

Non-state certification of smallholders for sustainable palm oil in Sumatra, Indonesia

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ABSTRACT

Rapid expansion of oil palm plantations is one of the leading causes of Indonesia's continued deforestation over the past decades. To reverse this trend against the wave of increasing global demand for palm oil, non-state certification programs, such as the Roundtable on Sustainable Palm Oil (RSPO), have been promoted to ensure sustainable palm oil production. However, limited empirical studies exist for understanding how RSPO is perceived and practiced by various stakeholders along the palm oil supply chain, especially at the source by small-scale farmers. We surveyed 181 certified independent smallholders in two sites in Jambi, Sumatra to understand: (1) the challenges and benefits of participating in RSPO; (2) the willingness of independent smallholders to continue their participation; and 3) the factors affecting their willingness. We found that most of the challenges of RSPO certification are not well understood by smallholders, except the need for organizational support. In both sites, extensive external support from a local NGO was the key factor that facilitated RSPO certification. Most of the respondents recognize both non-financial (e.g. knowledge, market access, and social recognition) and financial benefits (e.g. sales from RSPO credits) of certification. Although overall, direct financial benefits may be small, they can be a motivator for farmers to continue with certification and for others to consider joining the group when disbursed equitably in non-monetary and communal form, such as in shared food. In contrast, indirect and long-term benefits were not enough to motivate smallholders to maintain RSPO certification. This study provides important insights about the characteristics of the leaders (governing members) and factors affecting RSPO participation from actual experiences of certified smallholders. The information can be used to target early adopters to initiate the RSPO process in farmers' groups and to develop appropriate facilitation strategies at different stages of certification development for independent smallholders.

1. Introduction

Indonesia's continued deforestation over the past 50 years has mostly resulted from land use changes (Carlson et al., 2018; Kim et al., 2015; Liu et al., 2017; Margono et al., 2014; Wilcove and Koh, 2010). The main driver of land use changes in Indonesia is agricultural expansion (Ashraf et al., 2017; Geist and Lambin, 2001; Sharma et al., 2019), especially oil palm and industrial pulpwood plantations (Pardo Vargas et al., 2015; Gaveau et al., 2017). Between 1990 and 2005, oil palm production contributed to 16 % of forest loss in Indonesia (Fitzherbert et al., 2008; Koh and Wilcove, 2008) and is the main driver of peatland conversion to fire-prone landscapes with high rates of carbon

emission (Miettinen et al., 2016). To meet the growing global demand for palm oil, Indonesia will need an additional 6 million hectares of oil palm plantations by 2025 (Khatiwada et al., 2018). Thus, sustainable production of palm oil is an urgent policy need for Indonesia and the world.

In tropical countries with weak forest governance, such as Indonesia, non-state certification programs can be an effective market-based mechanism that complements other policy instruments (Lambin et al., 2014). They seek to tackle environmental problems by providing incentives for producers to apply sustainable practices in managing their plantations. Non-state certification standards are a common tool for improving land use practices that are often associated with producing

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agricultural commodities, such as palm oil, timber, coffee, cocoa, banana, and tea (Cattau et al., 2016; DeFries et al., 2017; Lambin et al., 2014). Non-state certification is a market driven policy that uses public pressure to induce producers to consider environment and social aspects in their business, which can be viewed as a soft form of legalization (Abbott and Snidal, 2000) and a legitimate governance mechanism when the governments give signals on approving such a certification scheme (Cashore, 2002). Certification schemes can promote the verification and traceability of products along the supply chain, using a third-party auditor (Bernstein and Cashore, 2007; Cashore et al., 2004). Non-state solutions, such as zero-deforestation commitments, in which a group of multinational companies pledge to eliminate deforestation from their palm oil supply chains, have been shown to be more effective than conventional government regulations (Austin et al., 2017). They can also promote other forms of experimentation and learning for improving environmental governance (Abbott, 2017).

The Roundtable on Sustainable Palm Oil (RSPO) was founded in 2004 by a multi-stakeholder group, including representatives from the private sector, non-governmental organizations (NGO), and investors (Schouten, 2013). It is a non-state certification program that seeks to address global palm oil sustainability (Schouten, 2013). RSPO is similar to the Forest Stewardship Council (FSC)'s certification for timber (established in 1994), in which a third-party certification body inspects growers' implementation of sustainability criteria. By June 2019, 3.89 million hectares of oil palm plantations, worldwide, had become RSPO certified (RSPO, 2019). More than 50 % of this area, or 1.97 million hectares, is located in Indonesia, and mostly as industrial plantations. Smallholder areas certified by RSPO amount to 452,933 ha globally, or 11.6 % of the total RSPO certified area. Included in these numbers, only 26,615 ha, or 0.68 % of the area have been certified for those who make their own management decisions (independent smallholders) (RSPO, 2020). Although industrial plantations owned by private enterprises are responsible for most deforestation, smallholdings of oil palm are growing rapidly (10 % yr⁻¹) and they are difficult to monitor and engage (Lee et al., 2014). To scale up, it is vitally important to effectively integrate smallholders and the areas that they manage into the certification program.

Smallholder oil palm plantations have increased from 3,125 ha in 1979 to more than 6 million hectares in 2019, accounting for about 41 % of the total oil palm plantations in Indonesia (Directorate of General Estate Crops, 2019). Smallholder palm oil production in Indonesia can be generally divided into two categories: independent smallholders and scheme-smallholders (Brandi et al., 2013). Independent smallholders manage their plantations individually and are not supported by the government (Brandi et al., 2015). Since smallholders often face difficulties in accessing financial resources, they often need to collaborate with other actors such as NGOs, companies, or other intermediaries to secure access to credit, receive training, and gain market access (Hidayat, 2015). Scheme-smallholders are usually bound by a contract and supervised by a processing facility (mill) (RSPO, 2018) and often depend on government financing schemes (Pramudya et al., 2017). The earlier scheme-smallholder programs were established with the goal of linking smallholders with government estates in the late 1970s and they were later embedded into transmigration programs launched by President Soeharto in the late 1980s (Jelsma et al., 2017; Pramudya et al., 2017). In these programs, management responsibilities were delegated to cooperatives or companies rather than to smallholders (Hidayat, 2015; Pramudya et al., 2017). Because the scheme-smallholders are tied to companies and cooperatives, management decisions, such as whether to join or maintain RSPO certification, are made by the companies. After the scheme contract period (usually ±20 years), the smallholders can continue selling their harvest exclusively to the company mill or they may choose to become independent. In the latter case, they can sell their harvests to any palm oil mill or middleman offering the best price and make their own management decisions.

This study focuses on independent smallholders who are responsible

for their own management decisions. Understanding independent smallholders is particularly important as their numbers and the area that they cultivate have increased rapidly since the mid-1990s (Euler et al., 2016a,b). According to data from AidEnvironment (2015), independent smallholders in Indonesia own 17 % (1.8 million hectares) of the total planted area of oil palm (10.6 million hectares). Independent smallholders do not receive direct support from the government and often have low production yields. They often lack agronomic knowledge, such as adequate fertilizer dosage and harvesting cycles, as well as the financial resources and access to good quality seedlings (Brandi et al., 2013, 2015; Cramb, 2013; Euler et al., 2016a,b; Lee et al., 2013). Independent smallholders often organize themselves as farmer groups led by "governing" members. Governing members are a small number of volunteers chosen by the membership to represent and manage the day to day affairs of the group. We refer to non-governing members who are registered in the group but are not involved in administrative aspects as "regular" members.

Although participation is voluntary, international market pressures require producers of agricultural commodities to comply with sustainability standards in order to enter the market. This serves as both an opportunity and a barrier for smallholders to engage in the global market. According to a quantitative study on oil palm smallholders in Peninsular Malaysia (Saadun et al., 2018), the majority of respondents are willing to participate in palm oil certification schemes if they can expect financial benefits (i.e. premium price and affordable costs). However, certification schemes are developed by those at the top of the supply chain, such as government agencies, non-governmental organizations (NGOs) and industry stakeholders, with limited input from those on the bottom. There has been limited research on the actual experiences and perspectives of smallholders participating in palm oil certification schemes. Previous studies on RSPO certified smallholders have been mostly based on qualitative interviews of key stakeholders (e.g. Brandi et al., 2015; Hidayat, 2015; Rietberg and Slingerland., 2016), and thus only reported the perspectives of a small number of governing members. It is important to understand regular members' perspectives and compare them with those of governing members and other stakeholders, in order to gauge the sustainability of existing RSPO certification efforts and the scalability of the program.

This study aims to understand the perceptions of independent smallholders certified by RSPO about 1) the challenges and benefits of RSPO certification; 2) their willingness to maintain their certification; and 3) factors affecting their willingness. To our knowledge, this is the first study that explores the inter- and intra-group differences between two certified independent smallholder groups with different RSPO durations and between governing and regular members within each group.

2. Research framework

One of the key principles of economic theory is that people make decisions to improve their status or welfare, characterized as utility or "profit" (Edwards-Jones, 2006). Farmers' decision-making in the agriculture sector often depends on anticipated "profit" (i.e. financial benefits) but is also influenced by nonfinancial factors, such as social and psychological characteristics of individual farmers (Edwards-Jones, 2006). Farmers' decisions are further complicated by necessary initial investment, institutional challenges and socio-political factors (Casson, 2000; McCarthy et al., 2012; Zen et al., 2005).

In Indonesia, smallholder adoption of oil palm started in the late 1970s when the government introduced a scheme-holder program to promote rural development, often tied to the transmigration program¹

¹ The national transmigration program relocated millions of landless farmers from densely populated islands, such as Java, to less populous areas of the country in the late 1970s and the 1980s. Sumatra was one of the primary destinations for the program in the 1980s (Elmhirst, 1999).

(McCarthy and Cramb, 2009; Jelsma et al., 2017; Pramudya et al., 2017). The number of independent smallholders was limited at the time as they lacked the financial capital for initial investment and the technical capacity to fund and develop oil palm plantations on their own (McCarthy and Cramb, 2009; Euler et al., 2016a,b; Jelsma et al., 2017). Despite these limitations, self-funded, independently managed oil palm plantations have continued to increase since the mid-1990s with the rising profitability of oil palm, while the number of scheme-smallholders has remained relatively steady (Euler et al., 2016a,b).

The potential factors driving smallholders' decisions to adopt oil palm are 1) socio-demographic characteristics of individual smallholders, such as education, farming experience, and income/assets; 2) biophysical factors, such as geographic location, land use type, and access to mills and markets; and 3) macro factors, such as global prices of palm oil and alternative crops, and government policies, such as the scheme-holder and transmigration programs (Euler et al., 2016a,b). In general, oil palm adoption has shown positive impacts on smallholders' livelihoods (Rist and Feintrenie, 2010; Feintrenie et al., 2010; Chrisendo et al., 2020), especially for those with more land and capital (Krishna et al., 2017). However, impacts of oil palm development on smallholders' well-being depend on their biophysical and socio-economic conditions (Santika et al., 2019). While the overall impacts may be positive in communities around low to moderate forest cover where livelihood options are already market-based, they can also be negative, especially in subsistence-based communities near dense forest cover (Santika et al., 2019).

The environmental concerns related to expansion of the oil palm industry started a new approach to palm oil production with RSPO certification in 2004. This mechanism was originally set up for industrial plantations and demonstrated its effectiveness in reducing deforestation (Carlson et al., 2018). However, RSPO was adopted mostly by older plantations with little remaining forests anyway (Carlson et al., 2018), while oil palm development by smallholders has continued to rise, increasing pressure on the environment and exacerbating biodiversity loss. Thus, promoting broader adoption of RSPO, especially among smallholders, became an important priority for RSPO (RSPO, 2019a). The history of oil palm adoption by smallholders shows that lack of capital and technical capacity present initial barriers for smallholders to get into oil palm production (Brandt et al., 2015). We expect that the adoption of oil palm certification (non-state certification standard) would also pose similar barriers for smallholders to seek certification on their own.

Drawing on the history of oil palm development in Indonesia, Fig. 1 illustrates farmers' pathway to palm oil certification. Farmers choose their main cash crop based on price and production input costs and switch their choice of crop to oil palm when it becomes more profitable than other crops. For example, a previous study in Sumatra showed that

farmers changed their cash crop from rubber to oil palm when the price of rubber decreased and labor costs rose (Krishna et al., 2017). They can grow oil palm as scheme-holders working with a company or be independent. For the scheme-smallholders, their company decides if they are to be certified or not. In this study, we focus on independent smallholders since they have more autonomy in their decision-making process. However, most independent smallholders would need external assistance to obtain certification from intermediaries, such as palm oil companies that they supply to or NGOs (Fig. 1).

Several studies have described the challenges of oil palm certification for smallholders. For example, Brandt et al. (2015) and Rietberg and Slingerland. (2016) summarized five different types of challenges that smallholders face: 1) technical challenges of applying good agricultural practices; 2) institutional challenges to access the market; 3) financial challenges to adopt appropriate technology in order to comply with certification standards; 4) compliance challenges with regulations, such as acquiring land titles; and 5) other capacity challenges such as keeping records on yields and uses of pesticides and fertilizer. Hutabarat et al. (2018) highlighted the high cost of training farmers for certification as a particular challenge.

The potential benefits of certification for smallholders are both financial and nonfinancial. Direct financial benefits include a premium price and sales of RSPO credits (Hidayat, 2015). Financial benefits, such as premium price, was argued to be the primary motivation for smallholders to undertake certification (Saadun et al., 2018). Nonfinancial benefits include technical knowledge gained from participating in certification training, gaining access to new markets such as PalmTrace (a trading platform for RSPO certification credits) and new mills; and increased social recognition of farmers (connection and networking) (Hidayat, 2015). Nonfinancial benefits can lead to higher yields and improve farmers' incomes. However, there are few empirical studies on these benefits for smallholders. Hutabarat et al. (2018) found that there is very little evidence for premium price or increased yield. A review by Rietberg and Slingerland. (2016) also showed a similar result, i.e., that benefits from sales of RSPO credits are very small compared to the costs.

Based on the literature, we constructed a research framework to analyze the possible factors affecting smallholder participation in RSPO certification (Fig. 2). We clustered the factors into four groups: socio-economic factors, financial benefits, nonfinancial benefits, and challenges/costs. As certification is by group, not by individual, the challenges and costs of certification that individual smallholders face are similar within a group. Thus, we assumed that individual willingness to maintain certification would depend on their socioeconomic conditions and their perception of the financial and nonfinancial benefits of certification. Socioeconomic factors include the following variables, which are often cited as factors affecting adoption of non-state certification standards (e.g. Lemeilleur, 2013; Sunny et al., 2018): (1) ethnicity and

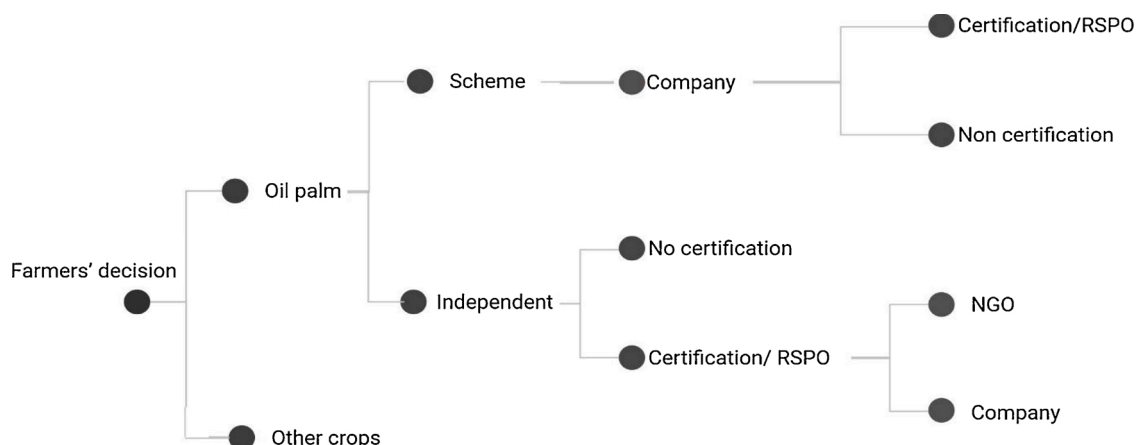


Fig. 1. Farmers' pathway to sustainability standards.

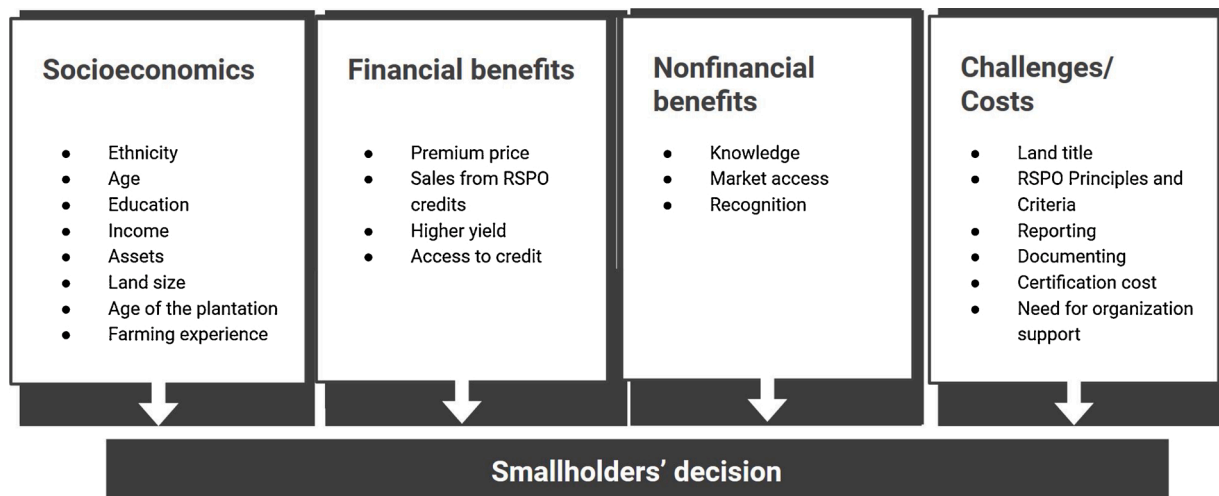


Fig. 2. Factors influencing smallholders' decision to join/maintain RSPO certification.

status within the farmers' group; (2) age, education, and farming experience, which are indicators of human capital; and (3) income, assets, land size, and age of plantation, which are indicators of physical capital. We hypothesize that smallholders with more physical capital and greater human capital would be more likely to adopt and maintain certification. Financial incentives are: (1) premium price; (2) sales of RSPO credits; (3) higher yield; and (4) access to credit. Nonfinancial incentives are: (1) knowledge gained; (2) market access; and (3) recognition. We also hypothesize that smallholders who perceive higher financial and nonfinancial benefits would be more likely to be willing to maintain certification.

3. Methods

3.1. Study area

As of 2017, all RSPO-certified independent smallholders were located in Sumatra, Indonesia. We chose Jambi Province as the study area since it is the only province with more than one certified independent smallholder group. We identified two groups in Jambi Province to examine inter-group differences due to community characteristics (e. g. ethnicity) and certification duration. Jambi Province is the second-largest province in Indonesia in terms of total area of smallholder oil palm plantations, second to Riau Province, which is also in Sumatra. Farmers in the province switched their main cash crop from rubber to oil palm, as the price of rubber has been low and oil palm cultivation tends to require less labor (Krishna, 2017). The oldest RSPO-certified independent smallholder group in Jambi is Gapoktan Tanjung Sehati (GTS).

Certified in 2014, it was the second group of independent smallholders to be certified in Indonesia. GTS has 350 independent smallholder members who cultivate 347 ha of RSPO-certified oil palm plantations. A local NGO, Yayasan Setara, has been working with GTS since 2014, facilitating the certification and auditing processes. The other existing independent smallholder group in Jambi is Forum Petani Swadaya – Merlung Renah Mendaluh (FPS), certified by RSPO in 2017. The profile of each joint farmer group is shown in Table 1 below. For GTS, all certified farmers are from one village (Mekar Jaya, Merangin District) and are members of the same joint farmer groups. For FPS, five joint farmer groups from five villages in Tanjung Jabung Barat District formed FPS to acquire RSPO certification. Based on recommendations from Yayasan Setara, we selected three FPS villages where farmers reside near the plantation for the survey. Table 1 shows the profile of two groups and the villages selected for this study.

3.2. Semi structured interviews and household surveys

We conducted semi structured interviews with selected RSPO stakeholders between June and August 2018. The interviews were designed to gain an understanding of what different stakeholders see as the challenges, costs, and benefits of RSPO certification. Seven stakeholders were selected for these initial interviews: representatives from local and multinational NGOs, a consulting agency, the certification body, and from the local government. We also interviewed 10 farmers who serve on the governing boards of the certified groups in the study sites.

Survey questionnaires were initially designed based on the

Table 1
Profile of the certified farmer's group.

Subdistrict	Merangin (GTS)	Tanjung Jabung Barat (FPS)				
	Tabir Selatan	Merlung	Renah Mendaluh			
Gapoktan name	Tanjung Sehati	Merlung Mandiri	Sungai Temegan	Usaha Berkat	Maju Jaya	Usaha bersatu
Village	Mekar Jaya*	Merlung	Lubuk terap	Pulau pauh*	Rantau benar*	Sungai rotan*
Population	2,272	5,272	805	1,188	2,219	1,294
Households	555	1,426	195	289	605	370
Certified oil palm area (ha)	347	79	69	94	91	162
		(total of 495 ha)				
Members (persons)	214	29	32	31	33	47
		(total of 172 persons)				
Ethnicity	Javanese	Malay				
Year of certification	2014	2017				
Number of audits	5 times	Twice				
Range of oil palm area per household	Similar (0.25–6 ha)	Varies (0.80 to above 10 ha)				

* Surveyed villages.

challenges, costs, and benefits of RSPO certification as identified in the literature (Brandt et al., 2015; Hidayat, 2015; Rietberg and Slingerland, 2016). The questionnaires were refined and revised after the initial interviews and after pretesting with NGO employees. Using the random number generator in a spreadsheet, we randomly selected interviewees from the list of certified farmers and aimed to survey at least 50 % of members of each group (out of 214 members in GTS and 111 members in three FPS villages). We added additional names to the initial set when the originally selected interviewee was not available. In July 2018, a total of 182 smallholders of oil palm plantations were surveyed in the study area. This included 101 smallholders (16 governing and 85 regular members) from GTS, and 80 smallholders (13 governing and 67 regular members) from FPS.

The survey sites are shown in Fig. 3. We visited the smallholders’

homes in the afternoons because most farmers are at work on their farms in the mornings. The survey questionnaire consisted of 45 questions, divided into three sections: 1) demographic and economic information (e.g. ethnicity, education, age, income, assets, land size, land production, and age of the plantation), 2) challenges, costs, and benefits of RSPO (e.g. social and economic costs, social/nonfinancial benefits of certification, such as social recognition, and access to training/knowledge/information, and economic benefits of certification, such as access to credit and market), and 3) motivation (e.g. willingness to continue RSPO under different scenarios).

3.3. Statistical analysis

The quantitative data were coded and entered into a spreadsheet,

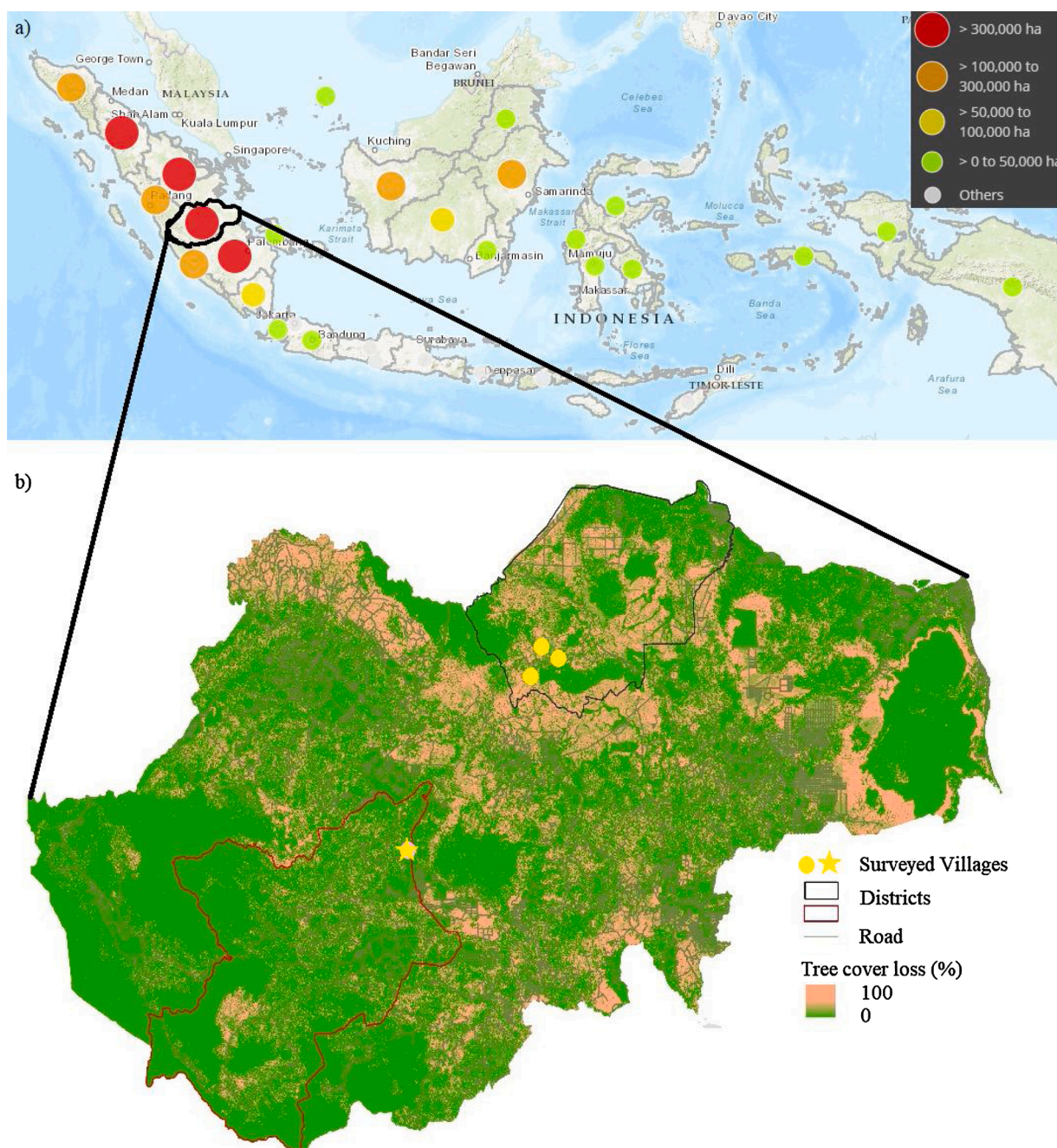


Fig. 3. a) Mature oil palm plantations managed by smallholders; b) Survey locations (Sources: Hansen et al., 2013; MoEF, 2016; RSPO Market Data - November 2015).

and the stakeholder interviews were transcribed. We analyzed the data with the R statistical software package (R version 3.4.2) and used a *t*-test to compare the demographic data between sites and between governing board and regular members. We used the Wilcoxon rank sum test to compare the nonparametric variables, such as challenges, financial benefits, and nonfinancial benefits (Tabachnik and Fidell, 2001).

We conducted logistic regression to identify the factors influencing individual farmers' willingness to maintain the certification. A logistic regression model has been employed in other studies to examine the factors influencing landowners'/farmers' decisions to participate in non-state certification programs (e.g. Ma et al., 2012; Tikina et al., 2009). A general linear model (GLM) was applied using R software to assess the probability of smallholders maintaining certification if they had to contribute a certain cost. The variables used for the model are listed in Table 2. The Hosmer–Lemeshow test was conducted to assess the goodness-of-fit of the model. The form of the logistic regression model is:

$$Pr_i (Yes = 1) = \frac{e^{f(X_i, Y_i, Z_i)}}{1 + e^{f(X_i, Y_i, Z_i)}}$$

Or

$$\text{Logit } Pr_i (Yes = 1) = f(X_i, Y_i, Z_i)$$

where $Pr_i (Yes)$ is the probability of respondent *i*'s willingness to continue RSPO certification, X_i is the vector of socioeconomic variables of respondent *i*, Y_i is the vector of respondent *i*'s perception of the financial benefits of RSPO, and Z_i is the vector of respondent *i*'s perception of the nonfinancial benefits of RSPO.

4. Results

Smallholders, independent or schemed, cannot be certified as individuals and must form a group to be eligible for RSPO certification (Brandi et al., 2013). They are required to establish an internal control system (ICS), which is a “documented quality assurance system that allows the external certification body to delegate the annual inspection of individual group members to an identified body or unit within the certified operator” (IFOAM, 2002, p.9). Thus, the third-party certification body only inspects the functionality of ICS within each group and

Table 2

Questions developed to understand perceived challenges for joining/maintaining certification with RSPO. Respondents were asked on a 4-point Likert scale if they agreed or disagreed with each of the following statements: -2 for strongly disagree; -1 for disagree; 1 for agree; 2 for strongly agree. The statements developed based on findings of Brandi et al. (2015) and Rietberg et al. (2016).

Barriers/costs of certification	Statements
Reporting	RSPO certification reporting is difficult Recording production and sale prices is difficult
Documenting	Recording fertilizer used is difficult The RSPO principles and criteria are difficult to understand
Understanding the principles and criteria of RSPO	The RSPO principles and criteria are difficult to apply Land certificate (SKT/SHM) is challenging to obtain
Land title (SKT/SHM)*	Land certificate (SKT/SHM) is costly to acquire
Certification cost	The annual audit fee is expensive Support from NGO is needed to continue the certification
Organizational support	Support from the company is needed to continue the certification Support from government is needed to continue the certification

* SKT (Surat Keterangan Tanah): land certificate letter; SHM (Surat Hak Milik): land ownership letter.

performs an audit for a few selected individual smallholders in the group.

Our interviews showed that independent smallholders can be organized in several different ways. Farmers at the village level can be organized into a farmers' group, and then that group can join with other groups to form a joint farmers' group (*Gapoktan*), which can be part of an association, a forum, or a cooperative. Although many organized groups existed before RSPO certification in our study area, the respondents stated that most of these groups were not active and did not have a structure that qualified as an ICS. Also, there were many individual smallholders who were not part of any group in the area, which made it difficult to engage them in organized efforts to seek RSPO certification. In the study area, the RSPO certification process was initiated by the NGO (*Yayasan Setara*), which facilitated the reactivation of existing groups and educated nonmembers about the benefits of joining a group, such as access to subsidized fertilizers and technical training on oil palm management. The NGO also established the ICS for the groups.

We compared socioeconomic characteristics of smallholders in both sites, both governing members (i.e. those who are on the governing board and responsible for ICS) and regular members, and contrasted their perceptions of the challenges and benefits of RSPO certification. While governing members are viewed as the agents of change in their communities and their perspectives have been presented in previous studies, regular members' perspectives have not been studied thus far. Understanding the similarities and differences between group leadership and regular members is important in scaling up individual smallholders' participation as well as in ensuring the long-term sustainability of certification.

4.1. Socioeconomic characteristics of independent smallholders

Most of the smallholders in GTS (97 %) are transmigrants from east Java who received 2.25 ha of land under the national transmigration program in 1979/80. The other 3% are ethnic groups from Sumatra, such as the Batak, Malay, Minang, and Palembang ethnic groups. In contrast with GTS, most of the smallholders in FPS are originally from Jambi Province (88 % Malay; 8% Javanese, and 4% other groups). Although the ethnic compositions are very different, the land use history of both sites is similar. Many farmers in both sites have switched their main cash crop from rubber to oil palm, starting in the 1990s for GTS and in the early 2000s for FPS.

There was no significant difference between GTS and FPS in the age of smallholders. However, in both sites, governing members were predominantly middle-aged compared to regular members (Fig. 4). The smallholders in GTS are more educated than those in FPS ($t = -2.979$; $P < 0.05$) (Fig. 4). In GTS, the education level of governing members is similar to that of regular members, while the governing members of FPS are more educated than regular members ($t = 1.8475$; $P < 0.1$).

Around 65 % of all smallholders in both sites reported they started their oil palm plantations without prior experience in managing oil palm (Fig. 5). Those who reported having prior experience in managing oil palm mostly learned while working as a laborer or an employee in a palm oil company (29 %). Although numbers were small, some learned while working on their own plantations (4%), or through academic training (2%). Farmers in GTS had more experience in managing oil palm plantations and with farming in general than those in FPS. The data show that governing members in both sites had a similar level of experience to regular members (Fig. 5).

More than half the smallholders in both sites also reported that they owned oil palm plantations other than those certified (62 %), as well as rubber plantations (70 %), as a source of income. There was no significant difference in this aspect between the governing and regular members. For 66 % of the smallholders we surveyed, rubber was their main source of income before they started oil palm plantations. In terms of general income from oil palm plantations, governing members earned more ($\bar{x} = \text{IDR } 4 \text{ million}$) than regular members ($\bar{x} = \text{IDR } 2.5 \text{ M}$;

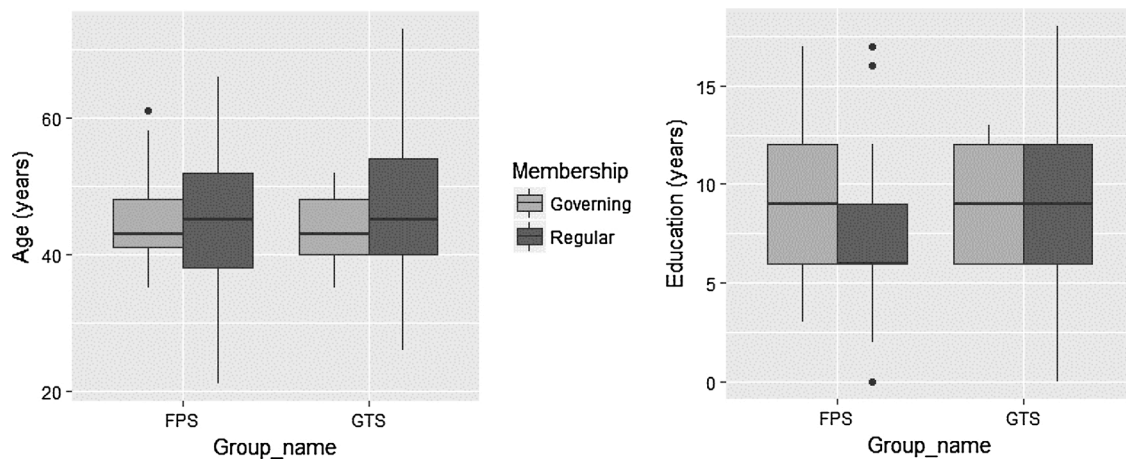


Fig. 4. Comparisons for education (left) and age (right) between GTS and FPS, and between governing members and regular members in each group. The smallholders in GTS (\bar{x} = 8.84 years; range: 6-18 years) were more educated than FPS (\bar{x} = 7.25 years; range: 0-17 years; t = -2.979; df = 165.23; P < 0.05). In GTS, the education level of governing members (\bar{x} = 8.94 years; range: 6-13 years) was similar to those of regular members (\bar{x} = 8.82 years; range: 0-18 years). The governing members (\bar{x} = 9 years; range: 3-17 years) in FPS were more educated than regular members (\bar{x} = 6.9 years; range: 0-13 years; t = 1.8475; df = 16.443; P < 0.1). There was no significant difference in the age of smallholders between GTS (\bar{x} = 46.33 years; range: 26-73 years) and FPS (\bar{x} = 44.27 years; range: 21-66 years). Governing members were predominantly middle-aged (\bar{x} = 44.17 years; range: 35-61 years) compared to regular members (\bar{x} = 45.66 years; range: 21-73 years) in both sites.

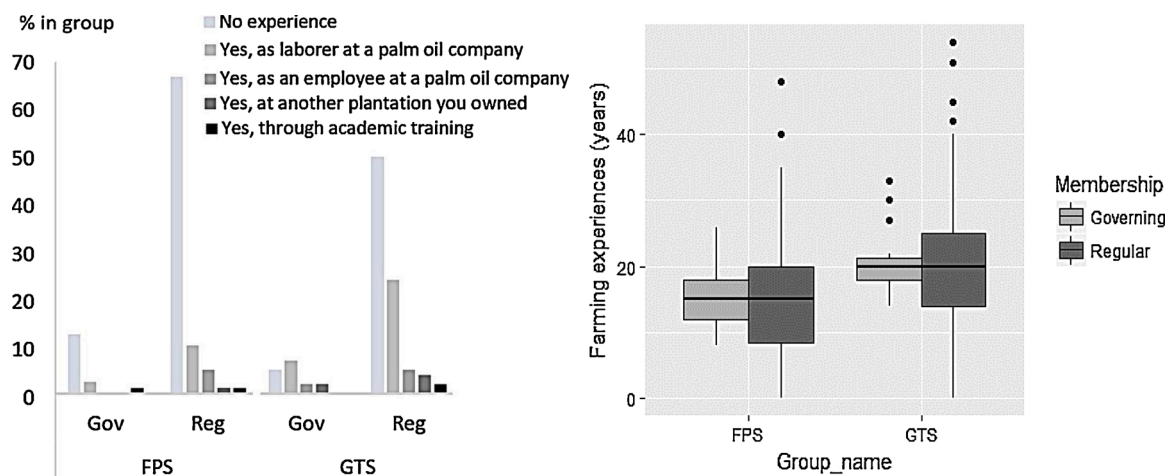


Fig. 5. Smallholders' experiences in managing oil palm (left); general farming experiences of governing and regular members in both sites (right). GTS (46 %) had more experience in managing oil palm plantation and with farming in general (\bar{x} = 20.18 years; range: 0-54 years; p < 0.001) than FPS (22 %) (\bar{x} = 15.12 years; range: 0-48 years).

t = 3.797; P < 0.001). Although the size of plantations between governing and regular members was similar, governing members (\bar{x} = 14.4 years) owned oil palm plantations that were significantly older than those of regular members (\bar{x} = 12.9 years; t = 2.246; p < 0.05). The age of the plantation can significantly affect palm oil productivity, as farmers can generally begin harvesting after year 4. However, the yield starts declining around 20 years and palms may grow too tall for ready harvesting, thus replanting may be required after 20–25 years (Woittiez et al., 2017).

4.2. Challenges of RSPO certification for smallholders

Based on the previous literature related to oil palm smallholders and our own initial stakeholder interviews, we developed a series of statements to gauge the challenges faced by smallholders in obtaining RSPO certification (Table 2). Lack of organizational and managerial skills of independent smallholders (e.g. documenting, record keeping, reporting) was cited as one of the major barriers to certification in previous literature (Brandi et al., 2015; Rietberg and Slingerland., 2016).

Independent smallholders often experience difficulties in complying with regulations, such as proving their land ownership through legal documents (e.g. SKT/SHM) (see the footnote to Table 2) (Brandi et al., 2015; Rietberg and Slingerland., 2016). High certification costs and lack of technical knowledge were also reported as major challenges (Brandi et al., 2015; Rietberg and Slingerland., 2016). We followed up these previous findings in our survey, but found that the smallholders we surveyed were not aware of these difficulties and did not perceive them as barriers and challenges for them to participate in certification (Fig. 6).

There was no significant difference in the perceived need for organizational support between governing and regular members (W = 2345.5, P -value = 0.451). More than half of the smallholders we surveyed did not consider reporting, documenting, and obtaining land titles, nor understanding the principles and criteria of RSPO being too difficult (Fig. 6), with no significant difference between governing and regular members (W = 2149, P -value = 0.8072). Only about half of the smallholders (52 %) we surveyed viewed the audit as costly. About one-third of the respondents did not see the audit as being expensive (31 %) and some (17 %) had no clear idea about the cost of the audit (Fig. 6).

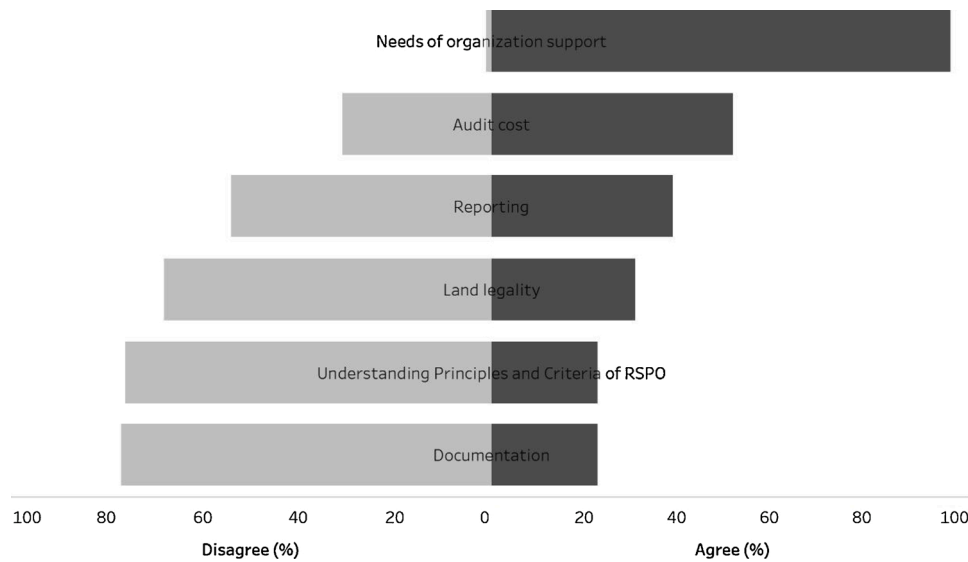


Fig. 6. Perceived challenges of RSPO certification by smallholders. The only challenge that most of respondents agreed on was the need for organizational support. Only about half of the smallholders (52 %) we surveyed viewed the audit as costly.

Most of the governing members (83 %) agreed that the audit was costly, compared with less than half of the regular members (46 %), which was statistically significant ($t = -3.1375$; $df = 86.066$; $P\text{-value} = 0.0023$). Interviews with governing members showed that they better understood the difficulties and the time-consuming nature of the RSPO process, such as acquiring a statement of capability to manage and monitor environmental impacts (SPPL), and a business permit (STDB) from local government.

“... we were struggling with the audit process; it wasn’t that we didn’t understand the question, but their language [i.e., the auditor from the certification body] was different for us [farmers], we live in the village and it is difficult to access the information, we need financial support from the NGO as well as knowledge support to continue certification ...” – A governing member (GTS)

4.3. Financial benefits of certification for independent smallholders

We classified potential benefits of RSPO certification into two groups, direct and indirect, and identified five potential financial benefits (Table 3). RSPO certification improved the technical skills of independent smallholders for managing their plantations, such as improving fertilizer use, harvesting, and seed selection. With the improved technical skills, smallholders can produce higher yields and increase their incomes (Hidayat, 2015; Rietberg and Slingerland., 2016). The premium price and benefits from sales of RSPO credits have also

Table 3
Potential financial benefits of certification for smallholders. Respondents were asked on a 4-point Likert scale if they agreed or disagreed with each of the following statements: -2 for strongly disagree; -1 for disagree; 1 for agree; 2 for strongly agree. The statements developed based on findings of Hidayat (2015) and Rietberg and Slingerland. (2016).

Financial benefits	Types	Statements
Premium price	Direct	Price of certified oil palm is higher than for noncertified oil palm
Sales from RSPO credits	Direct	I can financially benefit from selling RSPO credits
Higher yield	Indirect	After the certification training, I get better yields
Reduction in production costs	Indirect	After the certification, the production cost decreased
Access to credit	Indirect	The certification makes it easier to get loans from financial institutions (banks)

been reported as potential monetary benefits from certification (Hidayat, 2015; Rietberg and Slingerland., 2016). RSPO has established a platform (PalmTrace) where independent smallholders can trade their RSPO credits. These platforms were established to provide a certified palm oil source from the very bottom of the supply chain.

The majority of smallholders we surveyed confirmed that they received benefits from sales of RSPO credits (94 %). The profits from the sales were often shared among members through distribution of meat, rice, and vegetable oil (*sembako*). More than half agreed that their production cost of oil palm decreased (67 %) following certification. All governing members (100 %) agreed on the cost reduction; meanwhile, 39 % of regular members felt that certification did *not* reduce their production costs. Only 50 % of smallholders felt that certification improved the price of oil palm (fresh fruit bunches/FFB) (Fig. 7). There was no significant difference between governing (48 %) and regular members (50 %) on the impact of certification on FFB price ($W = 2172.5$, $P\text{-value} = 0.8949$).

In both sites, most smallholders (75 %) reported that RSPO certification had increased their oil palm production (Fig. 8). GTS has a longer history of RSPO certification (5 years) than FPS (2 years). The number of regular members who did not perceive positive impacts of RSPO on their oil palm production was higher in FPS than in GTS (Fig. 8).

Previous research has found that improved access to financial credit was one of the indirect benefits for smallholders. However, smallholders we surveyed did not see that RSPO certification improved their access to financial credit, even though the certification process helped them secure land ownership certificates needed to obtain loans from the bank.

“... they [the bank] only asked about land title/legality, not RSPO certification ...” – A governing member (FPS)

4.4. Non-financial benefit of certification for smallholders

Three nonfinancial benefits from RSPO certification were identified from the literature review and stakeholder interviews (Table 4). Certification can improve smallholders’ technical knowledge about managing oil palm, and increase social capital – for example, recognition by other farmers (Hidayat, 2015).

As discussed earlier, most of the independent smallholders we surveyed did not have much prior experience in managing oil palm plantations, and their limited knowledge of good agricultural practices therefore resulted in low yields. Learning about improved agricultural

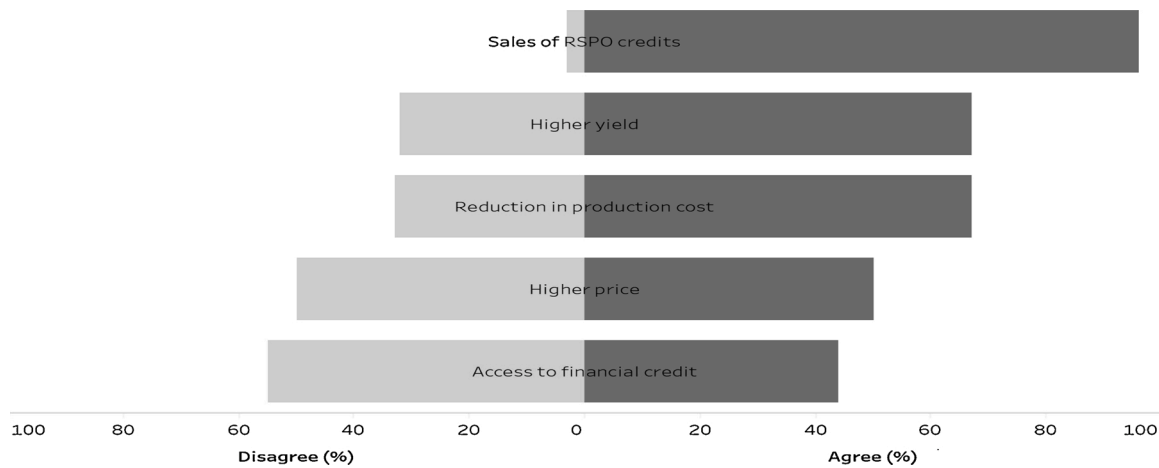


Fig. 7. Perceived financial benefits of RSPO certification by smallholders. The majority of smallholders recognized benefits from sales of RSPO credits (94 %). More than half agreed that their production cost of oil palm decreased (67 %) following certification. Only 50 % of smallholders felt that certification improved the oil palm (fresh fruit bunches/FFB) price.

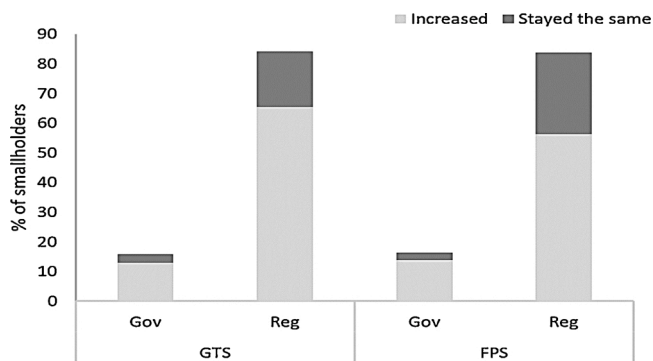


Fig. 8. Perceived changes in oil palm production after RSPO certification (left), and the difference between governing and regular members in both sites (right). Most smallholders (75 %) reported that the RSPO certification had increased their oil palm production.

Table 4

Questions developed to understand the perceived nonfinancial benefits of RSPO. Respondents were asked on a 4-point Likert scale if they agreed or disagreed with each of the following statements: -2 for strongly disagree; -1 for disagree; 1 for agree; 2 for strongly agree. The statements were developed based on findings of Hidayat (2015) and Rietberg and Slingerland. (2016).

Nonfinancial benefits	Statements
Knowledge	I know more about how to manage oil palm plantations after the certification
	More mills are willing to buy the certified oil palm from our group
Market access	I have access to the trade platforms for selling RSPO credits
	Noncertified farmers asked me about certification and management of oil palm plantations

practices was the main nonfinancial benefit of RSPO certification that most smallholders (97 %) agreed on (Fig. 9), as noted by one group member:

"... the economic improvement [from certification] was not that significant; however, we experienced significant improvement in terms of knowledge, knowledge in managing oil palm plantation, choosing good seeds and [in the use of] personal protective gear..." – A governing member (GTS)

The second nonfinancial benefit that most smallholders (86 %) agreed on was gaining access to certified palm oil platforms (e.g. PalmTrace). Both governing members (100 %) and regular members (83 %) agreed that they could now access the platforms to trade their RSPO credits. However, most did not recognize that they gained access to new mills that purchased their certified palm oil.

Another nonfinancial benefit identified in the literature was social recognition from other farmers. However, less than half of smallholders (48 %) viewed this as a benefit. There was a significant difference ($t = 6.3155$; $df = 52.677$; $P\text{-value} = 5.806e-08$) between governing (90 %) and regular members (45 %) in this regard. The majority of the governing members agreed that they are recognized by noncertified farmers, who ask them about certification and solicit advice for managing their plantations. This social recognition may not be as common for regular members.

4.5. Willingness of smallholders to continue certification

Based on a literature review of the challenges and benefits of RSPO certification, we proposed nine scenarios to assess independent smallholders' willingness to continue certification (Table 5).

Among all scenarios, only scenarios 1 and 2 were perceived negatively by governing members (Table 5). There was a statistically significant difference between governing (48 %) and regular members (68 %) on their willingness to continue certification if the group had to bear the full financial costs of maintaining certification (Scenario 1; $t = -1.7856$; $df = 39.966$; $P\text{-value} = 0.08176$) (Fig. 10). If there were no buyers of their RSPO credits (Scenario 2), governing members (52 %) were more likely to discontinue certification compared with regular members (17 %) ($t = -3.4502$; $df = 33.939$; $P\text{-value} = 0.001517$). This shows that governing members are more aware of not only the financial burden, but also the financial benefit of certification than regular members.

No scenario seems to affect the decision of regular members to continue the certification program. Regular members are willing to follow governing members' decision, since governing members are the ones doing the primary work for certification. Considering the vital role that the NGO played in every step of the RSPO process, it is surprising that both governing and regular members said they would continue certification, even though a higher number of governing members (38 %) than regular members (23 %) said that they were unlikely to continue certification without NGO support.

Scenarios 7 and 8 are aimed at understanding the financial motivation for certification. However, both governing and regular members

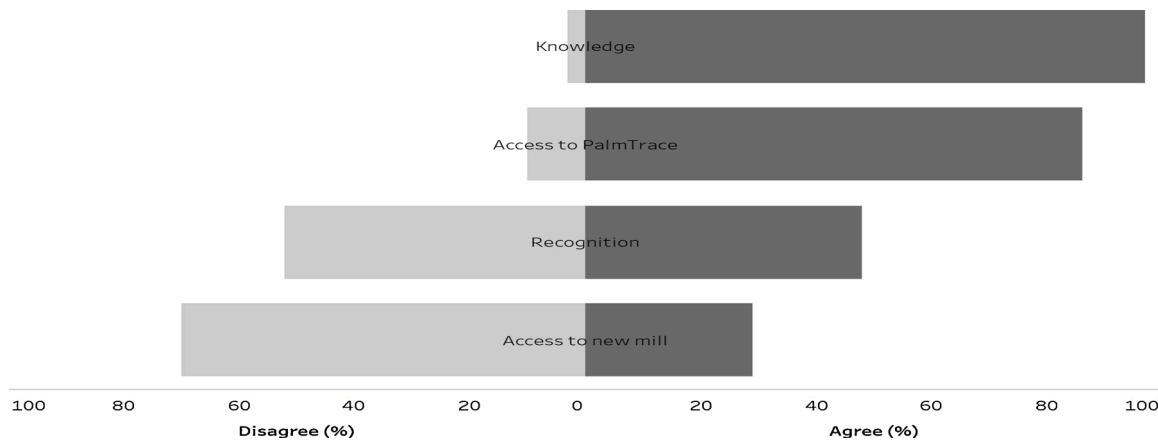


Fig. 9. Perceived nonfinancial benefits of RSPO certification for smallholders. Most respondents agreed they learned improved agricultural practices through certification trainings (97 %) and gained access to the certified palm oil platforms (86 %).

Table 5
Governing and regular members’ willingness to continue RSPO certification under different scenarios.

Scenarios	Governing	Regular
1 With financial burden	-	+
2 No buyers in PalmTrace	-	+
3 No NGO support	+	+
4 No training on Principle and Criteria of RSPO	+	+
5 No training on environment	+	+
6 No training on managing palm oil	+	+
7 No higher price	+	+
8 No higher yield	+	+
9 No new buyers (mill)	+	+

were willing to continue certification even if there was no improvement in price or yield.

4.6. Regression results of the factors affecting certified smallholders’ willingness to continue

As discussed in the previous section, respondents tended to state that they are willing to continue with certification regardless of the costs or benefits. Thus, the simple aggregates of their responses did not provide insights into the factors affecting smallholders’ willingness to continue RSPO certification. We conducted a logistic regression, setting the response variable as the willingness to maintain certification even if they had to contribute a certain cost, which showed the most variations in responses. The response and explanatory variables and their summary statistics for the model are listed in Table 6.

The factors influencing smallholders’ willingness to maintain RSPO certification were analyzed using binary logistic regression (logit model). Table 7 shows the regression results of all certified smallholders sampled in both sites, as well as two groups separately as they differ in group heterogeneity and duration of the certification. We included the analysis of marginal effects since the coefficients convey the direction of influence, but do not express the extent (Sunny et al., 2018). We excluded the income variable from the model due to its interaction with land size, as income is based on revenues from crop production.

The regression model of all responses shows that smallholders’ status in the farmers’ group and land size were the only socioeconomic factors that significantly ($P < 0.10$) affected the likelihood of smallholders’ willingness to maintain certification. Perceptions of positive financial benefits, such as premium price and sales from RSPO credits, are positively correlated with smallholders’ willingness to maintain certification even if they have to contribute a certain cost. This is consistent with other studies, where direct financial benefits, such as premium price,

were shown to attract smallholders to participate in RSPO certification (Hidayat, 2015; Saadun et al., 2018).

The regression analyses of the two groups help us understand the factors influencing farmers’ decisions in the different communities, which are at different stages of the certification process. In FPS, with the certification duration of only 2 years, the logistic regression analysis (Table 7) shows that socioeconomic variables are the only factors that affect smallholders’ decision to maintain certification if they have to contribute financially. Similar to the overall model, the governing status decreased the probability of smallholders saying yes to maintaining the certification by 26 %, ceteris paribus. The second socioeconomic factor statistically significant in affecting the smallholders’ decision in FPS is smallholders’ age and land size. Our results differ from previous studies, where farmers’ age was found to have a positive relationship with adoption, with younger famers usually being more open to implementing new knowledge (e.g. Sunny et al., 2018). We could not find evidence that perceived financial and nonfinancial benefits of RSPO affect the likelihood of smallholders saying yes to maintaining the certification in FPS.

GTS is one of the few independent smallholder groups that was certified in the early stage of RSPO and still maintains their certification. As GTS has held RSPO certification longer than FPS, GTS has benefitted longer than FPS, both financially and non-financially. In GTS, we found that socioeconomic, financial, and nonfinancial benefits were more significant in determining smallholders’ decision about maintaining certification even if they had to face a certain cost (Table 7). Total assets owned by smallholders in GTS were significantly and positively correlated with their decision to maintain certification, suggesting that the wealthier the respondent, the more likely they are willing to maintain the certification. In GTS, the age of the oil palm plantation was found to be a relevant factor in smallholders’ decision on maintaining certification. Although found to be significant, it was negatively related to smallholders’ decision, indicating that smallholders who owned older plantations were less willing to maintain certification. The marginal effects showed that a 1-year increase in oil palm plantation age would decrease the willingness by 3.6 %, ceteris paribus. The sale from RSPO credits was found to significantly and positively influence the response variable in GTS. After 5 years of holding the certification, smallholders’ willingness to maintain certification not only depended on their socioeconomic condition, but also on incentives from the certification. When holding other variables constant, respondents who strongly agreed that they financially benefit from RSPO credit sales were 17 % more likely to say yes to maintaining the certification than those who just agreed with the statement in GTS.

Social recognition as one of the nonfinancial benefits from certification was significant in explaining the willingness to continue

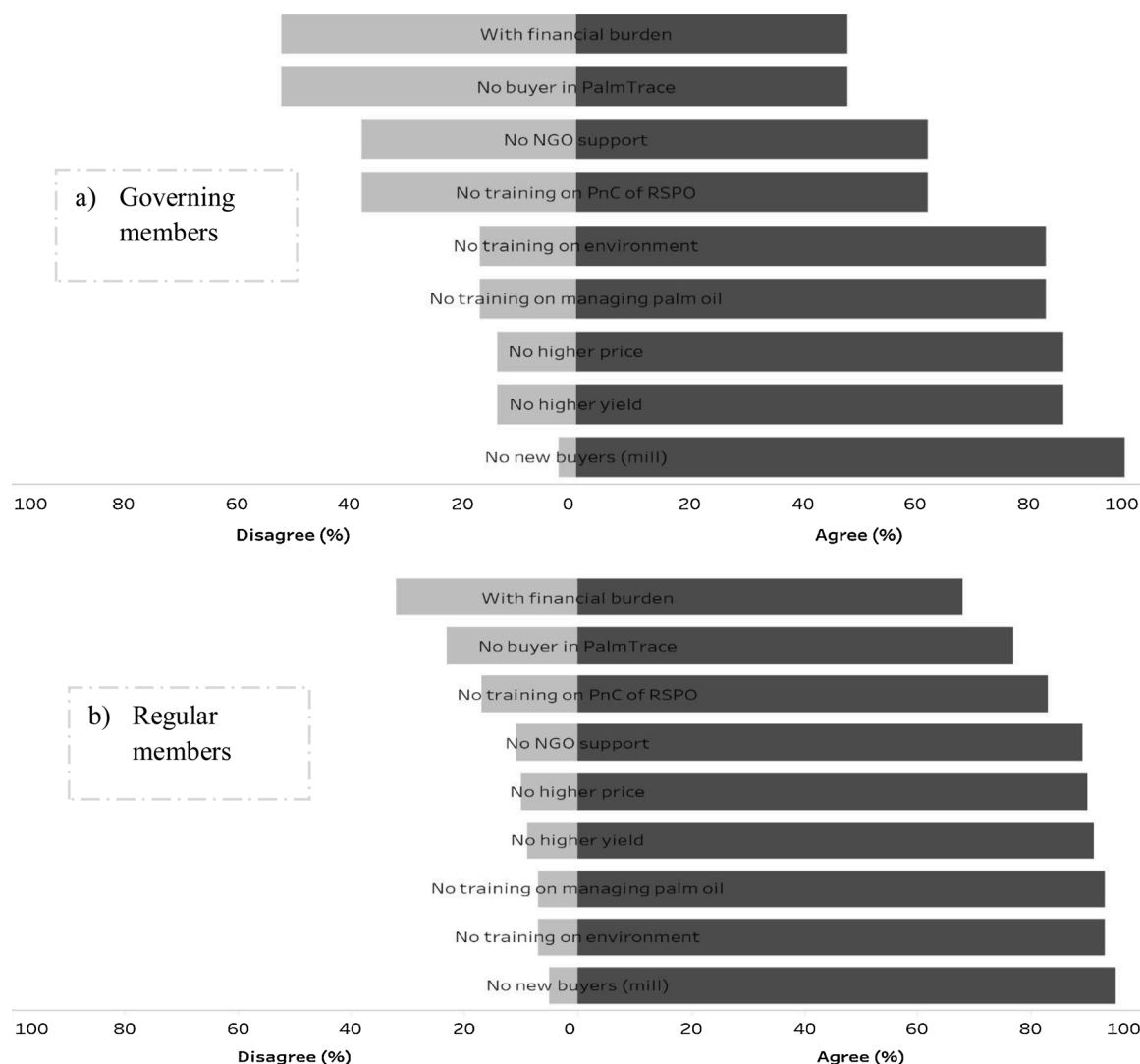


Fig. 10. Smallholders' willingness to continue RSPO certification for smallholders: a) governing members; b) regular members.

certification in GTS. Smallholders in GTS were motivated by being recognized socially, such as being asked about their oil palm management by noncertified farmers.

However, we found no evidence that indirect financial benefits, such as having higher yields and better access to credit, would increase the likelihood of smallholders maintaining the certification across all models. The theory of change in RSPO certification states that higher yield would increase smallholders' income (RSPO, 2017) and would in turn increase their likelihood of participating in RSPO. Although higher yield as an indirect financial benefit was recognized by smallholders (Fig. 7), obtaining higher yield from RSPO certification needs a number of years to be realized. Our results show that short-term and more immediate benefits drive smallholders' decisions on maintaining certification, but only in the group with longer duration of RSPO. We also found no evidence that acquiring knowledge on oil palm cultivation would increase the probability of smallholders maintaining the certification; this also applied to them gaining access to a mill or the RSPO credits platform.

5. Discussion

We studied two independent smallholder groups in Jambi, Indonesia, that are certified by RSPO. These two sites present similar socioeconomic conditions but differ in their community homogeneity

(ethnicity and economic conditions) and the duration of certification. We have summarized our major findings and their implications below.

5.1. Challenges: NGO dependency and the long-term sustainability of RSPO certification among small holders

Our survey results show that the challenges of RSPO certification are not well understood by smallholders, particularly those who are not involved in day-to-day operations of the farmers' group (regular members). The same local NGO (Yayasan Setara) introduced RSPO to both sites, and their organizational support was perceived by smallholders as the key to their continuing participation in the RSPO certification program (98 %) (Fig. 6). According to our interviews, Yayasan Setara has helped prepare smallholder groups for certification by: 1) establishing ICS, including Standard Operation Procedures (SOP); 2) providing administrative and organizational training to the ICS team (governing members); 3) facilitating oil palm management training, including trainings on good agricultural practices and high conservation value lands; 4) facilitating farmers to obtain the necessary documents for certification, such as land titles (SKT and SHM), business permits (STDB: Surat Tanda Daftar Usaha Perkebunan), and a statement of capability to manage and monitor the environment (SPPL: Surat Pernyataan Kesanggupan Pengelolaan dan Pemantauan Lingkungan Hidup); 5) providing full financial support to the farmer groups to pay for their RSPO

Table 6

Description and summary statistics of explanatory variables for the logistic regression of smallholders' willingness to maintain RSPO certification (yes = 1; no = 0) (n = 181).

Variable	Description
<i>Socioeconomic variables</i>	
Ethnicity: Javanese	Javanese = 1; others = 0
Ethnicity: Malay	Malay = 1; others = 0
Status in farmers group	Governing member = 1; others = 0
Age (years)	Age of smallholder (mean = 45.41 std. dev = 9.96, range 21-73)
Education	Years of smallholders' education
Income	Income from palm oil sales per month ¹ (mean = 4.52 std. dev = 1.3, range 2-6)
Assets	Total number of assets in the households ² (mean = 11.21 std. dev = 4.68, range 4-36)
Land size	Hectares of oil palm area owned by smallholders (mean = 5.15 std. dev = 5.44, range 0.5-33.3)
Age of the plantation	Years of plantation age (mean = 3.1 std. dev = 3.15, range 4-21)
Farming experience	Years of farming (mean = 7.9 std. dev = 0.12, range 0-54)
<i>Financial benefits</i> ³ : Premium price; Sales from RSPO credits	Higher yield; Access to credit
<i>Nonfinancial benefits</i> ³ : Knowledge; Market access (mill); Market access (RSPO credits platform); Recognition	

¹ Income measures: 1 = ≤ \$35; 2 = \$35.01–\$69; 3 = \$69.01–\$138; 4 = \$138.01–\$207; 5 = \$207.01–\$345; 6 = > \$345 (\$1USD ~ IDR 14,500).

² Assets include cellphone, motorbike, car, truck, house, livestock, plantation tool, and household appliances. The number of assets is commonly used in surveying rural households in Indonesia, such as in the national census, to estimate each household's wealth.

³ Financial and non-financial benefits are measured in 4-point Likert-scale: –2 to –1 for strongly disagree and disagree and 1–2 for agree and strongly agree.

membership; 6) linking farmer groups to RSPO-certified palm oil mills in order to get direct orders from the mill; 7) providing full financial support to pay for the first major certification audit; and 8) helping farmer groups divide the profits from selling RSPO credits among members. The burden of reporting, documenting, and obtaining land titles was not well understood by smallholders due to the full support they received from the NGO. The NGO facilitated every step of the certification process for the smallholders we surveyed, including ensuring their legal claims to

Table 7

Logistic regression estimations for all certified farmers in both sites, FPS and GTS. Bold indicates those variables that were significant in at least one of the models.

Variable	Total (n = 181)		FPS (n = 80)		GTS (n = 101)	
	Coefficient (Std. Err.)	ME ¹ (%)	Coefficient (Std. Err.)	ME (%)	Coefficient (Std. Err.)	ME (%)
<i>Socioeconomic:</i>						
Ethnicity: Javanese	–1.09 (1.18)	–18 %	–	–	–0.88 (2.10)	–15 %
Ethnicity: Malay	–1.31 (1.17)	–22 %	–1.14 (1.36)	–18 %	–	–
Governing member	–0.94* (0.50)	–20 %	–1.44* (0.83)	–25 %	–1.09 (0.78)	–20 %
Age	0.02 (0.02)	0.3 %	0.08* (0.04)	1%	0.01 (0.03)	0.2 %
Education	–0.02 (0.06)	–0.4 %	0.06 (0.11)	0%	0.01 (0.09)	0.2 %
Farming experience	0.01 (0.02)	0.2 %	0.06 (0.04)	1%	–0.05 (0.03)	–0.8%
Assets	0.01 (0.05)	0.2 %	–0.06 (0.08)	–1%	0.22* (0.12)	3.7 %
Land size	0.08* (0.05)	1.7 %	0.17* (0.09)	3%	0.04 (0.07)	0.7 %
Age of the plantation	–0.06 (0.06)	–1%	–0.06 (0.10)	–1%	–0.21* (0.11)	–4%
<i>Financial benefit:</i>						
Premium price	0.30* (0.18)	6%	0.60 (0.38)	10 %	0.22 (0.27)	3.8 %
Sales from RSPO credits	0.54* (0.31)	11 %	0.51 (0.47)	9%	1.00* (0.56)	17.0 %
Higher yield	–0.30 (0.21)	–6%	–0.17 (0.35)	–3%	–0.35 (0.32)	–5%
Access to credit	0.11 (0.18)	2%	–0.47 (0.41)	–8%	0.22 (0.27)	3.8 %
<i>Nonfinancial benefit:</i>						
Knowledge	0.25 (0.33)	5%	0.11 (0.65)	2%	0.37 (0.48)	6.2 %
Market access (mill)	–0.18 (0.17)	–4%	–0.41 (0.31)	–7%	–0.11 (0.26)	–19 %
Market access (RSPO credits platform)	–0.02 (0.21)	–0.4 %	0.42 (0.35)	7%	–0.22 (0.37)	–4%
Recognition	0.16 (0.19)	3%	–0.13 (0.34)	–2%	0.48* (0.29)	8.3 %
Hosmer–Lemeshow	$\chi^2 = 14.4$; P-value = 0.50		$\chi^2 = 10.8$; P-value = 0.77		$\chi^2 = 12.2$; P-value = 0.66	

1 ME is Marginal effects (dy/dx).

2 Statistically significant at the 0.10 (*) levels of probability.

land ownership. For example, in 2017 the NGO succeeded in persuading the local government in Tanjung Jabung Barat district (FPS) to provide a business permit (STDB) for free to other uncertified smallholders to increase the smallholders' participation in certification.

We also found that neither governing nor regular members were aware of significant preparatory costs for certification, as most of these costs were covered by the intermediate actor, supported by funding from the NGO's donors. These included the costs of training and securing certification documents (land title, SPPL, STDB), RSPO membership registration fees, and pre-audit costs. RSPO certification is valid for 5 years and the smallholders' group must monitor their compliance with the RSPO standards annually. Periodic audits are required, and the associated costs can be quite high. Only governing members were aware of some of the costs for annual monitoring, only after the NGO delegated the responsibility of paying these costs to the farmers' group in the second year of certificate ownership.

The primary expense of RSPO certification is the cost of organizing independent smallholders, which includes costs related to ICS establishment, training, and internal assessments (Table 8). The financial burden of organizing smallholders accounts for 83.6 % of the total cost (about USD 62,000) (Table 8) (Hutabarat et al., 2018). The annual monitoring cost was estimated at USD 6200/year, while the total certification cost was estimated at USD 100/ha or USD 200/farmer (Hutabarat et al., 2018). Considering that the average income per household from our survey was about USD 190/month (for a regular member) to USD 300/month (for a governing member), it is apparent that most smallholders would not be able to afford these certification costs without external financial support.

While NGO support enabled the smallholders to obtain RSPO certification, this also created a dependency between independent smallholders and stakeholders who support these certification costs through the NGO (Hidayat, 2015). Audit costs are relatively small compared to group preparation costs (Table 8). Even so, unless financial benefits from the certification exceed the audit costs, it may not be possible for farmers' groups to cover the costs of the audit and annual monitoring. In our study area, the NGO had facilitated the group in GTS for 5 years, but the support has still not been enough to make them independent both financially and institutionally. This continuing dependency raises the question of long-term sustainability of RSPO certification for smallholders.

Table 8
Steps and activities required for RSPO certification and associated costs (Hutabarat et al., 2018).

Steps	Activities	Important actor	Cost (%)
Group preparation	ICS establishment	NGO	83.6
	ICS training session	NGO	
	Regular member training session	Governing members and NGO	
	Group certification documents	Government, NGO	
	Farmers' documents	NGO, government, governing and regular members	
	Internal assessment I	NGO, governing member	
Audit preparation	Internal assessment II	NGO, governing member	16.4
	RSPO member registration	NGO, RSPO	
	Pre-audit	Certification body, NGO, governing member	
	Remedial CARs*	Governing member, NGO	
	Main audit	Certification body, NGO, Governing member	

* CARs: Correction Action Requests.

Meanwhile, RSPO principles and criteria have been updated three times (2010, 2013, and 2016), and many stakeholders we interviewed expected that adhering to the new standards of RSPO would be even more difficult for smallholders. For example, the 2016 standard now requires a Land Use Change Analysis (LUCA), which was not required of smallholders for RSPO certification at the time we surveyed the two groups. Through LUCA, a group seeking RSPO certification must prove that there was no land conversion from forest prior to the establishment of their oil palm plantations. Key NGO staff we interviewed worried that the LUCA requirement would be too difficult and too costly for smallholder groups to follow. They suggested that RSPO should conduct LUCA for all areas seeking certification in Indonesia.

5.2. Financial benefits of RSPO may be small, but it matters how they are shared

Based on our interviews in both sites, there was no price increase for the sale of oil palm FFBs. However, half of the smallholders we surveyed felt that their market access became more certain through "direct order" requests for their FFBs by palm oil mills. They expected that they could get a higher price for RSPO certified oil palm in the future. The only direct monetary benefits realized for farmers' groups in both sites were from the sales of RSPO credits through PalmTrace. Although small compared to the costs of certification, RSPO credit sales can provide enough motivation for regular members to follow certification requirements and for noncertified farmers to become more interested, if governing members can distribute the benefits to regular members equitably. In interviews, individual smallholders reported that those who were not in the certification scheme became more interested in joining the group for RSPO certification after they had seen the farmers' group members receiving nonmonetary benefits, such as shared foods (*sembako*) and personal protective gear. This result based on actual experiences of certified smallholders differs from the case of Malaysia, where premium price was identified as the main motivation for smallholders' willingness to seek oil palm certification (Saadun et al., 2018).

5.3. Direct and short-term financial benefits motivate smallholders to maintain RSPO certification

The results of regression analyses showed that physical capital, such as land size and assets, affects smallholders' willingness to maintain certification more than those representing human capital, such as education and farming experience. Direct and short-term benefits, such as sales of RSPO credits and social recognition, were the main benefits that

could significantly increase smallholders' willingness. However, it may take some time for these benefits to be realized enough to motivate smallholders to maintain their certification. In the group with the longer (5 years) history of certification, their decision was influenced by several factors, ranging from socioeconomic aspects (assets, age of plantation), financial benefits (sales from RSPO credits), and nonfinancial benefits (recognition), while in the group just certified (2 years), the socioeconomic factors (status in farmers' group, farmer age, land size) were the only variables that influenced their willingness. The certified smallholders we surveyed may be focusing on just getting direct financial benefits, since the nonfinancial benefits were already in place and accessible to them through organizational support from the NGO, and there may not be additional motivation to continue the certification. Although most smallholders reported that RSPO certification had increased their oil palm production, it was not enough to motivate smallholders to continue certification. However, further study may be needed in this area since we only asked the question based on smallholders' opinion, and not based upon actual yield data comparison (before and after certification). The impacts of RSPO certification on improving oil palm productivity for independent smallholders may be limited due to two factors (Hutabarat et al., 2018). First, the quality of seedlings affects oil palm productivity. If certified farmers already planted their oil palm without assessing the quality of seeds, technical training from the RSPO certification process can only go so far. Second, RSPO training can help farmers learn more about fertilizer application, which results in improved productivity, but some farmers may not be able to afford fertilizers anyway.

5.4. Characteristics of early adopters/leaders

The stakeholders we interviewed stated that culturally homogeneous groups are easier to organize; thus, cultural differences among independent smallholders could be a barrier to forming a group to be certified. Hidayat (2015) shared a similar finding that cultural differences affect the ability of farmers' groups to work together towards a shared goal to succeed in certification. We anticipated that perceived challenges, costs and benefits of RSPO certification would differ in the two sites. However, our results show that the more culturally homogeneous group (GTS) with a longer history of certification showed little difference (compared to FPS) in terms of their understanding of challenges, financial benefits, and nonfinancial benefits from certification.

There were significant differences between governing and regular members among certified independent smallholders, a point that has not been highlighted in previous studies. The socioeconomic data showed that governing members in both sites are middle-aged and more educated, with older plantations and higher incomes than regular members. In both sites we studied, regular members lacked understanding of the challenges and costs of the certification and were willing to follow the leadership of governing members.

5.5. Research implications

The results of this study suggest that it may take some time for the benefits of RSPO certification to become great enough to motivate smallholders to continue certification at their own expense, since extensive external support from the NGO was the key factor facilitating RSPO certification in both sites. Long-term sustainability of RSPO certification for smallholders largely depends on continued financial and organizational support from intermediary actors (e.g. NGO) and their donors. The RSPO certifying body must also recognize the limitations of smallholders and work with farmer groups to develop their capacity, but they must also work to streamline the process to ensure that certification and audit processes are more accessible. Thus, efforts to scale up RSPO certification should include broader strategies to build community capacity, assure market incentives, and develop an exit strategy for the NGO, or, alternatively, long-term commitments from donors to continue

funding NGO support. RSPO has recognized the needs to engage more smallholders and is developing separate new standards (e.g. RSPO Independent Smallholder Standards) to ensure smallholders' livelihood and market access and to simplify some of the certification requirements (RSPO, 2019b). Any future effort to promote independent smallholder certification should therefore include an explicit plan to cultivate agents of change in the communities and engage those smallholders with the socioeconomic characteristics of early adopters in the initial stage. The results of this study can help understand the characteristics of early adopters of sustainable oil palm development and identify those smallholders who can be targeted to promote RSPO certification in other smallholder areas.

Oil palm is the most recent addition to the suite of certified tropical commodities grown by smallholders, such as coffee, banana, and tea (DeFries et al., 2017; Lambin et al., 2014). Although non-state certifications in general have been associated with positive environmental outcomes, their social-economic impacts on smallholders have been mixed (DeFries et al., 2017). Studies on other commodities with a longer history of certification, such as coffee, from Africa and Latin America suggested that non-state certification generated more positive welfare effects from improved agronomic practices and increased productivity than from price premium effects and cautioned against adding more control mechanisms and overlapping certification schemes (Vanderhaegen et al., 2018).

The Indonesian government plans to require all smallholders to participate in mandatory oil palm certification, called the Indonesian Sustainable Palm Oil (ISPO). The criteria and principles of ISPO are considered less strict than those of RSPO (Hospes, 2014; Yaap and Paoli, 2014), and ISPO acceptance in global market is uncertain (Astari and Lovett, 2019). However, the mandatory ISPO certification can promote RSPO rather than competing, as it can help secure land tenure for smallholders, which is one of the most critical requirements of RSPO for smallholders (RSPO P&C 2: Operate legally and respect rights) and often the most difficult to comply without support (Brandi et al., 2015; Rietberg and Slingerland, 2016). If ISPO and RSPO can complement each other, it would be strategically beneficial for Indonesian government to expand their access to international market and for RSPO to continue their efforts on increasing the demand of sustainable palm oil around the world. The lessons learned from RSPO implementation can be used to accelerate and improve ISPO standards and implementation throughout the country. However, how ISPO will address potential trade-offs between environmental and social-economic outcomes, as well as those from overlapping certifications should be evaluated carefully.

6. Conclusion

Indonesia and Malaysia, which produce (84 %) and export (90 %) most of palm oil globally (USDA, 2020), have been under intense international scrutiny in relation to oil palm expansion and associated environmental issues. One recent example of such international pressure is the European Union (EU)'s decision to phase out palm oil from renewable resources for biofuel by 2030 (Jong, 2019). Even though this may not mean that the EU will ban palm oil altogether, it is a threat to international oil palm trade, since EU demand for palm oil for biofuel has continuously increased over the past years (ICCT, 2019). Non-state certification standards, such as RSPO, were created to tackle the reported environmental impacts of oil palm development by increasing the numbers of sustainably produced palm oil products around the world. However, if the EU phases out palm oil from the list of biofuel feedstock, the question remains as to whether the certification efforts for producing sustainable palm oil products will be continued into the future. Oil palm produces up to nine times more oil than any other oil crop. Simply banning palm oil will only shift the environmental problems to other crops (Meijaard et al., 2018). State and non-state actors on both side of the value chain will have to work together to manage palm oil production sustainably.

This study aims to understand the perceptions of independent smallholders about the challenges and benefits of RSPO certification, their willingness to maintain their certification and factors affecting their willingness. Our research focuses on the bottom of the palm oil supply chain, i.e. smallholders who produce 40 % of the global palm oil (RSPO, 2017). We found that global demand for sustainable palm oil products through the RSPO credits platform (PalmTrace) has influenced smallholders' decision on certification, although a premium price for palm oil has not been realized for smallholders.

Although this study is limited to one province in Indonesia, we believe that the findings of this study have broad implications for improving the design and approach for encouraging farmers to choose oil palm certification. Given the extensive dependency of the farmers' groups to NGO's and donor supports, we argue that structural changes are needed to secure scalability and long-term sustainability of RSPO certification for smallholders. In addition to developing the new standard for independent smallholders (RSPO, 2019b), institutional mechanisms can be built to share costs and risks of certifying smallholders among RSPO members and stakeholders including processors, traders, financial institutions, retailers, as well as manufacturers of consumer goods, as they also benefit from increasing sustainably produced palm oil. Nevertheless, additional studies are needed to systematically assess and quantify the factors driving smallholder participation in RSPO on a larger scale if we are to generalize the findings of this case study to smallholder groups in other areas. Future research can employ experimental designs for quantifying actual cost and benefits of certification for smallholders before and after the certification and stratifying the community experiences and outcomes under different types of intermediaries, such as NGOs, companies and government agencies.

Since smallholders are important actors in global palm oil production, we propose that civil society groups should continue to increase public awareness about palm oil sustainability through certification. Meanwhile, public policies are still needed to make sure no future oil palm expansion occurs in areas of high biodiversity and high conservation value. Creating synergies between public policy instruments and non-state certification standards is the preferred way to move forward in producing sustainably managed palm oil in Indonesia.

CRedit authorship contribution statement

Ernawati Apriani: Conceptualization, Methodology, Software, Data curation, Formal analysis, Investigation, Visualization, Writing - original draft. **Yeon-Su Kim:** Conceptualization, Methodology, Supervision, Writing - review & editing. **Larry A. Fisher:** Writing - review & editing. **Himal Baral:** Resources, Writing - review & editing.

Declaration of Competing Interest

The authors declare no conflict of interest.

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Appendix A. Supplementary data

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