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Evaluating the drivers of environmental sustainability practices – mango farm managers' perspective

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Abstract. This study evaluated the drivers of environmental sustainability practices using mango farm managers in Thailand. The purpose was to ascertain farmers' ability to conserve natural resources and protect the ecosystem. This was necessitated to raise environmental awareness, promote sustainable human development, and increase economic growth and quality of life. The study adopted a quantitative survey design with primary data collected from mango farm managers in four provinces in Thailand. Data were collected from a total of 383 respondents. The data was analyzed using CFA and SEM techniques employing SPSS v26 and AMOS v26. The findings showed that Organizational Culture and Employee Training significantly and positively influence Environmental Sustainability Practices in managing mango as a natural resource. Organizational Culture was also found to positively mediate the effect of information system adoption. The study concluded that management and employees in mango farms should be trained about the importance of environmental sustainability and encouraged to cultivate a culture grounded in the sustainability practices of mango as a natural resource. They should be taught how advancing and adopting sustainable practices by subsistence and commercial mango farmers in Thailand can enhance sustainable development, economic growth, and regional cooperation by checking materials and methods.

Key words: natural resources, human development, organizational culture, information system adoption.

INTRODUCTION

Human existence and wellbeing are linked to the environment and natural resources available to them. Much of the problems faced by humans around the globe are linked to the health of the environment, and the scarcity or pollution of natural resources. Healthy living requires individuals to access fresh water and clean air to breathe and survive. The concept of environmental sustainability is thus the ability of people to behave in a manner that conserves natural resources and protects the ecosystems to

ensure the promotion of health and wellbeing. Pata (2021) outlines that the concept of environmental sustainability is pegged on three pillars: renewable resources, pollution, and non-renewable resources. Under these pillars, environmental sustainability can be achieved by ensuring that the rate of using renewable resources does not exceed the rate of regeneration. Also, regarding pollution, the rate of waste generation should not exceed the assimilative capacity. Similarly, the use and depletion of non-renewable resources should be done with comparable renewable substitutes for the resources to enhance sustainability. In the age of Industry 4.0, more accurate information must be used as input data into virtual models for higher output (Herak et al., 2018; Wasserbauer et al., 2019; Wall et al., 2021).

Attaining environmental sustainability requires the adoption of practices that drive sustainable growth. Some of the key drivers in environmental sustainability include practices such as environmental management based on set policies and environmental legislation. These include antipollution and emission laws and policies (Risku-Norja & Mikkola, 2009; Naidoo, 2018; Havrysh et al., 2021). Greenhouse Gas Emissions (GHE) conservation is another practice that ensures sustainable environmental systems by passing and implementing laws and policies that limit GHE for the country. Also, climate change influences certain aspects of environmental sustainability (Amekawa, 2010; Singh, 2019; Rabbi et al., 2021). Reducing the levels of global climate change positively influences the environment towards sustainability. The effect of GHE has been felt in increasing global temperatures, which has affected agricultural yields, thus threatening the sustainability of humans (Amekawa, 2010). Measures like soil fertility conservation and soil degradation prevention play a vital role in ensuring sustainable farming practices and, consequently, a sustainable environment (Molnar et al., 2013; Turner et al., 2016; Escobar et al., 2019). Water quality is also vital by ensuring the non-contamination of groundwater sources and soil detoxification to remove harmful elements capable of reducing agricultural yield or crop failure. Various drivers of environmental sustainability are practiced worldwide, involving waste management, green labeling, and life cycle assessment.

Sustainability can be enhanced by also considerably reducing the carbon footprint in the distribution process by mango farmers. They can adopt measures such as ensuring the full loads of shipments to minimize emissions due to transportation. Mango fruits should be loaded onto trucks heading to the border, and firms should collaborate with other export sectors to ensure that other products are loaded onto trucks traveling back from the border. Farmers may also consider using independent trucking firms with the most fuel-efficient fleets to distribute mango produce and ensure they carry out routine vehicle maintenance. Mango farmers are encouraged to switch from flood irrigation to drip and dispersion irrigation to minimize the greenhouse gas emissions from pumping equipment. Mango farmers should employ photovoltaic cells as a renewable energy source to reduce the electricity used during production. They can further save on electricity by dividing up cool rooms in packing houses so that just the parts containing the mango produce are cooled, rather than refrigerating the entire room (National Mango Board, 2017). The novelty of the study is in the analysis and determination of drivers of environmental sustainability in the cultivation of mango as an export commodity to boost the trade economy of Thailand. Understanding the dynamics that make it a sustainable enterprise is critical when considering the Sustainability Development Goals (SDGs)

and the growing influence of Thailand in the Southeast Asia region in promoting sustainability.

Environmental Sustainability Practices in Thailand

Thailand is one of the countries in Southeast Asia that has achieved increased social and economic growth in the past few decades. Despite the political uncertainty, the country recognizes environmental sustainability as one of the main objectives of economic and social development. According to the global stability index, Thailand is ranked 154th out of 195 countries based on its policies and actions toward environmental stability (Naidoo, 2018; Chmielarz et al., 2020). In a bid to achieve environmental sustainability, the country adopted measures to manage its natural resources sustainably. While the national strategy framework was put in place in 2017 as a 20-year strategy to 2036, the idea of sustainability is not new to the Thai people, who live under the 'Sufficient Economy Philosophy (SEP)'. The SEP principle that encourages people to live balanced lives based on moderation, reasonableness, and self-immunity. The concepts under the SEP philosophy align with the sustainable development goals.

Among the key factors promoting environmental sustainability in Thailand are environmental legislation, policies and sustainable farming practices. For instance, the Thai government has implemented the green integration policy and the national green directory, which aim to promote environmentally friendly products and services (Amekawa, 2010; Chaiyasoonthorn et al., 2019; Andersson et al., 2020; Csákay et al., 2021; Smirnova et al., 2021). The Thai government uses various agencies to promote its environmental policies and explain them to the public. For instance, the government facilitates environmental policies through institutions such as the national environment board and the ministry of natural resources. Non-governmental organizations also promote Thailand's environmental policies and philosophies to ensure social justice and sustainability (Chomchalow & Songkhla, 2008; Muangmee, 2021). For example, in many instances, many non-governmental organizations in Thailand argue against rapid capitalist expansion, terming it the basis for environmental degradation and economic inequality. Intertwining economic development with the environment plays a vital role in ensuring environmental sustainability in the country.

Sustainability in Thailand has also been largely linked to the sustainable agricultural practices in the country since the early 1900s. The Thai government has, over the years, encouraged sustainable farming practices through the extension of services such as incorporating green technologies into irrigation schemes as well as the provision of economic incentives to increase crop production. The other key factors in improving sustainable agriculture in Thailand involve integrating integrated farming systems where the farmers engage in two or more agricultural activities in the same field to lower costs and ensure the attainment of maximum potential from the farming lands (Chomchalow & Songkhla, 2008). The country also promotes organic farming, where alternative ways are utilized to limit the quantities of herbicides, pesticides, and fertilizers used in farming. Organic farming in Thailand is promoted by government research and non-governmental organizations (Panuwet et al., 2012; Larkin, 2017; Meemken & Qaim, 2018; Formoso, 2021). The other farming practices in the country aimed at promoting environmental sustainability include agroforestry, which encompasses farming of cash crops to coexist with cattle, and natural farming, which involves farming without applying chemicals to preserve the environment.

However, despite the environmental sustainability progress, Thailand continues to face various environmental problems related to pollution. Although the country has established good water treatment facilities, it lags in developing an enhanced piping system to deliver the water. Similarly, the retail and hotel industries continue to use plastic packaging, contributing to water and soil pollution. Environmental challenges in Thailand challenge economic growth through farming and social fulfilment.

Mango Farming in Thailand

Thailand is one of the largest mango producers globally after India and China, and in 2016, the country produced 3.4 million tons of mango. Mango farming in the country is mainly for commercial purposes, which involves processing and exporting fruit products. Much of the mango product produced in Thailand is exported to Japan, Malaysia, China and Singapore. However, despite being one of the world's highest mango farming countries, much of the mango fruit is sold in the domestic markets, with only 2% sold as exports. Sales from mango farming in Thailand are estimated to be over $50 million per year (Kumar et al., 2021).

Mango farming in Thailand takes various forms in different regions. For instance, farming of the mangoes is often done using dwarf trees under horticultural practices. This form of farming comes with the advantages of easy harvesting and reduced farming costs. It is also advantageous as it ensures minimal damage to the mangos. Similarly, the mango farming practices in Thailand also involve the use of tip pruning to reduce vegetative growth and ensure easy flowering and plant management. Other mango farming practices practiced in Thailand involve thinning, where the immature fruit is thinned to allow the remaining fruit to mature to its maximum size.

However, despite the high mango fruit production in Thailand, the farmers are increasingly faced with uncertainties due to the increasing scarcity of water resources for irrigation. Similarly, whether the anomalies pose a challenge to the off-season production of mango fruits in the country remains to be seen. To address these problems, farmers in Thailand adopted micro-irrigation systems that save water resources in the irrigation practices and are cost-effective as they are not labor-intensive (Kumar et al., 2021).

Mango farming in Thailand is based on the season. The rationale for the high season, which involves harvesting the fruits, is characterized by excess supply exceeding demand, resulting in low prices. However, farmers have in the past ignored the market-led production by developing an off-season production farming culture. The development of off-season farming methods through irrigation is a relatively high investment for the farmers (Chomchalow & Songkhla, 2008; Kumar et al., 2021). However, on the flip side, off-season farming also affects the environment through strains on the water resources for irrigation, and the use of herbicides and pesticides to control pests and diseases common during the off-season periods. Thus, to ensure environmental sustainability, mango farming in Thailand must address various aspects of farming practices, including the farming organizational culture, farming employee training, and adoption of technology that will positively affect environmental sustainability.

Information Technology Adoption and Its Effects on Environmental Sustainability

The effects of global warming and climate change on the environment have led to an increased focus on technologies that promote environmental sustainability around the globe. Various research indicates the success of the use of 'green technologies' in promoting environmental sustainability (Yumashev et al., 2020; Jayashree et al., 2021). Dezdar (2017) argues that adopting eco-technologies helps in developing practices that ensure non-toxic products are generated. The mango farming industry in Thailand takes environmental concerns seriously and, in turn, adopts various technologies aimed at promoting environmental sustainability. Some of the technological adoptions in Thailand's mango farming practices involve post-harvest technologies (Chomchalow & Songkhla, 2008). For instance, farmers in Thailand use specially made paper bags to cover the mango fruits to prevent them from being eaten by pests, especially the oriental fruit flies. The use of specially made paper bags benefits the fruit product by not allowing light to penetrate the fruit and providing a good environment to develop the perfect color for the ripe fruits for export. The paper bag and fruit wrapping technologies are environmentally sustainable. They prevent farmers from around the country from applying insecticides to prevent oriental fruit flies and consequently protect the environment (Karar, 2019). Similarly, the special wrapping papers are biodegradable, contributing positively to the environmental sustainability efforts in Thailand.

The use of information technology helps farmers learn about climate change and apply this information to farming methods to meet the conditions. Climate change has led to uncertainties in weather conditions that affect crop production and the quality of products. Due to the risks of the high cost of products, high labor costs, or labor shortages, not having the right information to tackle these factors in farming is often damaging, with adverse effects on the sustenance of the farm enterprise (Rolnick, 2019; Chaveesuk et al., 2020; Ndinojuo, 2020; Jędrzejczyk, 2021; Smimova et al., 2021). The use of information technologies helps search for information and share experiences related to weather and the environment. In the Thai farming industry, the farmers, with the help of the government, utilize the Near-Infrared Spectrometer (NIR) technology that provides information on the maturity of mangoes for harvesting (Chomchalow & Songkhla, 2008). Having information on whether the mangoes are ready for picking or not helps the farmers prepare other processes such as grade selecting and packaging for export, hence helping reduce costs during the selection process. The other aim of adopting information technologies in mango farming is to ensure an information connection between mango production and the market. Similarly, by maintaining a connection of information in the farming processes, the information is also used in determining climate change and ways to combat the severe effects of global warming. Adopting information technologies contributes positively to environmental sustainability efforts. From the above literature, the following Hypothesis has been developed:

Hypothesis (H1): The adoption of Information Technology significantly and positively influences environmental sustainability practices.

Organizational Culture and Its Effects on Environmental Sustainability

Organizational Culture involves the behavior based on shared common beliefs and values in particular organizations that leaders can communicate to influence employee

perception and behavior. According to Chomchalow & Songkhla (2008), mango farmers in Thailand have formed coalitions that have turned into strong, productive organizations that work professionally to produce quality mangos to meet market demand. Fietz (2021) articulates that the concept of Organizational Culture plays a vital role in ensuring corporate environmental management and sustainability. The Thai authorities use the farmers' Organizational Culture to implement sustainability policies. For instance, the mango farmers adhere to the measures on agrochemicals put in place by the importing markets (Krause, 2016). Japan is one of the export markets for Thai mango fruits, and it has put in place measures on the level of chemicals to be used by farmers on the fruits. Such measures help build an Organizational Culture that positively affects environmental sustainability in Thailand.

Organizational Culture in Thailand: Mango farming affects sustainability by embedding environmentally sustainable farming practices among the farmers' behavior. Greater emphasis is being placed on the standardization of mango fruits to meet the export market's demands. In the research by Chomchalow & Songkhla (2008), various regulating bodies in Thailand, from the export regulating committees to agrochemical companies, have set sustainable standards that farmers should follow in producing mangoes. The sustainable market culture has led to the development of a sustainable mango farming culture among the farming cluster cooperatives in the country. Spreer (2013) states that establishing the one-stop service center, which facilitates the exporting process of the mango fruits in the country, involves all three parties in the mango farming industry, including farmers who cultivate the product; exporters who export the mango fruits to other countries from Thailand, and the government, which serves as the regulator in the entire process from production to export. The one-stop service center uses green labeling as the key driver toward implementing environmental sustainability practices. Under the labeling scheme, the regulators insist on the importance of farming management methods that adhere to the agrochemical regulations set by the exporter markets. Farmers in Thailand's mango industry thus must develop a sustainability culture in their farming practices to benefit from the export markets, thus positively impacting the country's environmental sustainability measures. From the above literature, the following Hypothesis has been developed:

Hypothesis (H2): Organization culture positively and significantly influences Environmental Sustainability Practices in Thailand.

Employee Training and Its Effects on Environmental Sustainability Practices

Attaining sustainability takes time, and training is one of the best ways to ensure continued defined behavior towards environmental sustainability. At the organizational level, employee training is one way to ensure sustainability discussions are held within the business and a way to begin the process of sustainable change in the future (Fernández et al., 2003). According to Ji (2012), employee training influences organizations' performance in sustainable development. Organizations adhere to various environmental regulations put in place by the government and other agencies in their line of business. Thus, training employees toward environmental sustainability helps organizations meet the regulatory measures while improving the firm's performance (Wagner & Schaltegger, 2003; Muangmee et al., 2021). The farmers under these clustered groups thus operate as the group employees who should moderate positively between the groups' environmental attitudes and performance towards sustainable

development. Farmers operating in groups produce superior mango fruits that meet the market demand (Limniranku, 2010). Farmers working in groups gain a supply chain for the export market and support from the local governments to train themselves to adhere to the sustainability regulations demanded by the export markets (Haque & Yamoah, 2021). Consequently, these lead to a positive impact on the environmental sustainability efforts in the country.

The organization's employees are the first point of contact between the organization and the customers; hence, training the employees on environmental sustainability helps organizations meet the customer's desire for eco-friendly options while maintaining improved performance. (Jędrzejczyk, 2021). In the Thai mango industry, the farmers operate as business groups, and the members are considered employees (Vasudha & Agarwal, 2019). Thus, to ensure the mango fruits meet the consumer demands of going green, the community business groups conduct farmer training to adhere to sustainability measures. Chomchalow & Songkhla (2008) and Pachura (2019) remind us that the community business groups formed by the farmers invite agricultural experts to train the members on sustainable farming methods, including fruit wrapping, tree pruning, harvesting, and chemical spraying, among other methods that reduce environmental degradation while improving their production performance. By training the farmers on sustainable farming methods, the Thai farming industry contributes positively to the environmental sustainability efforts in the country. From the above literature, the following Hypothesis has been developed:

Hypothesis (H3): Employees Training positively and significantly influences Environmental Sustainability Practices in Thailand.

Conceptual Framework

Based on the evaluation of the literature review in the previous section, the conceptual framework bearing the study model was developed. The model comprises four variables: Environmental Sustainability Practices (which is the dependent variable) and three independent variables, which include Information Systems Adoption (ISA), Organizational Culture (OC), and Employee Training (ET). The relationship between these variables is presented in Fig. 1.

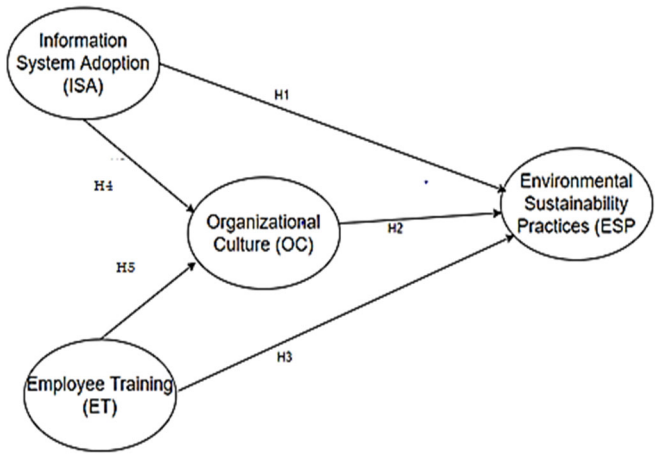

Figure 1. Conceptual model.

Hypothesis 1 (H1): Information system adoption (ISA) positively influences Environmental Sustainability Practices in Thailand.

Hypothesis 2 (H2): Organizational culture positively influences Environmental Sustainability Practices in Thailand.

Hypothesis 3 (H3): Employees Training positively influences Environmental Sustainability Practices in Thailand.

Hypothesis 4 (H4): Organizational culture mediates the relationship between Information system adoption and environmental sustainability in Thailand

Hypothesis 5 (H5): Organizational culture mediates the relationship between Employees Training and environmental sustainability in Thailand.

MATERIALS AND METHODS

This study adopted the quantitative method, where primary data was collected from the mango farmers in Thailand. The population of the study comprised mango farmers in five provinces in Thailand: Suphan Buri, Prachinburi, Phitsanulok, and Chainat. These provinces were considered suitable because they are regarded as the highest producers of mangoes. The data was collected using a questionnaire from a total of 383 mango farmers through personal interviews with the aid of the Association of Mango Producers in those regions. Regarding the data collection, the four variables of the study, Environmental Sustainability Practices (ESP), Organizational Culture (OC), Information System Adoption (ISA), and Employee Training (ET), were measured by adapting existing scales that have been validated in previous studies. All the measures were undertaken using 5-point Likert Scales (1 = strongly disagree to 5 = strongly agree) as follows: Environmental Sustainability Practices (ESP) with six indicators adopted from Pachura (2019) and Silvestre & Tîrca (2019); Organizational Culture (OC) with six indicators from (Baird et al., 2017); Information System Adoption (ISA) with six indicators from (Wagner & Schaltegger, 2003; Pérez-Méndez & Machado-Cabezas, 2015); Employee Training (ET) with seven indicators (Consoli et al., 2016; Rojo-Ramirez et al., 2019). The analysis of the data was conducted using various techniques. The first analysis was descriptive statistics of the data, followed by an evaluation of the suitability of the model using confirmatory factor analysis (CFA). Reliability and validity analysis were analyzed using Cronbach's Alpha, and average variance was extracted (AVE). The hypotheses were evaluated using structural equation modeling (SEM). The analysis was carried out using SPSS (version 26) and AMOS (version 26).

RESULTS AND DISCUSSION

Characteristics of the Respondents

The evaluation of the respondent's characteristics was carried out using the data collected. The results indicated that most respondents were female, 243 (63%), with males being at least 140 (37%). The largest age group was 31–40 years old (201, 52.48%), followed by 41–50 years old (64, 16.71%). The highest education level of the respondents was college (226, 59%), followed by high school and below (79, 21%). The study also evaluated the income of the respondents from the mango farming activities. The highest income level was 35,000–45,000 Baht, followed by 5,000–15,0000 Baht per season of mango harvesting. A summary of the demographic data is presented in Table 1.

Several techniques were adopted to evaluate the fitness of the model adopted in the study. The techniques applied include the reliability analysis, which was statistically conducted using Cronbach's Alpha and Convergent Reliability (CR). The validity of the constructs used in the study was evaluated using average variance extracted (AVE). The model used for the study was evaluated using confirmatory factor analysis (CFA). The results of the CFA revealed that the chi-square statistic for the model was significant ($\chi 2$ [458] = 936.716, p <0.01) to the check of (CMIN/df = 2.045), which was considered acceptable since it was below the threshold of 3.0 (Hu & Bentler, 1999; Schumacker & Lomax, 2004). Additional statistics included IFI = 0.939, TLI = 0.933, CFI = 0.938, NFI = 0.886, and RMSEA = 0.052. RMSEA was below the threshold of 0.80 and verified the suitability of the model (Hu & Bentler, 1999), while the variables for Convergent Reliability and Cronbach Alpha were above the 0.9 thresholds as recommended by (Thompson, 2004; Kline, 2005).

Table 1. Demographic data of respondents

Demographic features	Possible options	Frequency (n)	Percent (%0)
Gender	Male	140	36.6
	Female	243	63.4
Age	18–30 years	82	21.41
	31–40 years	201	52.48
	41–50 years	64	16.71
	above 51 years	36	9.40
Education	High school and below	79	20.6
	College	226	59
	Bachelor	76	19.8
	Master	2	0.5
Income (Baht)	Below 15,000	135	35.2
	15,001–25,000	40	10.4
	25,001–35,000	29	7.6
	35,000–45,000	141	36.8
	above 45,000	38	9.9

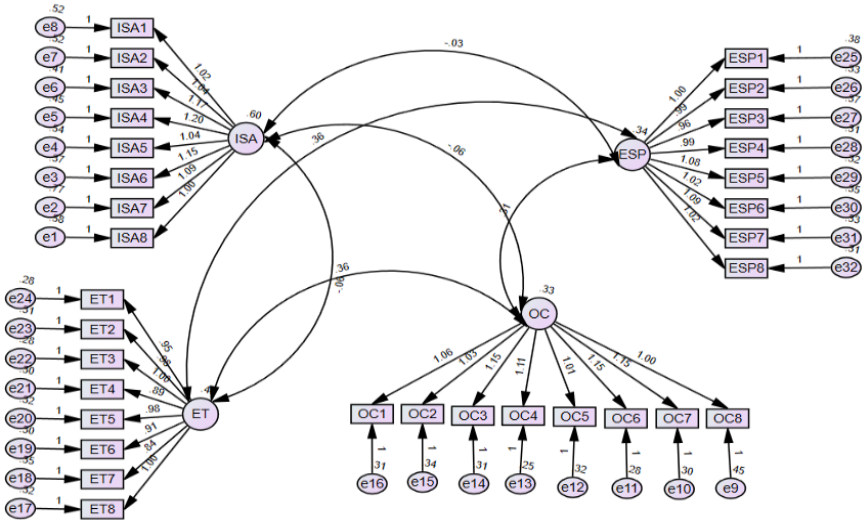

Figure 2. Model Fitness.

The suitability of the observant variables and latent variables was evaluated using factor loadings, the Convergent Reliability (CR), Average Variance Extracted (AVE), and Cronbach's Alpha as presented in Fig. 2. From the results, the CR ranged from 0.894 to 0.918. These values were above the required threshold of 0.7 according to Fornell &

Larcker (1981). Considering the AVE, the values ranged between 0.512 and 0.583 (see Table 2), which were above the required threshold of 0.5 according to (Segars, 1997). The satisfaction of all the required thresholds proved that the study model was suitable for conducting the study.

Table 2. Validity and reliability analysis

Constructs	Items	Factor Loadings	CR	AVE	Cronbach's Alpha
	Information System Adoption (ISA)		**0.918**	**0.583**	**0.917**
ISA1	The use of the internet is a good source to obtain information to innovate in the company environmental sustainability practices	0.74			
ISA2	The advances of science presented at fairs and other events favour environmental sustainability practices	0.746			
ISA3	The different levels of government share their skills and information with companies environmental sustainability practices	0.819			
ISA4	Development of a web page is needed for the company to inform customers and suppliers regarding environmental sustainability practices	0.812			
ISA5	The information generated in technological R&D centres contribute to the innovative production processes of the firm environmental sustainability practices	0.741			
ISA6	The information about the ecological situation, forests, soil resources, and available water is grounded in managing the company	0.827			
ISA7	Information Technology encourages improved environmental sustainability practices	0.696			
ISA8	Internet and web services are vital in spreading the word regarding environmental sustainability practices	0.715			
	Organizational Culture (OC)		**0.907**	**0.550**	**0.906**
OC1	Not being constrained by many rules encourages environmental sustainability practices	0.738			
OC2	Being quick to take advantages of opportunities boosts environmental sustainability practices	0.711			
OC3	Being Innovative is an aspect of environmental sustainability practices	0.765			
OC4	Being achievement-oriented is vital to environmental sustainability practices	0.788			
OC5	Having high expectation for performance encourages environmental sustainability practices	0.715			
OC6	Being results-oriented is important to environmental sustainability practices	0.781			
OC7	Paying attention to detail is sometimes not suitable for environmental sustainability practices	0.772			
OC8	Being precise is critical for environmental sustainability practices	0.65			

Table 2 (continued)

	Employee Training (ET)		**0.914**	**0.570**	**0.913**
ET1	Training is a key to the development of the environmental sustainability practices	0.773			
ET2	Learning is a key to improving production processes in the company's environmental sustainability practices	0.765			
ET3	Knowledge management is a key in the company's environmental sustainability practices	0.791			
ET4	Attending events fairs is a key to getting more knowledge for the staff that works in the company's environmental sustainability practices	0.738			
ET5	The professionalization of workers and managers is a key in the activities of environmental sustainability practices	0.761			
ET6	Self-training is a key to personal and professional development of workers and managers in the firm for environmental sustainability practices	0.749			
ET7	The level of education is a key to the relationship between workers and employers in the company's environmental sustainability practices	0.692			
ET8	Managerial encouragement is critical for encouraging employees best practices	0.765			
	Environmental Sustainability Practices (ESP)		**0.894**	**0.512**	**0.893**
ESP1	The organizations carry out fertility tests and soil moisture	0.69			
ESP2	The irrigation systems used in the company are of the latest technology	0.71			
ESP3	The cultivation (conventional/ecological) is related to productivity and financial performance	0.674			
ESP4	Natural resources are used rationally in the company	0.724			
ESP5	The companies have environmental certifications	0.744			
ESP6	In the organization, they care about the good management of toxic inputs	0.711			
ESP7	Climate change issues are part of organizational policies	0.739			
ESP8	We are always aware of environmental sustainability practices	0.731			

Structural Equation Modelling

Structural Equation Modeling (SEM) was used to evaluate the five hypotheses of the study. The result of SEM is presented in Fig. 3 and Table 3.

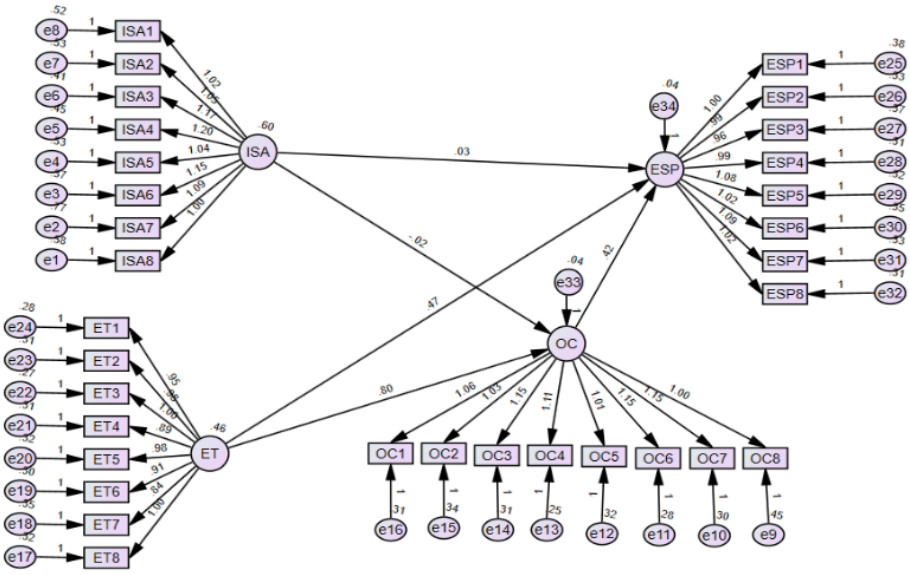

Figure 3. SEM analysis.

The SEM model was evaluated for suitability before the actual analysis of the hypothesis. The data revealed that the chi-square statistic for the model was significant ($\chi 2$ [458] = 936.716, $p < 0.01$) the check of (CMIN/df = 2.045), which was considered acceptable since it was below the threshold of 3.0 (Pérez-Méndez & Machado-Cabezas, 2015; Consoli et al., 2016). Additional statistics included IFI = 0.939, TLI = 0.933, CFI = 0.938, NFI = 0.886, and RMSEA = 0.052. RMSEA was below the threshold of 0.80 and showed the suitability of the model (Schumaker & Lomax, 2004), while the variables (IFI, TLI, and CFI) were above the 0.9 thresholds as recommended by Kline (2005) and Thompson (2004).

Table 3. SEM analysis for Thailand mango farmers

Hypo-thesis	Relationship	β	Accept?
	ISA ----> OC ---> ESP	0.415***	
H1	ISA ----> ESP	0.027	No
H2	OC ----> ESP	0.415***	Yes
H3	ET ----> ESP	0.470***	Yes
H4		-0.007***	Yes
H5	ET ----> OC ---> ESP	0.331	No

*H2, H3 and H4 were accepted while H1 and H5 were rejected from the SEM analysis.

From the SEM, the five hypotheses of the study were evaluated. The results showed that the path coefficients between Information System Adoption (ISA) and Environmental Sustainability Practices (ESP) (H1) (β = 0.027, $p > 0.00$) indicated that Information System Adoption (ISA) positively but insignificantly influences Environmental Sustainability Practices in Thailand. This led to the rejection of Hypothesis 1. The path coefficients between Organizational Culture (OC) and Information System Adoption (ISA) (H2) (β = 0.415, $p < 0.00$), indicated that Organizational Culture positively and significantly influences Environmental Sustainability Practices in Thailand. This led to the acceptance of the second

Hypothesis of the study. The results also showed that the path coefficients between Employee Training (ET) and Environmental Sustainability Practices (ESP) (H3) ($\beta = 0.470$, $p < 0.00$), indicate that Employee Training positively and significantly influences Environmental Sustainability Practices in Thailand. This led to the acceptance of the third hypothesis. The effect of Information System Adoption (ISA) on Environmental Sustainability Practices (ESP) through Organizational Culture (OC) (H4) ($\beta = -0.007$, $p < 0.00$) indicated that Organizational Culture mediates the relationship between Information System Adoption and environmental sustainability in Thailand. This led to the acceptance of the fourth Hypothesis of the study.

The effect of Employee Training (ET) on Environmental Sustainability Practices (ESP) through Organizational Culture (OC) (H5) ($\beta = 0.331$, $p > 0.00$) indicated that Organizational Culture does not mediate the relationship between Information Systems Adoption and environmental sustainability in Thailand. This led to the rejection of the fifth Hypothesis of the study.

Effects of Information system adoption on environmental sustainability practices

This section is discussed with reference to the first Hypothesis of the study, which investigated how information system adoption influences environmental sustainability practices. According to the findings of the study, it was found that the information system does not significantly influence the environmental sustainability practice among Thai mango farmers. This implies that the aspects of information system adoption, such as the use of the internet as a good source to obtain information to innovate in the company's environmental sustainability practices, the advances of science presented at fairs and other events that favor environmental sustainability practices, and the different levels of government sharing their skills and information with companies' environmental sustainability practices do not influence the environmental sustainability practices. The findings of this Hypothesis do not agree with the literature by Dezdar (2017), who opined that eco-technologies play an important role in the development of practices that ensure environmentally friendly products. Mango farmers in Thailand have not keyed into this important resource about environmental sustainability, which is available via the adoption of information systems. Similarly, Rolnick (2019) also found that Information Technology is important in informing people about the benefits of environmentally friendly production practices. The non-adoption of information systems will hamper the inclusion of sustainable environmental practices in mango farming. The reason for this non-adoption could be that in mango farming in Thailand, the use of high technology has not been widely adopted and implemented in the production practices of mango, considered in many aspects a natural resource.

Effects of Organizational Culture on environmental sustainability practices

In this study, Organizational Culture was considered a critical aspect of the Environmental Sustainability Practices of Thailand's mango farmers. It incorporated the behaviors and common beliefs and values shared among people, a community, or an organization engaged in mango farming in Thailand. The results of the study indicated that Organizational Culture has a significant and positive influence on Environmental Sustainability Practices in Thailand. These results were in agreement with that of Fietz

(2021), who indicated that the concept of Organizational Culture plays a vital role in ensuring corporate environmental management and sustainability. The reason is because the Organizational Culture makes it easy for the management to implement environmental practices and guidelines to ensure sustainability. As Turner et al. (2016) point out, problems associated with contemporary agriculture and natural resources are on the rise globally and have affected social order and the ability to tackle issues associated with climate change. From the perspective of this research, the specific Organizational Culture aspects that influence Environmental Sustainability Practices include the cultivated organizational innovativeness, achievement-oriented, high expectations from the members, and being results-oriented in mango farming.

Effects of Employee Training on Environmental Sustainability Practices

Employee Training was considered development of farm managers' continued commitment to adopting and implementing Environmental Sustainability Practices for natural resources. The findings of this study indicated that Employee Training contributes positively and significantly toward the Environmental Sustainability Practices in Thailand. These findings agreed with that of Ji (2012), who indicated that Employee Training influences organizations' performance in sustainable development. This aspect is grounded on the argument that Employee Training at the organizational level is one of the ways to ensure sustainability discussions are held within the business and a way to begin the process of sustainable change in the future and the management of natural resources. These findings were further supported by Fernández et al. (2003), who indicated that training employees toward environmental sustainability helps organizations meet the regulatory measures while improving the firm's performance. From the perspective of this study, Employee Training aspects that contribute to Environmental Sustainability Practices include considering training as a key employee development strategy; learning is a key to improving production processes, and investing in knowledge management to ensure sustainable harnessing of natural resources associated with an area. Thailand, as one of the top global mango producers (Chomchalow & Songkhla, 2008), should incorporate sustainable practices into its operations toward the sustainable development of its mango farms.

Mediating Role of Organizational Culture

In this study, organizational culture was evaluated as a mediator of the effect of employee training and information system adoption on environmental sustainability practices. The findings of the study indicated that organizational culture mediated the effect of information system adoption on environmental sustainability practices but did not significantly mediate the effect of employee training on environmental sustainability practices. The interesting finding from the study is that when the organizational culture was included as a mediator, the information system adoption changed from having an insignificant influence to having a significant influence on environmental sustainability practices. This paper proposed that to be effective, the information system should be incorporated by the people, community, and organizational culture, or rather, considered as an aspect of the inherent values to effectively influence the Environmental Sustainability Practices in mango farming in Thailand.

CONCLUSIONS

From the findings of this study, several policy recommendations were made both to the mango farmers in Thailand as well as the concerned stakeholders in the sector, especially about harnessing mango as a natural resource for Thailand. The first recommendation is that in this study and from the literature, employee training is an important variable for enhancing environmental sustainability practices. Therefore, management and employees on the mango farms should be trained regarding the importance and aspects of environmental sustainability. The second recommendation is that organizational culture could play a critical role as far as environmental sustainability practices are concerned. Cultivating an organizational culture grounded in environmental sustainability practices and aspects could play a great role in advancing it, both for mango farmers in Thailand. Another policy recommendation is that information system adoption by itself may not influence environmental sustainability practices. It should be incorporated into the organization's culture so that it can have a significant influence on environmental sustainability practices.

The first limitation of the study is that it was specific to Thailand. This is because it particularly focused on mango farmers in Thailand, and data was collected from five provinces. The limitation is that mango is cultivated in many areas of Thailand. As a result, the application of the results and generalization of the findings should be applied in recognition of the study's specificity. The next limitation is that the study variables and sample size were quite small. This study recommends that future studies should consider increasing the sample size and the study variables, as well as covering a larger study area for comparisons. The last limitation of the research is the non-inclusion of seasonal production as a variable and how it affects mango production in Thailand among farmers. Future studies should include this as a variable in studies about mango farming and other crops with seasonal variants.

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