APEDA, 2024). An agricultural-related entrepreneurial activity is considered as a creation and extraction of value from the environment (Anderson, 1998). It is also a growth-propelling engine, primarily in generating employment and improving economic growth and development (Bairwa *et al.*, 2014). Thus, agripreneurship is not solely confined to farm and rural enterprises but involves adoption of newer technologies and sustainable cultivation practices as per the market opportunities (Wiklund and Shepherd, 2005). It encompasses a broader definition of all the activities that are related to agriculture and are a part of the agri-value chain (Sharma *et al.,* 2019). Also, in recent years, the ill effects and sustainability of traditional agricultural practices, involving the usage of chemicals have led to a growing interest in a more environmentally friendly alternative farming practice, such as `Organic Farming' defined as the use of biofertilizers and green manures to enhance or maintain the fertility and nutrient status of soil (Mishra *et al*., 2019).

The overall global organic agricultural movement has grown significantly, which now records 72.3 million hectares, with more than 3.1 million certified producers (FiBL and IFOAM Organic International, 2022). In India, due to the demand for fresh, chemical-free, high-nutritive-value food crops, the certified area under organic farming practices has increased but is still quite low as compared to overall area under cultivation (APEDA, 2024). It is reported that an area of 2.78 mill. hectares are under certified organic farming, which is about 2 percent of India's 140.1 mill hectares net sown area (CSE, 2020). Also, the overall area under organic farming and production have registered an increase from 4.20 to 7.53 percent (CAGR), for the period from 2005 to 2022 (Poonam and Kiran, 2024). Studies show that the organic vegetable growers, mostly comprised of rural farmstead having small holdings, formed the bulk of the vegetable producers in India (Dev, 2012; FiBL and IFOAM, 2022). In this regard, to promote the opportunities of organic cultivation practices among smallholder farmers, development of their entrepreneurial skills appears important (Mahindarathne and Gunaratne, 2015).

Farming is considered as a social entity, and farmers are defined as those who are involved in farming activities to realize their main sources of income (McElwee, 2008). On the other hand, an entrepreneur is considered as a person who identifies opportunities and takes risks and converts them into marketable ideas (Kuratko, 2009), and those farmers who could create and develop a profitable business were considered as entrepreneurial farmers (de Wolf and Schoorlemmer, 2007). Therefore, Agripreneurial Orientation (AO), is the application of entrepreneurial orientation proposed by Lumpkin and Dess (1996; 2001) in the context of agricultural producers and involves the willingness of

farmers to take risks and try out innovative practices, services, markets, and be more proactive and competitive compared to competitors (Shahbaz *et al.*, 2023).

Despite the various initiatives taken by the Government of India, in launching the National Programme for Organic Production (NPOP) as well as the awareness initiatives taken by the State Departments of Agriculture, the adoption rate of organic farming by farmers is very low, compared to the opportunities available for increasing the area under organic cultivation (APEDA, 2024; Paramasivam *et al.*, 2022). Besides many other factors, low adoption rate of effective organic farming practices has been attributed to poor technical expertise and inadequate skills to manage the farms (Reddy, 2010; Das *et al*., 2020). Several researchers have discussed the various factors influencing smallholder farmers' adoption of organic farming practices, which include, demographic characteristics, psycho-behavioural and psychosocial factors, and farming factors (Jaganathan *et al*., 2009; Paneerselvam *et al.,* 2012; Nandi *et al*., 2015). However, the influence of need-based training as an effective strategy for enhancing the effect of agripreneurial orientation in improving the overall farm performance is under explored especially in the context of smallholder organic vegetables farmers. Few studies have discussed how lack of formal entrepreneurial education and farming experience significantly affected entrepreneurial skills and thereby reduced agripreneurial behaviour and agricultural performance of organic farmers (Jaganathan *et al*., 2016; Ilham *et al*., 2024; Tambwe, 2024). But these studies do not explicitly cover the impact of targeted training programmes run by government departments for specific farmer populations as moderator in the relationship between Agripreneurial orientation and farm performance.

The present study explored the interaction effect of training with three important agripreneurial orientation (AO) variables - Innovativeness (IN), Opportunity seeking (OS) and Risk taking (RT) in enhanching farm performance by analysing data collected from smallholder organic vegetables farmers in the state of Tamil Nadu, one of the major states in India producing organic farm products (Habanyati *et al*., 2024). Hence the study aimed to bridge the gap in literature by integrating the role of entrepreneurship traits and farmers training in driving organic farm success.

Materials and methods

Research Framework for this study is grounded in the entrepreneurial orientation theory (Lumpkin and Dess, 1996; Miller, 1983; Wiklund and Shepherd, 2003) which proposes innovativeness, risk taking and proactiveness or opportunity seeking as the tenets of entrepreneurial orientation. While,

innovativeness is the desire of farmers to try out new opportunities, creative ideas and experiments, which enable them to shift and deviate from the existing old practices to new technologies; opportunity seeking is the ability of farmers to identify new opportunities and then convert the same into marketable ideas and value-added products; and risk taking is the willingness to take some calculated risks for allocation of scarce resources and ensuring the cost of failure to minimum levels (Rosairo and Potts, 2016).

The study followed a mixed methods approach starting with identification of AO dimensions from literature followed by qualitative interviews in two phases. In the fist phase, 18 experts including agricultural officers from State Department of Agriculture; Professors of entrepreneurship development and agricultral economics / agribusiness in higher education institutions; and officers from rural and agricultural credit institutions were interviewed for understanding the different aspects of innovativeness, opportunity seeking (or proactiveness), and risk taking in context of organic farmers in India.

In the second phase 20 farmers involved in organic farming were interviewed through a structured interview schedule developed on the basis of expert responses from the first phase, to understand what steps they take or feel are necessary to be taken for driving success of organic farms in terms of the three AO variables. Formative index for measuring Innovativeness (IN), Opportunity seeking (OS) and Risk taking (RT) were developed based on the major aspects identified for each of the variables employing directed content analysis and coding of interview responses guided by theory (DeVellis and Thorpe, 2021; Mackenzie *et al.*, 2011).

The initial pool of items generated was given to 5 experts for assessing content validity. One item of innovativeness and one of risk taking was deleted as they were suggested as being vague and not clearly covering a distinct aspect making them redundant in the formative index. One item of opportunity seeking was rated low on content validity by 4 out of 5 experts and was therefore dropped. The construct for performance was measured reflectively using items from established scales (Raman *et al.*, 2025). The final items for measuring constructs in the study are listed in Table 1.

All items were measured on a 1-5 rating with anchors ranging from strongly disagree to strongly agree except two items of performance for which the anchors are mentioned in the table. Training was measured as a binary dummy variable with farmers who attended trainings offered by government agricultural and rural development departments coded as 1 and those who did not receive any training coded as 0.

Table 1. Measurement instrument

Construct	Items
Innovativeness (IN)	IN1: I cultivate high-yielding hybrid varieties and other new crop varieties. IN2: I adopt innovative and newer farming techniques, using new implements, farm machinery, tractors, etc. IN3: I experiment and try out new organic inputs and other soil amendments. INGlobal: Overall I have an innovative approach towards organic farming.
Opportunity Seeking (OS)	OS1: I explore new markets to sell my crop produce. OS2: I gather new information from market for making key decision involving my produce. OS3: I seek information from media (TV/newspaper/social media) to keep myself updated on newer developments in the field of organic agriculture. OS4: I constantly seek department level development projects for sustainable farm production. OSglobal: I keep seeking all types of opportunities for enhancing my farm performance.
Risk Taking (RT)	RT1: I invest in new farm implements and machinery which are entirely new to the region. RT2: I borrow funds on credit to expand any new farm operations. RT3: I cultivate organic crop varieties that are entirely new to the region or locality. RT4: I fear in initiating any new activity which is not tried and tested in my organic farm business. ® RTGlobal: Overall I do not hesitate in taking risk in my organic farming business.
PERF	PERF1: Organic farming has been my primary source of income in the past 12 months. PERF2: My organic farming business has been profitable in the past 12 months. PERF3: I have a good profit margin on organic farming produce. PERF4: What has been the overall position of your organic farming business? (1=Huge Loss to 5=Highly Profitable) PERF5: How sustainable do you believe your organic business will be in the long run? (1=Highly unsustainable to 5=Highly Sustainable)

® = Reverse Coded

In the second stage of study survey data was collected using the measurement instrument from 224 smallholder organic vegetable farmers from Tamil Nadu state of India through purposive sampling. Sample size was adequate as determined by power analysis using G*Power (Faul *et al.*, 2009) which suggested a minimum sample size of 213 respondents for achieving 90% power at 5% level of significance assuming small effect size of 0.05. The demographic

profile revealed that male farmers represented 68 percent of the respondents, while females accounted for 32 percent. In terms of educational attainment, a substantial majority of 72 percent had completed schooling only up to the primary level, whereas 19 percent reported education up to the secondary level, and a small fraction indicated having no formal education. With respect to landholding, a dominant share of over 80 percent operated on plots of two acres or less and only one-fifth possessed larger farms (upto 5 acres) for organic cultivation. Considering age distribution, most participants were concentrated in the 30–50-year age bracket, with 12 percent aged above 50 years and 5 percent younger than 30 years. Quantitative analysis was done employing Partial Least Square Structural Equation Modelling (PLS-SEM) which is the recommended SEM approach when formatively measured constructs are involved, and the study is exploratory incorporating new relationships focussed on prediction rather than testing established theories (Hair *et al.*, 2019). The effect of AO dimensions on farm performance moderated by training intervention were hypothesized and tested.

Earlier studies have shown a positive relationship between entrepreneurial orientation (EO) and performance. EO is manifested in farmers looking for newer opportunities, innovating, and taking risk to stay competitive (Pindado and Sánchez, 2017; Slater and Narver *et al*., 2000; Verhees *et al.*, 2012; Wiklund and Shepherd, 2005). Farmers who possess agripreneurial characteristics comprising of innovativeness, opportunity seeking as well as risk taking were found to be more capable of transforming an ordinary farming operation into a highly profitable agribusiness venture in recent studies (Yoganandan *et al.*, 2022). Following hypotheses were thus framed and tested for investigating the effect of AO components of Innovativeness, Opportunity Seeking and Risk Taking on performance of smallholder organic farms:

H1: Innovativeness has a positive effect on farm performance.

H2: Opportunity seeking has a positive effect on farm performance.

H3: Risk taking has a significant effect on farm performance.

Positive effect of training on entrepreneurial efficacy is well documented in literature (Ho *et al.*, 2018). Training can enhance the positive effect of entrepreneurial traits on farm performance by guiding farmers in strategically managing their farms for enhanced performance (Raman *et al.*, 2025; Xue *et al.*,

2022). Therefore, we model the dummy for receiving training interventions as a moderator in the framework and formulate the following hypotheses:

H4a: Training interventions moderate the relationship between innovativeness and farm performance.

H4b: Training interventions moderate the relationship between opportunity seeking and farm performance.

H4c: Training interventions moderate the relationship between risk taking and farm performance.

Results

The measurement model was assessed for both formative and reflective constructs in the framework followed by the evaluation of structural model in accordance with guidelines given by Hair *et al.* (2022).

Measurement model

The reflective construct PERF demonstrated satisfactory measurement properties. Reliability estimates (Cronbach's Alpha, Rho A, and Rho C) all exceeded 0.70, and the AVE surpassed 0.50, supporting convergent validity (Hair *et al.*, 2022). A summary of the measurement model results for the reflective construct Performance (PERF) is shown in Table 2.

The formative measurement model of IN, OS, and RT was assessed through redundancy analysis, which evaluates convergent validity by correlating each construct with its corresponding global item. All the three constructs showed correlations above 0.80 with the respective global item, exceeding the threshold of 0.70 and thereby confirming convergent validity. In addition, all outer VIF values were below 3.0, eliminating concerns of multicollinearity. Examination of indicator weights indicated significance for all but IN1; however, because the loading of IN1 exceeded 0.50, the item was retained (Table 3). Thus, all constructs were found to be valid as per recommended guidelines (Diamantopoulos *et al.*, 2008).

Table 2. Measurement model of reflective construct (PERF)

Reflective Construct	Item	Loading	Cronbach's Alpha	Rho A	Rho C	AVE
PERF	PERF1	0.716	0.809	0.812	0.866	0.564
	PERF2	0.755				
	PERF3	0.768				
	PERF4	0.750				
	PERF5	0.764				

Table 3. Measurement model of formative constructs (IN, OS, RT)

Formative Construct	Redundancy Coefficient	Item	Outer VIF	Outer Weight	Weight sig. (p)	Outer loading
IN	0.801	IN1	1.054	0.203	0.146	0.511
		IN2	1.061	0.530	0.001	0.689
		IN3	1.050	0.683	0.000	0.808
OS	0.834	OS1	1.291	0.517	0.000	0.805
		OS2	1.424	0.188	0.005	0.655
		OS3	1.342	0.353	0.002	0.730
		OS4	1.226	0.334	0.000	0.609
RT	0.859	RT1	1.202	0.497	0.000	0.584
		RT2	1.138	0.374	0.011	0.505
		RT3	1.216	0.404	0.006	0.516
		RT4	1.354	0.614	0.000	0.813

Structural model

The structural model evaluation began with an assessment of multicollinearity among predictor constructs, as its presence can bias regression outcomes. The inner VIF values were examined, and since all were below 5, no serious collinearity issues were detected. Next, the path coefficients and their significance levels were analyzed to evaluate the hypothesized impact of the strategic mix elements on the performance of organic farmers. This was tested through bootstrapping with 5,000 subsamples, and the outcomes are illustrated in Figure 1. The direct path coefficients for IN and OS are positive and significant while the coefficient for RT is negative and insignificant at 5%. Further insights are revealed by moderation analysis. Detailed results of the hypothesized path relationships are summarized in Table 4.

Moderating effect of training was analysed through the significance of interaction effects and the slope analysis. Figures 2, 3 and 4 depict the slope analysis graphs which show the strength of relationships for farmers who attended training programs with green line and for those who did not attend the programs with red line. The slope of green and red lines was found to be considerably different in case of relationship between IN and PERF with the strength being higher in case of those who did not get any training intervention. The slope of these lines is parallel in case of relationship between OS and PERF showing that training does not moderate this relationship. On the other hand, in case of relationship between RT and PERF even the direction of lines is different showing that risk taking may have a negative effect on performance in absence of proper training.

The model's explanatory power was assessed using the coefficient of determination (R^2), while predictive relevance was evaluated through the

PLSpredict-based Q^2 measure. The explanatory capacity, model fit, and predictive validity of the overall model is presented in Table 5 which demonstrates that the model possesses satisfactory explanatory and predictive power, accounting for more than 40% of the variance in the dependent construct, with all Q^2 values exceeding zero, thereby confirming predictive relevance. Furthermore, the model's overall fit was acceptable, as indicated by an SRMR value of 0.074, which falls below the commonly recommended threshold of 0.08.

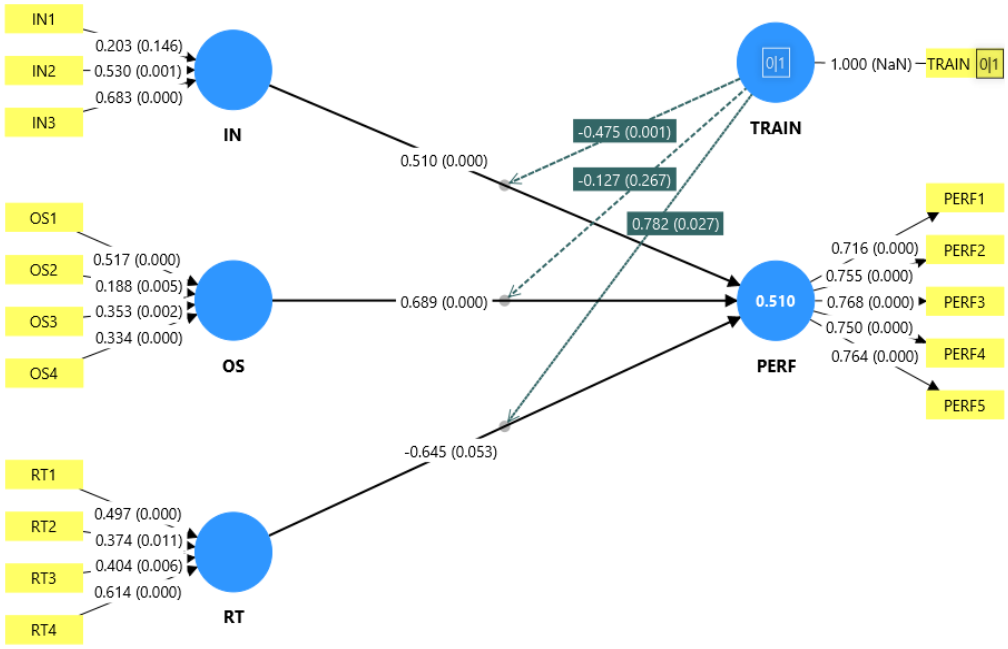

Figure 1. Bootstrapping results (with moderator)

Table 4. Path coefficients

Path	Inner VIF	Path Coefficient	t value	p value	Inference
IN-> PERF	3.743	0.510	3.533	0.000	H1 supported
OS-> PERF	2.197	0.689	3.657	0.000	H2 supported
RT->PERF	1.928	-0.645	1.619	0.053	H3 not supported
INxTrain-> PERF	1.608	-0.475	3.051	0.001	H4a supported
OSxTrain-> PERF	2.342	-0.127	0.621	0.267	H4b not supported
RTxTrain-> PERF	3.849	0.782	1.933	0.027	H4c supported

Table 5. Explanatory and predictive relevance

Explanatory Power			Predictive Power	
Endogenous Variable	R^2	R^2 Adj.	Q^2 (PLSpredict)	
Performance	0.510	0.499	Latent Variable Q^2	0.412
Exogenous Variables	f^2		Measured Variables Q^2	
Innovativeness	0.184			
Opportunity Seeking	0.142		PERF1	0.245
Risk Taking	0.023		PERF2	0.217
IN x Train	0.035		PERF3	0.141
OS x Train	0.012		PERF4	0.256
RT x Train	0.060		PERF5	0.344
Model Fit (SRMR): 0.074				

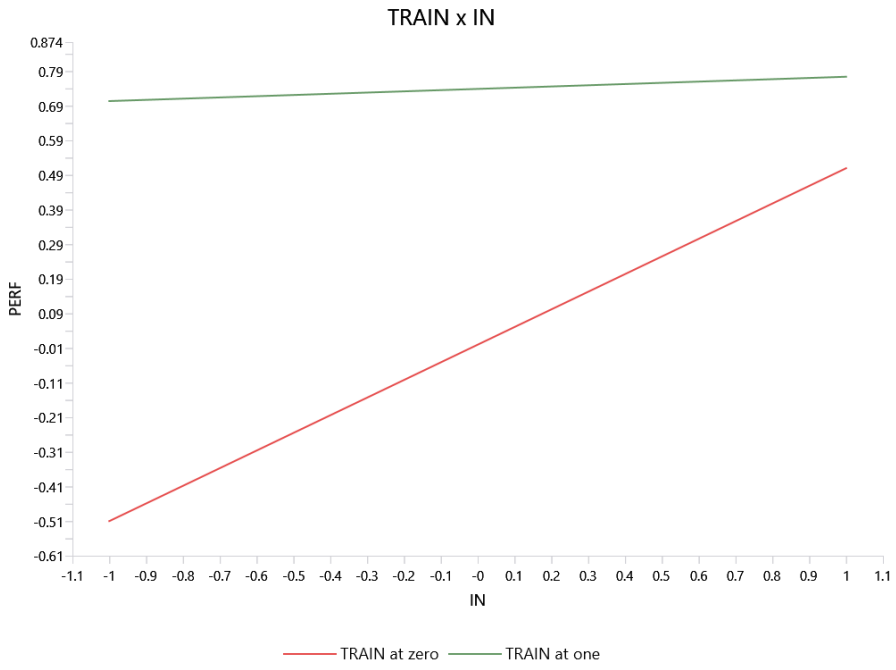

Figure 2. Moderating effect of training on IN -> PERF

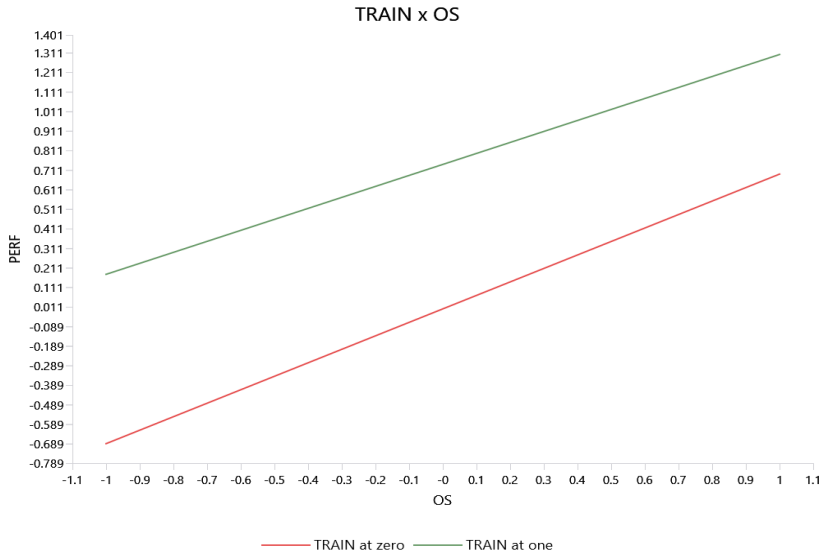

Figure 3. Moderating effect of training on OS -> PERF

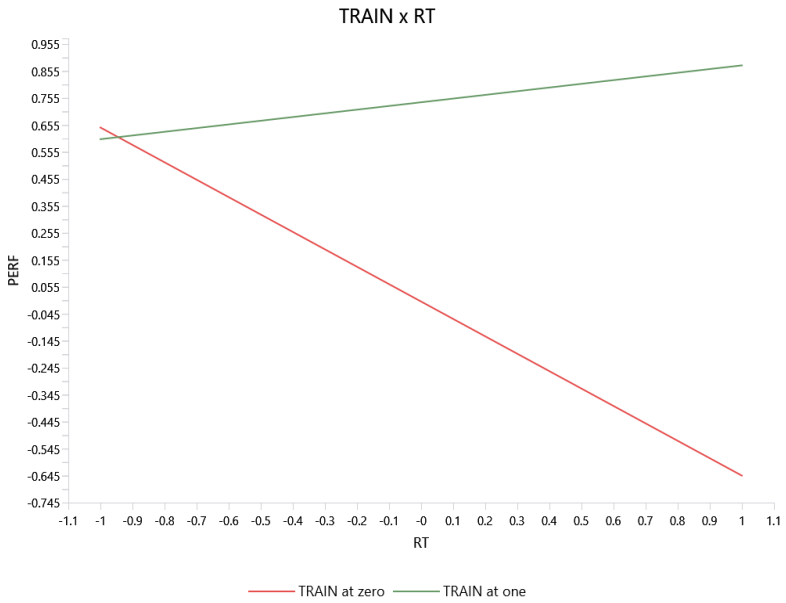

Figure 4. Moderating effect of training on RT -> PERF

For assessing the importance of training, the model was also estimated without moderator. The explanatory power of the model without moderator (R^2 = 0.436) was found to be lower than that of the model with training as moderator (R^2 = 0.510) while SRMR for both the models was similar. All the three AO traits showed a significant positive effect on performance in absence of training as moderator which highlights the shortcoming of such model in providing nuanced understanding of organic farming contexts where training efforts are being prioritized. Hence, the superiority of the model with training as moderator was established.

Discussion

The results of PLS-SEM analysis provide interesting insights regarding the role of agripreneurial orientation (AO) and its interaction with training in enhancing farm success for organic vegetable farmers. H1 being supported implies a significant positive effect of innovativeness of farmers on the farm performance. The result is in line with earlier studies which found innovativeness as an important entrepreneurial characteristic driving agribusiness performance (Pliakoura *et al.*, 2021; Verhees *et al.*, 2011). Results of moderation analysis reveal that training interventions dilute the effect of innovation on performance as training negatively moderates the relationship between innovativeness and farm performance (H4a supported). This result has two implications. First, it suggests that training can substitute for innovativeness and by providing effective training, the requirement of high innovative characteristics for success in organic farming may be reduced as training enables the farmers to understand new and innovative methods of farming. Specifically, even less innovative farmers may achieve satisfactory performance outcomes when provided with adequate training since structured programs enhance technical knowledge, managerial skills, and adoption of improved practices. This interpretation is supported by evidence from Ethiopia, where farmer training significantly increased wheat yields and net incomes regardless of prior differences in farmers' innovation levels (Wonde *et al.*, 2022). Similarly, training initiatives in China have been shown to improve farmers' willingness to adopt sustainable technologies such as straw-returning practices, thereby raising performance among those who may not otherwise engage in innovative experimentation (Xue *et al.*, 2022). Therefore, training can help in enhancing farm performance in cases where farmers may not be innately innovative. On the other hand, it may also point to the fact that training programs can standardize practices, potentially limiting the unique advantages that arise from individual experimentation and creative problem-solving. In other words, if training content is highly standardized, it may reduce

the distinct contribution of individual innovativeness by channeling farmers towards uniform practices. The dual nature of this moderation has important implications for policy making as it highlights the importance of designing training programs that not only impart standardized technical knowledge but also encourage adaptive, creative application to ensure that training complements and amplifies, rather than suppress the benefits of innovativeness.

Opportunity Seeking was also found to play a significant enabling role in driving farm performance as H2 stood supported. Farmers who are proactive in identifying opportunities existing in the environment are more successful as they are able to seize these prospects effectively and gain relative advantage over their competitiors. This result corroborates with existing studies on entrepreneurial orientation of farmers and their farm performance (Gao *et al.*, 2018; Rosairo and Potts, 2016). Training did not moderate the relationship between OS and performance (H4b not supported) signifying that the effect of proclivity behaviour in terms of seeking new growth opportunities for better farm performance is independent of training interventions received.

Risk taking did not exert a direct significant influence on farm performance (H3 not supported) in the presence of training interventions moderating effect which altered the direction of the RT influence on performance. When we compare the effects without training interventions, the overall effect of RT on Performance was found to be positive and significant (but this relationship got altered in the presence of training interventions which is a significant finding of this study. Extant literature also shows inconclusive evidence regarding the effect of risk taking on farm performance with different types of effect present in different countries and contexts (Verhees *et al.*, 2011). Our results provide an important direction towards understanding the varying effect of risk taking with entrepreneurial and agricultural training interventions playing a significant moderating role in this relationship (H4c supported). Without proper training, farmers are prone to taking irrational and uncalculated risks which may have a negative effect on performance. With effective training programs the agricultural departments and credit instituions can help farmers in taking measured risk to implement novel farming techniques, use new farm inputs, and expand organic agribusiness contributing to farm success.

The model comparison between models with and without training as moderator clearly shows that explanatory power of the model is enhanced considerably with the introduction of moderation effect of training with no change in model fit. This implies that models which do not consider the effects of training on the relationship between farmers' entrepreneurial orientation and farm performance in emerging countries settings where governments are putting

significant efforts in training farmers in organic farming and agribusiness management can miss crucial insights and provide over-generalized conclusions.

This study has its limitations in terms of geographical coverage and solely quantitative approach. Study was limited to data collection only from smallholder vegetable farmers in the State of Tamil Nadu in India due to limited availability of resources and therefore further research may be required from different regions of India and other emerging economies to fully establish the generalizability of results. Study can be extended to other crops as well to understand the differences among farmers growing different varieties of crops. Also, this study found moderating effect of training on relationship between innovativeness and performace to be negative which can have dual implications. Purely quantitative approach is not sufficient to explain such findings and further qualitative research is required to fully interpret this finding contextually. To conclude, the present study reveals interesting insights regarding the significant interactive role of training with three major dimensions of AO namely, IN, OS and RT, in enhancing farm success for organic smallholder vegetable farmers. Thus, without quality training on the technical as well as managerial aspects of organic farming, farmers are at risk of taking suboptimal decisions which may have a profoud effect on the productivity of farm performce. Thus, the present agripreneurial model emphasizes the importance of training, thereby filling a gap in the understanding of how the AO variables such as IN, OS and RT affect performance in the presence of training intervention.

Further, agripreneurial training should be facilitated by all the stakeholders and agricultural extension workers, NGO's etc., to foster a culture of

agriprneurship among organic smallholder farmers which can lead to enhanced local economic development.

Conflicts of interest

The authors declare no conflict of interest.

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