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Article

Smallholder's sustainable oil palm production commitment: Predictive role of organizational, work-related, psychological, and personal factors

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Abstract: This paper focuses on examining the relationship among organizational factor, work-related factor, psychological factor, personal factor and the commitment of oil palm smallholders toward Malaysian Sustainable Palm Oil (MSPO) certification. The study employed a descriptive research methodology and a structured survey instrument to gather data from oil palm smallholders (n = 441) through simple random sampling technique. Data analysis was conducted using SPSS and partial least square structural equation modeling (PLS-SEM) to test the proposed relationship. The findings reveal that organizational factors significantly impact the affective (β = 0.345, p < 0.05), normative (β = 0.424, p < 0.05), and continuance commitment (β = 0.339, p < 0.05) of oil palm smallholders. Additionally, work-related factors show a substantial effect on these same dimensions of commitment; affective (β = 0.277, p < 0.05), normative (β = 0.263, p < 0.05), and continuance (β = 0.413, p < 0.05). Psychological factors significantly impact the affective (β = 0.216, p < 0.05) and normative commitment (β = 0.146, p < 0.05), with no statistically significant influence on continuance commitment. Conversely, personal factors exhibit limited influence, affecting only continuance commitment (β = 0.104, p < 0.05) to a minor degree, with no statistically significant impact on affective and normative commitment. The present research is among the few empirical findings that have examined the oil palm smallholders' commitment towards MSPO certification. By emphasizing the role of organizational and work-related factors, the study offers valuable insights for stakeholders within the oil palm sector, highlighting areas to enhance smallholder commitment toward sustainability standards. Consequently, this study contributes a unique perspective to the existing body of literature on sustainable practices in the oil palm industry.

Keywords: oil palm smallholders; affective commitment; normative commitment; continuance commitment; organizational factors; work-related factors; psychological factors; personal factors; MSPO certification

1. Introduction

In the past two decades, global palm oil production has grown significantly, underscoring its essential role in the global economy. From 2014 to 2023, global production surged from around 62.71 million tons to 77.23 million tons (USDA, 2024), a nearly 25% increase. This rise is largely due to palm oil's unique versatility and high yield, making it crucial in industries from food and biofuels to cosmetics and household goods. Palm oil is cholesterol-free and widely used in products like cooking oil, margarine (Khatun et al., 2017), baked goods (Andoh et al., 2019) and dairy alternatives (Szulc et al., 2016). Beyond food, it is also a key ingredient in textiles, biodiesel, cosmetics, and oleochemical products production (Hudiyono and Septian, 2012; Mutsaers, 2019). Palm oil provides one of the leading vegetable oils produced

globally (Alam et al., 2015) and in fact it can yield 8 to 10 times more per hectare than crops like rapeseed (Basiron, 2007), all while having a relatively small global land footprint compared to other major commodities (Uusitalo et al., 2014).

Malaysia, the world's second-largest palm oil producer, has been crucial in meeting global demand but has seen ups and downs in its export volumes over the last decade. As shown in **Figure 1**, Malaysia's palm oil exports, including products like palm oil, palm kernel oil, palm kernel cake have fluctuated significantly. In 2016, exports hit a low of 23.29 million tons, largely due to decreased demand from major buyers like India, China, the European Union, and the United States (MPOB, 2017). Additionally, the European Union's stricter regulations on oil palm over environmental concerns have added extra challenges for Malaysia's exports (Naidu and Moorthy, 2021).

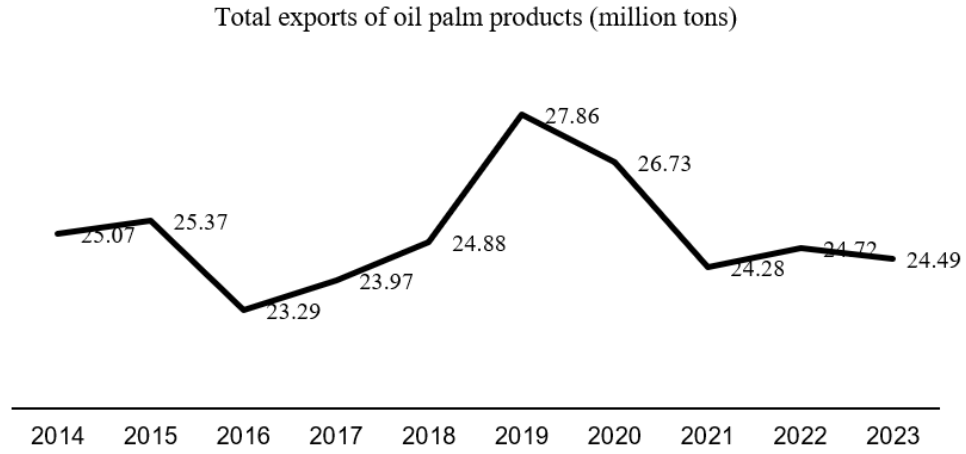

Figure 1. Total exports of oil palm products in million tons.
Source: MPOB (2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024).

To support sustainability in Malaysia's oil palm industry, the Malaysian Sustainable Palm Oil (MSPO) certification has become a key initiative. MSPO encourages safe, eco-friendly practices and promotes good agricultural practices (GAP), which together help to reduce pollution and elevate quality standards (Kadir, 2022). Designed as a national standard, MSPO aims to boost productivity, increase income, and improve market access, especially for smallholders (Kadir, 2020). It also offers a cost-effective alternative to international certifications like the Roundtable Sustainable Palm Oil (RSPO) (Mansor et al., 2016; MPOB, 2014), ensuring that Malaysian palm oil meets global eco-conscious standards. Since the Malaysian government made MSPO certification mandatory for all palm oil stakeholders, including plantations, organized smallholders, independent smallholders, palm mills, efforts have ramped up to ensure compliance across the industry. However, as of October 2024, only 76.9% of the 210,891 licensed independent smallholders have been MSPO-certified (TheStar, 2024). The Malaysian Palm Oil Board (MPOB) has set a target of over 90% certification for ISHs by the end of 2025, underscoring the need for enhanced certification efforts (TheStar, 2024). To maintain a stable supply of certified sustainable palm oil, it is essential to strengthen MSPO participation among independent smallholders (ISHs). Encouraging and understanding independent smallholders' commitment to MSPO certification is a critical step in achieving this

goal, fostering long-term sustainability and competitiveness in Malaysia's palm oil industry.

The literature has yet to fully address the fundamental questions of why ISHs commit to MSPO certification. However, recent studies have begun to shed light on various factors influencing participation in sustainable certification. Personal characteristics appear to play a role; studies show that gender (Pyk and Hatab, 2018), age (Quartey et al., 2023), educational level (Pyk and Hatab, 2018; Quartey et al., 2023), and farming experience (Quartey et al., 2023) can impact smallholders' decisions to pursue certification. Financial incentives and economic benefits are also major motivators (Apriani et al., 2020; Lemeilleur et al., 2020; Pramudya et al., 2022). Certification's potential for premium prices and higher income (Ansah et al., 2020; Lemeilleur et al., 2020; Oya et al., 2018; Quartey et al., 2023) adds significant appeal. Additionally, support from organizations (Apriani et al., 2020), access to technical assistance (Lemeilleur et al., 2020; Pramudya et al., 2022), regulatory support (Pramudya et al., 2022) and extension services (Quartey et al., 2023) make certification more accessible and sustainable for these smallholders. Incentives tailored to sustainable certification further influence decision-making. For example, Pramudya et al. (2022) highlight that rewards and funding play a crucial role in supporting ISHs compliance with the Indonesian Sustainable Palm Oil (ISPO) standard. Beyond economic and organizational factors, social interactions and communication also prove essential. Strong social ties, deliberative communication, and responsible leadership, as noted by Rizal and Md Nordin (2022), can greatly enhance smallholders' engagement in sustainable certifications.

While previous studies have explored factors influencing participation in sustainable certification, the drivers behind ISHs' commitment to MSPO certification remain less understood. This study seeks to address this gap by examining how various organizational, work-related, psychological, and personal factors impact ISHs' willingness to engage with MSPO, enhancing understanding of their commitment to this sustainable initiative. The article is organized as follows. First, it discussed potential determinants affecting commitment to MSPO certification. Next, the methodology is described, followed by the results. Finally, the discussion, which aligns with the objectives, and concluding with limitations and suggestions for future research. The study aims to help practitioners and researchers reassess the impacting ISHs' commitment to MSPO certification. Findings may also lead to practical solutions to increase smallholder participation, contributing to the goal of achieving at least 90% certification for ISH by the end of 2025.

2. Literature review and hypotheses

This section reviews the relevant literature to propose a research model for this study. Based on the existing literature, we proposed that organizational factors, work-related factors, psychological factors, and personal factors influence affective, normative, and continuance commitment in palm oil industry.

2.1. Organizational commitment

In organizational research, commitment is considered a key factor in understanding employees behavior (Meyer and Herscovitch, 2001). It is typically understood as a psychological state that links an employee with their organization and its goals (Meyer and Allen, 1991). Early theories, such as Becker's commitment model, framed this connection as a "contract", based primarily on the economic benefits an organization provides (WeiBo et al., 2010). According to Becker, employees remain committed because they have made investments called "side-bets," which make leaving difficult. These investments can be financial, emotional, or otherwise, and the more an employee feels they would lose by leaving, the more committed they are likely to be. Although Becker's "side-bet" theory is no longer the dominant model for understanding organizational commitment, it significantly influenced later frameworks, such as Meyer and Allen's concept of "continuance commitment." Meyer and Allen's (1991) Three-Component Framework, has been the leading framework for understanding organizational commitment for over four decades. Their framework emerged partly in response to the limitations in Becker's theory (Ghosh and Swamy, 2014). Meyer and Allen argued that commitment is better understood through three dimensions: affective, continuance, and normative commitment (Meyer and Allen, 1984, 1991). Affective commitment (AC) refers to an employee's emotional attachment to their organization, representing how much they genuinely want to stay due to strong connection and alignment with the organization's values (Meyer and Allen, 1991). In contrast, continuance commitment (CC) is based on the perceived need to stay because, often because of potential losses, such as benefits, job security, or relationship that leaving would be difficult (Meyer and Allen, 1991). Finally, normative commitment (NC), introduced in 1990, reflects an employee's sense of obligation to stay, often due to feeling of loyalty or a perceived debt to coworkers, managers, or the organization as a whole (Meyer and Allen, 1991).

In the context of Malaysia's palm oil industry, the MPOB plays a pivotal role, especially in supporting ISHs by providing them with the knowledge and incentives needed to achieve MSPO certification. The commitment of these independent smallholders to the MPOB and sustainability initiative is critical for the effective governance of the industry. Committed smallholders are not only more likely to stay engaged with the organization but also tend to experience greater economic benefits than less committed counterparts (Donkor and Hejkrlik, 2021). Moreover, committed smallholders are more willing to pursue MSPO certification (Manaf et al., 2023). Therefore, understanding how organizational, work-related, psychological, and personal factors influence ISHs' commitment to both the MPOB and MSPO certification is crucial.

2.2. Organizational factors

Organizational factors, as described by Valaitis et al. (2018), refer to the attributes, processes, and conditions within an organization that influence its operation and employee behaviors. These factors play a significant role in shaping various types of employee commitment, including AC, NC, and CC. Rewards are a key organizational factor that help establish and sustain employee commitment (Malhotra et al., 2007).

According to social exchange theory, when employees are satisfied with the rewards provided by the organization, they tend to respond with positive attitudes, including a higher level of commitment (Blau, 1964). This theory suggests that employees offer commitment in exchange for the rewards they receive (Aryee et al., 2002). Research by Miao et al. (2013) found that social rewards increased employee's AC, NC, and CC, while extrinsic rewards boosted AC and NC, and intrinsic rewards had a limited impact on all types of commitment.

Organizations that provide support to their employees in various ways can enhance their commitment and performance. Positive support allows organizations to leverage employees' skill and knowledge, fostering a stronger sense of responsibility toward their tasks and roles, which leads to higher organizational commitment (Gündüz, 2014). Research consistently shows that organizational support is a key predictor of AC, as employees tend to return the resources and socioemotional support they receive (Panaccio and Vandenberghe, 2009; Rhoades and Eisenberger, 2002). Organizational development, especially through training programs, play a critical role in fostering commitment. Factors like access to training, perceived training benefits, and support for training initiatives contributes to AC (Bulut and Culha, 2010). Training not only improves skills but also helps retain talent, as it strengthens employees' commitment to the organization (Dias and Silva, 2016). Studies also show a positive link between training opportunities and organizational commitment, with employees who see diversity training as beneficial demonstrating higher commitment levels (Dias and Silva, 2016; Yap et al., 2010).

As noted in the studies on Global Working Group for Good Agricultural Practices (Global GAP) certification scheme (Gündüz, 2014; Quartey et al., 2023), the economic incentives such as price premiums play a significant role in motivating oil palm smallholders to both join and remain committed to certification schemes. For oil palm smallholders, the prospect of premium prices for certified produce creates a direct financial incentive to participate in MSPO. If MSPO offers price premiums for sustainably produced palm oil, smallholders would be more likely to commit to the certification process. This mirrors the findings that as the price premium for pineapple increased, the likelihood of farmers adopting Global GAP certification rose by 19% (Quartey et al., 2023). In the case of MSPO, a similar price premium could serve as a strong motivator for smallholders to adopt sustainable farming practices, thereby fostering higher levels of commitment. Additionally, certified farmers in Gündüz, (2014) study were found to pay a media 30% higher wages to their workers per ton of fruit harvested, suggesting the rewards of certification extend beyond the farmers themselves to their broader communities. This form of economic benefit can foster a sense of responsibility and fairness among smallholders, contributing to their NC. Similarly, the organizational support for MSPO, such as training and technical assistance, could help enhance smallholders' engagement with the scheme. Just as the degree of organizational support was found to increase farmers' willingness to adopt water-saving irrigation technology (Deng et al., 2024), MSPO's support in the form of agricultural training, resources, and proactive outreach could play a key role in enhancing smallholders' commitment to the certification. In keeping with these arguments, we hypothesize:

Hypothesis 1a (H1a): There is a positive and significant effect of organizational factors on the affective commitment (AC) of smallholders.

Hypothesis 1b (H1b): There is a positive and significant effect of organizational factors on the normative commitment (NC) of smallholders.

Hypothesis 1c (H1c): There is a positive and significant effect of organizational factors on the continuance commitment (CC) of smallholders.

2.3. Work-related factors

Work-related factors, including work design and management, are crucial in shaping employee commitment within an organization. Effective work-related factors encourage employees to respond with stronger AC, a sense of responsibility, and a reduced interest in leaving the organization. Leadership plays a key role in achieving organizational goals, with transformational leadership particularly effective in motivating employees to exceed expectations. Studies show a positive association between leadership support and organizational commitment (Anh et al., 2023; Bass and Riggio, 2006; Hussain and Khayat, 2021; Park et al., 2022; Peng et al., 2019; Sahan and Terzioglu, 2022). The work environment also significantly impacts employee's outcomes, encompasses the physical, social, and psychological conditions under which employees work. A supportive and comfortable work environment that meets employees' needs enhances job performance, as employee-friendly organizations tend to have healthier, more committed workers (Djuwita et al., 2018; Herr et al., 2022). A high-quality work environment reduces stress and turnover intentions, while increasing commitment (Bangwal and Tiwari, 2019; Chmiel et al., 2017). Employees who successfully adapt to their organizational environment show higher levels of commitment (Bangwal and Tiwari, 2019). For smallholders involved in sustainable certification schemes like GlobalGAP, these work-related factors are particularly relevant. For instance, GlobalGAP certification can improve working conditions by ensuring a healthy and safe work environment, ultimately strengthening smallholders' commitment to the certification process and its sustainability goals (Akrong et al., 2024). Based on the arguments discussed above, the present study hypothesizes that:

Hypothesis 2a (H2a): There is a positive and significant influence of work-related factors on the affective commitment (AC) of smallholders.

Hypothesis 2b (H2b): There is a positive and significant influence of work-related factors on the normative commitment (NC) of smallholders.

Hypothesis 2c (H2c): There is a positive and significant influence of work-related factors on the continuance commitment (CC) of smallholders.

2.4. Psychological factors

Psychological factors, such as an individual's mindset and attitudes, play a critical role in driving behaviors that lead to job satisfaction. Job satisfaction is a central component in models of individual attitudes and behaviours and has significant implications for both personal well-being and organizational effectiveness (Judge and Klinger, 2008). It fosters greater organizational commitment, contributing to organizational success and improved employee retention (Kumar and

Mohammadnezhad, 2022). Research consistently shows a positive relationship between job satisfaction and all three dimensions of organizational commitment (Aydogdu and Asikgil, 2011). Furthermore, high job satisfaction is linked to lower turnover intentions, as employees are less likely to seek alternative employment when they are content in their current roles (Chen et al., 2022; Teng et al., 2022). In the context of smallholders involved in sustainable certification schemes, job satisfaction plays a similar role in enhancing their commitment to certification programs. Research by Zhu and Habisch (2020) highlights that smallholders' commitment to continuing with non-certified organic farming is positively influenced by their satisfaction levels. Based on the arguments, we hypothesize:

Hypothesis 3a (H3a): There is a positive and significant influence of psychological factors on the affective commitment (AC) of smallholders.

Hypothesis 3b (H3b): There is a positive and significant influence of psychological factors on the normative commitment (NC) of smallholders.

Hypothesis 3c (H3c): There is a positive and significant influence of psychological factors on the continuance commitment (CC) of smallholders.

2.5. Personal factors

Grotkamp et al. (2012) define personal factors as elements rooted in an individual's background, such as gender and age, which influence their behavior and perception within an organization. Gender, for example, affects both the conduct and perception of organizational members in formal and informal roles (Joshi et al., 2015) and has been identified as a predictor of organizational commitment (Mardsen et al., 1993). Labatmedienė et al. (2007) found that men in Lithuania display greater AC compared to women, while Hulpia et al. (2009) observed no significant gender effects on AC and CC. Some studies, however, suggest nuanced differences, such as higher NC among men than women (Lazar et al., 2022). Additionally, Mon et al. (2022) found years of experience significantly influenced AC (38%), NC (35.9%), and CC (28.3%).

These findings suggest that ISHs with more experience may exhibit stronger committed to MSPO likely due to a deeper understanding of its long-term benefits. Studies from other agricultural certification schemes further support this notion. For instance, Ajewole (2010) found that factors such as age, formal education, and farming experience were important predictors of farmer's adoption of agricultural certification schemes in Nigeria. Experienced farmers may have a more pragmatic view of the value and requirements of certification programs. In contrast, Quartey et al. (2023) found that in Ghana, formal education and farming experience did not significantly affect the adoption of Global GAP certification, while age had a significant negative relationship with the adoption likelihood. This suggests that while experience might not always be a determining factor, there are regional or contextual differences in how these factors influence smallholder commitment. In this context, while demographic factors like gender may not have a universally significant influence on smallholder commitment to MSPO, age and farming experience might play a critical role. In line with these arguments, we hypothesize:

Hypothesis 4a (H4a): There is a positive and significant influence of personal factors on the affective commitment (AC) of smallholders.

Hypothesis 4b (H4b): There is a positive and significant influence of personal factors on the normative commitment (NC) of smallholders.

Hypothesis 4c (H4c): There is a positive and significant influence of personal factors on the continuance commitment (CC) of smallholders.

All 12 hypotheses are depicted in **Figure 2**.

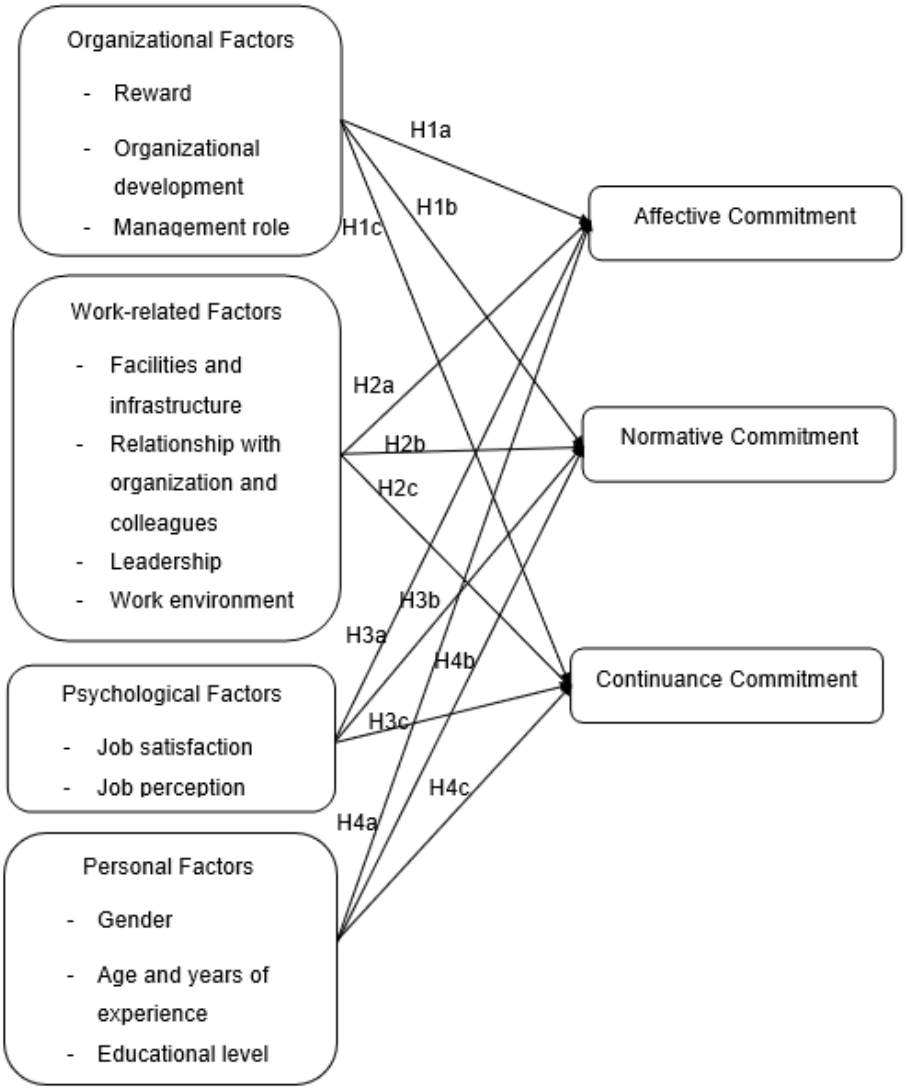

Figure 2. Research framework.

3. Materials and methods

3.1. Sample profile

A survey of 441 oil palm independent smallholders in Sarawak, Malaysia, was conducted. The majority of smallholders (80.7 per cent) were men, with an average age of 51. Approximately 91 per cent of oil palm smallholders were married, with 41 per cent having completed at least secondary school. Almost all were independent smallholders, with more than half earning less than RM3000 monthly. Most smallholders (81.2 per cent) employ no more than two workers to assist them in farm

management. Approximately 74 per cent of them successfully obtained MSPO certification in less than a year.

3.2. Location and sampling procedure

The target population of this study is certified oil palm smallholders in Sarawak, Malaysia. Sarawak has the largest planted area of oil palm, accounting for 28 percent of Malaysia's total planted area as of 2021 (MPIC, 2022). Furthermore, it has the second-highest number of smallholders (Rahman, 2020) and MSPO-certified smallholders (Baskaran et al., 2019). Because the certified smallholders were distributed across three regions in Sarawak, the sample was selected using multi-stage sampling techniques, which allow large population clusters to be divided into sub-clusters to form a sample. Regions and districts are two subclusters used in this study. Data were gathered from northern, central, and southern regions in Sarawak. Miri, Sarikei, and Bau were selected to represent Sarawak's northern, central, and southern regions, respectively. The 500 questionnaires were randomly distributed to certified smallholders in Miri, Sarikei, and Bau. 458 questionnaires were returned, with 17 rejected due to incompleteness and straight-lining issues. Finally, 441 questionnaires were assigned to be further examined. Each certified smallholder volunteered and was informed about the purpose of the study. Certified smallholders were also assured that their information would be kept confidential during the data collection process.

3.3. Measurement instrument

Organizational factors had been scaled on three multiple items, including reward, organizational development, and management role. Reward, organizational development, and management role were measured on the five items. One item of the scale on the reward scale includes the recognition provided by the MSPO certification that assists me in continuing to achieve the organization's mission and vision. One of the items for organizational development constitutes "through the organizational training, I was able to understand the responsibilities that I have to carry out in MSPO." For measuring management role, one example of an item includes "the management always keeps me up to date on MSPO." Work-related factors had been scaled on four multiple items such as facilities and infrastructure, relationship with organization and colleagues, leadership, and work environment. Facilities and infrastructure, relationship with organization and colleagues, leadership, and workplace environment were assessed on each of the five items. One item of the scale on facilities and infrastructure includes "adequate equipment and facilities support my work." One of the items for the relationship with organization and colleagues is "a good relationship with other members of the organization has an impact on the quality of my work. "One leadership scale item is "good leader assisted me in better understanding the needs of MSPO." For measuring workplace environment, one example of an item includes "I need to repay the organization's services for providing a pleasant working environment in terms of operations and support." Psychological factors had been scaled on multiple items, including job satisfaction and job perception. Job satisfaction and job perception were measured on each of the five items. One scale item on job satisfaction includes, "I never get tired of working on the plantations because it

produces good results." One job perception scale item is "MSPO certification ensures that the organization is always concerned with the problems that smallholders face." Personal factors had been scaled on three multiple different items, including gender, years of experience, and education level. Gender, years of experience, and education were assessed on each of the five items. One item of the scale on gender includes "job at a plantation honour both men and women." One of the items for the years of experience is "years of experience working on plantation piqued my interest in obtaining MSPO certification." For measuring education level, one example of an item includes "working on the plantation is appropriate for my educational level." AC and NC have been measured on each of ten item scales adapted from Allen and Meyer (1990) and Jaros (2007). One AC item as an example was, "I never get tired of assisting an organization in achieving their objectives through MSPO." One example of an NC item was ", the organization deserves my loyalty because it has provided me with excellent service." CC has been assessed on a nine items scale adapted from Allen and Meyer (1990) and Jaros (2007). An example item was "my life will be impacted if my plantation does not obtain MSPO certification." All of these latent variables were assessed using a 5-point Likert-type scale, ranging from 1 to 5, with 1 indicating "strongly disagree" and 5 "strongly agree". A pilot test was conducted in order to improve the questionnaire. All the constructs used in the study have acceptable levels of validity and reliability.

3.4. Data analytic strategy

Descriptive analyses such as percentages and average scores were calculated to characterize the respondents' demographic data. A Partial Least Square Structural Equation Modelling (PLS-SEM) was used to achieve the determined goal. PLS-SEM was selected for this research because it is less restrictive than the covariance-based structural equation model (CB-SEM) and is appropriate for the research objective. Hair Jr et al. (2021) have specified several criteria for researchers to choose PLS-SEM over CB-SEM, such as when the analysis is concerned with the distribution of issues, such as a lack of normality and is related to testing a framework from a prediction standpoint rather than confirming or rejecting theories. Statistical software such as SPSS and SmartPLS was used to analyze raw data based on a survey of 441 smallholders.

4. Results

The research framework in this study represents the hierarchical latent variable model with the reflective-formative model, as depicted in **Figure 3**. According to Sarstedt et al. (2019), the disjoint two-stage approach is one of the most prominent in specifying and estimating the hierarchical latent variable model. The disjoint two-stage process involves stage one and stage two. Stage one consists of the assessment of the reflective measurement model, whereas stage two consists of the evaluation of the formative measurement model and structural model.

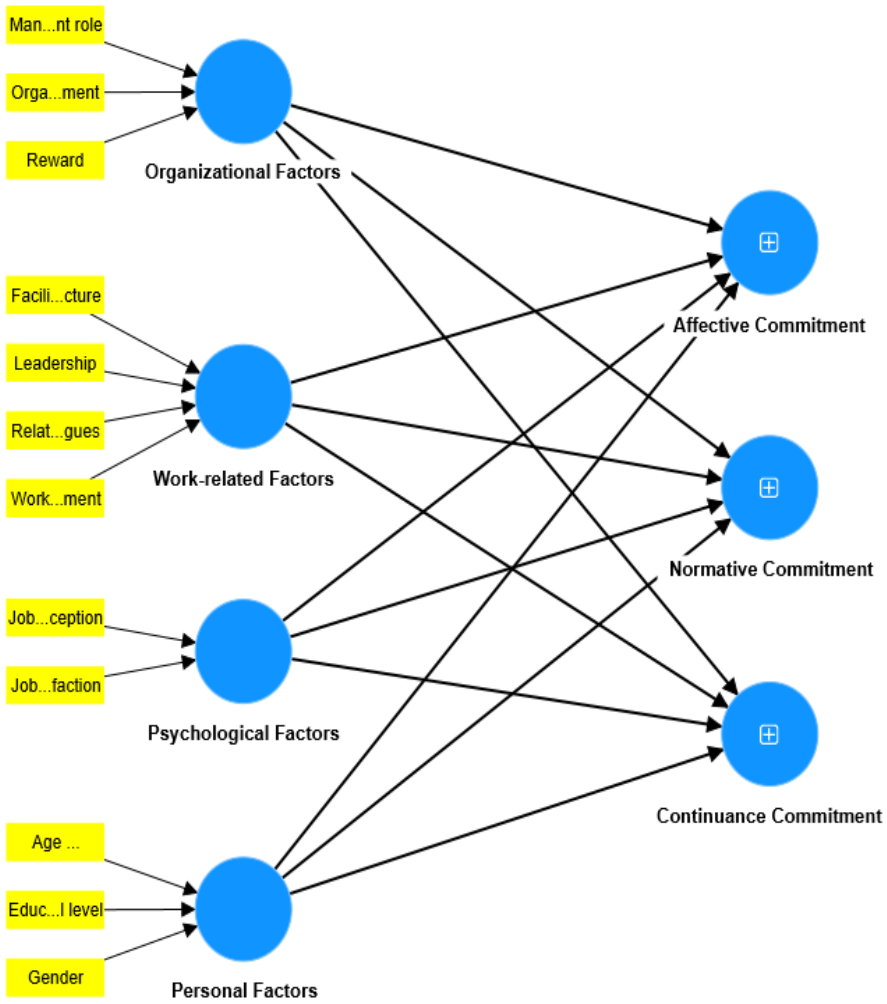

Figure 3. Hierarchical latent variable model with the reflective-formative model.

The reflective measurement model was assessed using internal consistency reliability, convergent validity, and discriminant validity (Hair Jr et al., 2017; Sarstedt et al., 2019). The internal consistency reliability was measured using Cronbach's Alpha (CA), reliability metric (ρA), and composite reliability (CR). Meanwhile, convergence validity was assessed using average extracted variance (AVE). Each construct's CA, ρA, and CR estimates were above the standard threshold of 0.7, while the AVE estimates for all constructs were above the threshold of 0.5 (Hair Jr et al., 2020). The CA, ρA, CR and AVE indicate that the model satisfies the internal consistency reliability and convergence validity requirements (see **Table 1** for details). The Fornell-Lacker criterion and Heterotrait-Monotrait (HTMT) were used to assess the discriminant validity of the reflective measurement model. The results in **Table 1** also indicate that the square root of the AVE of each construct was higher than the correlation with other constructs (Fornell and Larcker, 1981), except for AC, CC, WE, and FI. However, the HTMT is an excellent alternative for the Fornell-Larcker criterion, and HTMT values for each construct were below the cut-off of 1 (Garson, 2016). Based on the two criteria discussed above, the reflective measurement model can be said to have satisfied the requirements of discriminant validity.

Table 1. Reliability and validity results of the reflective measurement model.

Criteria	**AC**	**YE**	**CC**	**ED**	**WE**	**FI**	**GE**	**LD**	**MG**	**NC**	**OD**	**JP**	**RS**	**RW**	**JS**
CA	0.846	0.738	0.860	0.758	0.774	0.795	0.841	0.895	0.857	0.912	0.900	0.882	0.767	0.806	0.875
ρ_A	0.850	0.746	0.865	0.846	0.804	0.803	0.846	0.898	0.862	0.915	0.901	0.889	0.786	0.826	0.877
CR	0.883	0.814	0.893	0.831	0.848	0.859	0.926	0.923	0.897	0.927	0.926	0.914	0.850	0.867	0.909
AVE	0.521	0.526	0.546	0.510	0.533	0.551	0.863	0.707	0.637	0.561	0.714	0.680	0.589	0.569	0.667
Fornell-Larcker Criterion															
Construct	AC	YE	CC	ED	WE	FI	GE	LD	MG	NC	OD	JP	RS	RW	JS
AC	0.722														
YE	0.325	0.725													
CC	0.676	0.418	0.739												
ED	0.348	0.558	0.447	0.714											
WE	0.654	0.364	0.692	0.427	0.730										
FI	0.649	0.415	0.710	0.470	0.705	0.743									
GE	0.395	0.294	0.431	0.554	0.492	0.424	0.929								
LD	0.647	0.315	0.681	0.388	0.696	0.683	0.438	0.841							
MG	0.574	0.347	0.671	0.396	0.610	0.697	0.420	0.605	0.798						
NC	0.763	0.426	0.758	0.396	0.673	0.671	0.359	0.657	0.645	0.749					
OD	0.656	0.312	0.671	0.363	0.634	0.682	0.439	0.658	0.716	0.665	0.845				
JP	0.667	0.379	0.635	0.500	0.734	0.624	0.511	0.716	0.589	0.649	0.650	0.825			
RS	0.646	0.249	0.675	0.341	0.704	0.750	0.375	0.701	0.661	0.661	0.700	0.652	0.767		
RW	0.677	0.338	0.678	0.370	0.622	0.641	0.406	0.703	0.604	0.700	0.650	0.613	0.672	0.754	
JS	0.614	0.408	0.634	0.505	0.680	0.615	0.429	0.703	0.590	0.641	0.576	0.764	0.570	0.623	0.817
The square root of AVEs is represented by diagonal values in bold, while the correlation between constructs is represented by the off-diagonal values															
HTMT Ratio															
	AC	YE	CC	ED	WE	FI	GE	LD	MG	NC	OD	JP	RS	RW	JS
AC															
YE	0.360														
CC	0.783	0.481													
ED	0.407	0.793	0.517												
WE	0.792	0.450	0.831	0.519											
FI	0.786	0.464	0.855	0.553	0.884										
GE	0.464	0.273	0.507	0.632	0.585	0.524									
LD	0.742	0.314	0.776	0.413	0.822	0.809	0.506								
MG	0.664	0.357	0.778	0.447	0.736	0.844	0.492	0.691							
NC	0.865	0.453	0.853	0.441	0.787	0.783	0.407	0.728	0.723						
OD	0.749	0.317	0.758	0.402	0.745	0.801	0.505	0.732	0.807	0.730					
JP	0.765	0.376	0.723	0.543	0.868	0.737	0.589	0.805	0.673	0.720	0.730				
RS	0.787	0.284	0.817	0.423	0.894	0.949	0.466	0.841	0.804	0.772	0.831	0.781			
RW	0.809	0.360	0.808	0.434	0.770	0.804	0.493	0.827	0.718	0.810	0.751	0.726	0.854		
JS	0.707	0.443	0.725	0.569	0.817	0.732	0.495	0.790	0.678	0.714	0.643	0.867	0.683	0.731	

Note: AC = Affective commitment, YE = Age and years of experience, CC = Continuance commitment, ED = Educational level, WE = Workplace environment, FI = Facilities and infrastructure, GE = Gender, LD = Leadership, MG = Management role, NC = Normative commitment, OD = Organizational development, JP = Job perception, RS = Relationship with colleagues and organization, RW = Reward, JS = Job satisfaction.

The formative measurement model was evaluated in terms of lower-order constructs, collinearity, statistical significance, and relevance of the indicator weights (Sarstedt et al., 2019). Results reported in **Table 2** indicated that all the lower-order constructs are not negatively affected by collinearity, as the VIF estimates values less than the standard threshold of 5 (Hair Jr et al., 2017). All three lower-order constructs (RW: 0.514; OD: 0.347; MG: 0.276) are significant ($p < 0.001$) and have a pronounced effect on OGFs. Four lower-order constructs (FI: 0.311; RS: 0.211; LD: 0.293; WE: 0.317) are significant ($p < 0.01$) and have a pronounced effect on WRFs. Two lower-order constructs (JS: 0.464; JP: 0.599) are significant ($p < 0.001$) and have a pronounced impact on PSFs. Three lower-order constructs (GE: 0.523; ED: 0.235; YE: 0.500) are significant ($p < 0.05$) and have a pronounced effect on PLFs.

Table 2. Formative measurement model results.

Higher-order constructs	Lower-order constructs	VIF	Outer weight	*p*-value
OGFs	RW	1.857	0.514	0.000
	OD	2.420	0.347	0.000
	MG	2.202	0.276	0.000
WRFs	FI	2.796	0.311	0.000
	RS	2.886	0.211	0.001
	LD	2.454	0.293	0.000
	WE	2.565	0.317	0.000
PSFs	JS	2.399	0.464	0.000
	JP	2.399	0.599	0.000
PLFs	GE	1.443	0.523	0.000
	ED	1.917	0.235	0.033
	YE	1.454	0.500	0.000

The structural model results are summarized in **Table 3**, where the significance and relevance of the path coefficient, coefficient of determination (R^2), predictive relevance (Q^2), and $PLS_{predict}$ are displayed. As reported in **Table 3**, the model explains 60 per cent, 63.8 per cent, and 66 per cent of the variation in AC, CC, and NC, respectively, and all the R^2 values are considered substantial (Hair Jr et al., 2021). As reported in **Table 3**, nine out of the twelve hypotheses were supported. OGFs were found to have a positive and significant influence on AC ($\beta = 0.354$, $p < 0.001$), NC ($\beta = 0.424$, $p < 0.001$), and CC ($\beta = 0.339$, $p < 0.001$). WRFs were found to have a positive and significant influence on AC ($\beta = 0.277$, $p < 0.001$), NC ($\beta = 0.263$, $p < 0.001$), and CC ($\beta = 0.413$, $p < 0.001$). PSFs were found to have a positive and significant influence on AC ($\beta = 0.216$, $p < 0.01$) and NC ($\beta = 0.146$, $p < 0.05$). PLFs were found to positively and significantly influence CC only ($\beta = 0.104$, $p = 0.01$). In contrast, three out of twelve hypotheses were not supported, as PSFs were found to have a positive and insignificant influence on CC ($\beta = 0.031$, $p > 0.05$). PLFs were found to have a negative and insignificant influence on AC ($\beta = -0.025$, $p > 0.05$) and a positive and insignificant influence on NC ($\beta = 0.028$, $p > 0.05$). Furthermore, as evidenced by the highest values of $\beta = 0.354$ and $\beta = 0.424$, these findings show that OGFs, the most significant variable, influence smallholders' AC and NC for MSPO

certification. Meanwhile, the WRFs have the most crucial influence on smallholders' CC for MSPO certification, with a value of β = 0.413, compared to the OGFs (β = 0.339), PSFs (β = 0.031), and PLFs (β = 0.104).

Table 3. Structural model results.

Hypothesis	**Relationship**	**Beta value (β)**	***T*-stats**	***P*-value**	**Decision**
H1a	OGFs → AC	0.354	5.626	0.000	Supported
H1b	OGFs → NC	0.424	6.522	0.000	Supported
H1c	OGFs → CC	0.339	5.388	0.000	Supported
H2a	WRFs → AC	0.277	3.607	0.000	Supported
H2b	WRFs → NC	0.263	3.539	0.000	Supported
H2c	WRFs → CC	0.413	5.956	0.000	Supported
H3a	PSFs → AC	0.216	3.152	0.002	Supported
H3b	PSFs → NC	0.146	2.271	0.023	Supported
H3c	PSFs → CC	0.031	0.537	0.591	Not supported
H4a	PLFs → AC	-0.025	0.688	0.491	Not supported
H4b	PLFs → NC	0.028	0.736	0.462	Not supported
H4c	PLFs → CC	0.104	2.889	0.004	Supported
Construct				R^2	Q^2
AC				0.600	0.307
NC				0.638	0.353
CC				0.660	0.356

Table 3 also indicates that the model has in-sample predictive power with a Q^2 value of 0.307, 0.353, 0.356 for AC, NC, and CC, which are greater than zero (Chin, 1998), and these values represent the PLS-SEM model's medium predictive relevance (Hair Jr et al., 2020). The results from the R^2 and Q^2 suggest that the model has adequate in-sample predictive power (Hair Jr et al., 2020). Finally, a $PLS_{predict}$ analysis was carried out to assess the out-of-sample predictive power of the model. The results in **Table 4** suggest that the $Q^2_{predict}$ statistics of the PLS model (PLS-M) have lower predictive power as compared to the linear regression model (LR-M) (Hair Jr et al., 2020). Although the model has lower predictive power, the model is still the best with sufficiently in-sample predictive power.

Table 4. $PLS_{predict}$ results.

Indicator	**RMSE**		$\boldsymbol{Q^2_{predict}}$	
	PLS-M	**LR-M**	**PLS-M**	**LR-M**
AC				
AC1	0.485	0.487	0.269	0.262
AC2	0.574	0.573	0.324	0.328
AC4	0.478	0.485	0.369	0.352
AC7	0.453	0.450	0.235	0.244
AC8	0.507	0.504	0.223	0.232
AC9	0.424	0.419	0.385	0.399
AC10	0.551	0.542	0.326	0.348

Table 4. (*Continued*).

Indicator	RMSE		$Q^2_{predict}$	
	PLS-M	**LR-M**	**PLS-M**	**LR-M**
NC				
NC1	0.589	0.531	0.256	0.396
NC2	0.605	0.557	0.285	0.393
NC3	0.476	0.478	0.367	0.362
NC4	0.429	0.436	0.399	0.38
NC5	0.441	0.45	0.417	0.395
NC6	0.434	0.444	0.395	0.369
NC7	0.435	0.427	0.395	0.419
NC8	0.465	0.46	0.315	0.331
NC9	0.539	0.517	0.243	0.304
NC10	0.400	0.406	0.419	0.402
CC				
CC1	0.505	0.499	0.336	0.352
CC2	0.570	0.560	0.335	0.358
CC4	0.458	0.461	0.425	0.417
CC6	0.633	0.603	0.315	0.379
CC7	0.440	0.446	0.443	0.429
CC8	0.446	0.445	0.365	0.369
CC9	0.663	0.634	0.249	0.312

Note: RSME: Root mean squared error; PLS: Partial least square; LM: Linear regression model.

5. Discussion

The present research study attempted to test the main antecedents of organizational commitment of independent smallholders in Malaysian palm oil industry. The findings are somewhat consistent with previous studies, highlighting the important influence of organizational factors, work-related factors, psychological factors, and personal factors on independent smallholders' AC, NC, and CC to MSPO certification.

Relating these findings to ISHs' commitment to MSPO, organizational factors such as rewards, organizational support, and development initiatives play a pivotal role in enhancing their AC, NC, and CC. Aligned with Hypotheses 1a, 1b, and 1c, these elements positively impact all forms of commitment. Rewards tied to MSPO certification (e.g., premium prices or subsidies), consistent organizational support (e.g., access to technical guidance and resources), and organizational development (e.g., training in sustainable practices) foster an emotional bond with MSPO, reinforcing ISHs' sense of appreciation for sustainable practices. These incentives also create a sense of moral responsibility, encouraging ISHs to uphold MSPO's sustainability goals. Additionally, the combined economic and organizational advantages make remaining with MSPO a practical choice, as the benefits of certification outweigh potential costs of switching to alternative schemes. These findings are in line with previous studies. Pramudya et al. (2022) highlight that incentives are essential to help

smallholders comply with the ISPO certification. These incentives should include financial support, regulatory measures, promotion of best practices, technical assistance, and rewards for good performance. These organizational factors instill loyalty, foster responsibility and encourage smallholders to actively pursue certification, which has also been observed in prior studies (Ismail, 2016; Khraiwesh, 2020; Rhoades et al., 2001).

In the context of MSPO certification, work-related factors play a critical role in influencing ISHs' commitment, aligning with the findings from Hypotheses 2a, 2b and 2c. Positive relationships between these factors and AC, NC and CC suggest that elements such as leadership support, work-environment and facilities, and relationships with organization and peers can enhance ISHs' attachment, sense of duty, and perceived need to stay committed to MSPO standards. For instance, leadership can manifest through guidance and mentorship provided by MPOB representatives, who help ISHs understand and implement MSPO requirements. When they feel supported and guided, they are more likely to develop AC, fostering an emotional attachment to MSPO and a willingness to maintain certification standards. Strong relationships among ISHs, and MPOB promote both AC and NC. Collaborative relationships foster a sense of belonging and mutual support, as ISHs see themselves as part of a larger, purpose-driven community. This connection encourages a normative sense of duty to uphold the principles of MSPO certification, feeling morally obligated to contribute to its success. These elements collectively strengthen ISHs' commitment to MSPO, promoting sustained engagement and adherence to certification standards, which ultimately benefits both the ISHs and the sustainability goals of the MSPO framework. These insights align with previous studies, which confirm that a positive work environment contributes to employee commitment (Chiu and Ng, 1999; Gould and Fontenla, 2006; Landsman, 2008; Matata et al., 2014). This study suggests that investing in better facilities, supportive leadership, and constructive workplace culture can drive higher engagement and loyalty among smallholders.

Relating the positive influence of psychological factors on ISHs commitment toward MSPO certification align well with the empirical studies behind AC and NC. Psychological factors like job satisfaction and job perception, significantly impact how individuals emotionally connect with and feel responsible for organizational goals (Kumar and Mohammadnezhad, 2022; Zhu and Habisch, 2020), as shown in findings associated with Hypotheses 3a and 3b. For ISHs, job satisfaction within the framework of MSPO would include the satisfaction derived from meeting certification standards, being recognized as sustainable producers, or better access to the market. These aspects enhance ISHs' positive perception of MSPO, promoting a greater sense of AC, an emotional attachment to the certification. When ISHs feel that MSPO align with their values and aspirations, they become more committed to maintaining the standard, thus strengthening their loyalty to MSPO goals. Similarly, job perception in this context encompasses ISHs' view on the value and purpose of MSPO certification. When ISHs see MSPO not just as a compliance requirement but as a framework that aligns with their own goals for improved livelihood and environmental responsibility, they experience a stronger NC. This perceived alignment fosters a sense of moral obligation to adhere to MSPO standards. This finding aligns with previous studies by

Kalkavan and Katrinli (2014), who observed that job satisfaction and role clarity foster greater organizational commitment.

Relating Hypothesis 4c to ISH' commitment to MSPO, personal factors like gender, age, and experience significantly influence their CC. These personal attributes contribute to a smallholder's perceived need to stay with MSPO, aligning with their individual goals and circumstances. For instance, older smallholders often seek stability plus limited career mobility and thus favor maintaining MSPO certification, viewing it as essential for securing consistent income and long-term sustainability. Previous research supports this, suggesting that smallholders with fewer alternative job opportunities are more likely to continue their involvement out of necessity rather than loyalty or duty (Elkhdr, 2019; Elkhdr and Kanbur, 2018). Most Malaysian oil palm smallholders are older (Abazue et al., 2015; Parthiban et al., 2017). For example, approximately 58 per cent are above 50 (Abazue et al., 2015). The characteristics of the smallholders in the current study also exemplify it. Therefore, the researchers hypothesized that these demographic characteristics may partly explain why personal factors have a limited effect on broader organizational commitment dimensions, significant for CC only.

6. Implications

6.1. Theoretical implications

This study contributes to the existing literature in the following ways. First, the study extends existing organization commitment theory, particularly the AC, NC, and CC frameworks, into the context of ISHs in Malaysia palm oil industry. By demonstrating the importance of organizational, work-related, psychological, and personal factors in shaping ISHs commitment to the MSPO certification, this research supports and enriches the understanding of commitment in agricultural sectors, which have been relatively underexplored in the literature. Second, the study highlights the essential role of organizational factors in enhancing ISHs' commitment to MSPO. The findings emphasize the theoretical importance of considering organizational structures and support systems in agricultural settings. These findings could contribute to the broader theory of organizational commitment by showing how external factors (such as market-driven rewards) can influence commitment levels in industries with smallholder-based supply chains. Third, psychological factors like job satisfaction and perception of the certification scheme are crucial in determining ISHs' emotional attachment and sense of moral responsibility. This underscores the relevance of psychological and emotional dimensions in understanding commitment, especially in contexts where external motivations (e.g., financial rewards) align with intrinsic values, as is the case with MSPO certification. Lastly, the study brings attention to the personal factors, such as gender, age, and experience, which influence ISHs' CC to MSPO. This insight is significant as it integrates demographic and personal aspects into the organizational commitment framework, providing a more nuanced understanding of how these individual differences shape the commitment behavior of ISHs.

6.2. Practical/managerial implications

This study contributes to the practicality in the following ways. First, the findings suggest that policy and programmatic support from organizations like the MPOB can play a crucial role in increasing ISHs' commitment to MSPO. Practical steps can include offering more tangible incentives (e.g., subsidies, premium prices for certified palm oil), expanding training programs on sustainable farming practices, and fostering relationships that help ISHs understand and implement MSPO standards. These actions not only benefit the ISHs but also promote the larger sustainability goals of MSPO. Second, in terms of work-related factors, ISHs' relationships with MPOB representatives, peers, and other stakeholders are critical. Organizations should emphasize fostering collaboration and open communication to create an environment of support and trust. Leadership mentorship, training, and peer networks can be valuable tools for reinforcing commitment. MPOB could focus on enhancing mentorship programs and facilitating networking events for ISHs to create a more cohesive community around MSPO. Third, since job satisfaction and perceptions of MSPO certification play a major role in fostering emotional attachment and a sense of responsibility among ISHs, practical interventions should aim to improve ISHs' perceptions of the certification process. This could include simplifying the certification process, providing clear benefits, and ensuring that ISHs feel recognized and rewarded for their contributions to sustainability. Offering support through accessible resources, like technical assistance and clearer communication about the market benefits of certification, would also improve satisfaction levels.

7. Conclusion

This study examines the impact of organizational, work-related, psychological, and personal factors on oil palm smallholders' commitment (i.e., AC, NC, CC) toward MSPO certification. Findings confirm that organizational factors and work-related factors significantly enhance independent smallholders' AC, NC, and CC to MSPO certification. Additionally, psychological factors positively affect smallholders' AC and NC, while personal factors contribute only to CC. By highlighting the critical roles of organizational and work-related influences, the study advances our understanding of how agricultural infrastructure and policy initiatives can reinforce sustainable agricultural practices. These insights underscore the need for targeted strategies that align organizational and work-related support systems with ISH goals to foster adherence to sustainability standards. This research contributes to infrastructure and policy development by identifying pathways to strengthen ISH commitment to sustainability certifications like MSPO, which are essential for promoting sustainable agriculture and achieving alignment with broader national and international sustainability objectives.

8. Limitation and future scope

The empirical flaws in this study point to potential areas for future studies. The primary limitation has to deal with the concept that the research concentrates mainly on independent oil palm smallholders in Malaysia because it is impossible to perform research encompassing all forms of oil palm producers (e.g., plantation, organized

smallholder). As a result, chances to gather information from all oil palm producers exist. Additionally, future studies can be done on comparisons between independent smallholders and organized smallholders. Furthermore, the truth is that this research is focused on cross-sectional data collection. This offers the chance to carry out subsequent research using longitudinal datasets. Considering that this work is limited to a single region of the country, future work may examine whether the empirical results of the current study stay constant in other states. The examination of how organizational, work-environment, psychological, and personal factors affects smallholders' commitment toward MSPO certification adds to the branch of knowledge in organizational studies. Another drawback of the present work could be the absence of mediating and moderating effects. Future research could inspect the role of relevant mediators and moderators in the association between study variables.

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