On The Profitability of Sustainability Certification: An Analysis among Indonesian Palm Oil Smallholders

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The research is financed by the Royal Netherlands Academy of Arts and Sciences (KNAW) and the Directorate General of Higher Education (DIKTI) of the Ministry of Education and Culture of Republic Indonesia

Abstract

This paper analyses the profitability of palm oil certification through the use of a financial Cost-Benefit Analysis (CBA) and the assessment of Net Present Value (NPV). Better understanding the investment value of certification adoption can be used by policy makers or certification providers to bring more smallholders and to make certification more beneficial for the generally vulnerable smallholders. The results indicate that certification is currently profitable for different types of Indonesian palm oil smallholders. The extent to which certification is profitable depends on the smallholders’ pre-conditions. In the self-funded scenario certification is not profitable for scheme smallholders and only remains profitable for independent smallholders when they continue to receive premium prices. If premium prices are however removed the independent smallholders may need unrealistically high premium fees for certification to remain profitable in this scenario. Next to certification, we found that the organization of farmers around miller companies contributes positively to profit, even before certification takes place. Therefore investing in organization may be an effective form of government involvement.

Keywords: Profitability; palm oil; Indonesian smallholders; sustainability certification; RSPO

1. Introduction

If we consider monetary returns in relation to investments, oil palm is one of the most attractive commodities for smallholders, also compared to crops like cassava, rice, and rubber (Brandi et al., 2015; Suberiv & Vagneron, 2013). Although the expansion rate of oil palm plantations in Indonesia is slowly decreasing from 11% in 2009 to 7% in 2013 (Statistik Indonesia, 2014), the total land area of oil palm plantations owned by smallholders in Indonesia still increases every year. Oil palm plantations contribute positively to the economic situation of smallholders, particularly in rural areas (Allen Blackman & Guerriero, 2012; McCarthy, Gillespie, & Zen, 2012; WorldGrowth, 2011; WWF, 2013). Notwithstanding these positive effects, the expansion of palm oil plantations is not undated as many studies have also discovered negative effects of oil palm plantations on environment and social position of smallholders (McCarthy et al., 2012; More). Palm oil expansion is said to contribute to deforestation, greenhouse gas emissions, and land conflicts (Fitzerberht et al., 2008; Oxbizinski, Andriani, Komarudin, & Andrianto, 2012).

Awareness of international buyers about sustainability problems related to the production of agricultural commodities has led to the emergence of private sustainability certification standards (Basu, Chau, & Grote, 2004; Stahn, Chichaibelu, Stellmacher, & Grote, 2012), such as the Roundtable on Sustainable Palm Oil (RSPO). These standards can be seen as new governance models (Glasbergen, 2013) and alternative steering instruments for governmental regulation to overcome the downside effects of agricultural production (Oosterbeek, Adji, Vellema, & Stingerland, 2014).

The RSPO, as one of the most important organisations for sustainability certification (Offermans & Glasbergen, 2015), was established in 2004 (Preusser, 2015) and initially targeted large-scale producers (Schouten & Glasbergen, 2011; Silva-Castañeda, 2012). However, 42% of the Indonesian palm oil producers are smallholders who together own 4.42 million ha of oil palm plantations (Statistik Indonesia, 2014). Although palm oil certification has a potentially positive effect on smallholder’s livelihoods, certification does not improve smallholders’ vulnerable position or market access (Hidayat, Glasbergen, & Offermans, 2015). There are two types of smallholders in Indonesia (Brandi et al., 2013): the scheme smallholders, who are part of the larger palm oil company through formal partnerships that also provide the farmers with technical assistance, and the independent smallholders, who operate independently and without assistance from palm oil companies. Although both groups are differently organized and funded, they face comparable challenges to enroll in certification (Brandi et al., 2013), which puts them in a marginalized position from the sustainable palm oil market (Astiow, Mithofier, & Waibel, 2010; Fichter, 2013). These challenges include the lack of capacity and knowledge regarding compliance to the standards, the lack of organization and incentives to become involved, and high certification cost (Brandi et al., 2015). Therefore, even though the establishment of the RSPO took place more than a decade ago already, only 3.8% of the total Indonesian smallholders are certified (Estimated value).

Acknowledging the importance of smallholders in the oil palm production, the RSPO developed many sub-programs intended to bring in more smallholders in the certification. Examples are the Smallholders Task Force (STF) and the RSPO Smallholders Support Fund (RSSF) (Pescosia & Glasbergen, 2013). Furthermore, the Indonesian Sustainable Palm Oil (ISPO) sustainability standard that was developed by the Indonesian Government, is now mandatory for large-scale companies and will become mandatory for smallholders in 2022 (for more information see Hospe, 2014; Hospe & Kentin, 2012; Schouten & Bitzer, 2015).

Earlier research shows that financial benefits are the main motivation of smallholders to participate in sustainability certification (Hidayat et al., 2015). So far, it however remains unclear whether the new practices that go together with palm oil certification, present better profit. We argue that, for smallholders, certification adoption may be seen as an investment project that should offer tangible financial benefits in order to consider participation. Next, it is not only the present profitability of palm oil certification that matters and is uncertain, but also the potential future profitability. The latter is particularly uncertain because certified smallholders are currently dependent on companies or NGOs to pay the certification costs (Bitzer, Glasbergen, & Arts, 2013; Hidayat et al., 2015), and to provide the farmers with a premium fee. Both forms of support can however not be guaranteed into the future, and changes may result in consequences for smallholders’ profit, making certification adoption less attractive.

To this end, this study analyses whether or not certification is profitable for Indonesian palm oil smallholders. We defined two research questions: (1) to what extent and in what way is sustainability certification profitable for Indonesian palm oil smallholders? (2) Following from the fact that certification costs are currently paid by the affiliated miller companies or donors we question: Is certification still profitable for Indonesian palm oil smallholders if they had to pay all certification costs themselves? If not, how much premium fee would then be necessary to make certification profitable for the smallholders for all groups? The way to analyse the profitability of palm oil certification is to use cost-benefit analysis. This analysis assesses the profitability of an investment project or program (Campbell & Brown, 2003) as an aid for decision making (Zerbe & Dively, 1994). It provides information on whether or not a particular project is worthwhile (Gee, Brown, 2003; Present & Turvey, 1965) gives present resources and benefit values, comparing costs and benefits in the case of project adoption and in the case wherein the project will not be adopted, or will be adopted in a different way. This approach helps to better understand the investment value of certification adoption. This information, on its turn, can be used by policy makers or certification providers to bring in more smallholders and to make certification more beneficial for the generally vulnerable smallholders.

First we present information from previous studies on profitability of certification adoption (section 2), that need to be considered when studying the framework to assess profitability of the sustainability certification. Then we present in section 3. Sections four and five introduce the research methods, study sites and characteristics of the smallholder respondents. Our findings are presented in section six, before turning to the conclusion in section nine.

2. Literature Review

There are several studies on the economic effects of certification. Most of them however focus on the effects of certification on gross income. For example, Méndez et al. (2010) who indicate positive effects of certification on gross income, or Ruben and Zuniga (2011) and Ruben and Fort (2012) who use a so-called Propensity Matching Score to compare differences in gross income between certified and uncertified farmers. Other impact studies compare differences between certified and uncertified farmers by looking at the revenue, costs, prices, and the costs of production. Some authors refer to this as profit (Blackmore & Keeley, 2012; Valkilia, 2009), others as net income (Christopher M. Bacon, Ernesto Méndez, Gómez, Stuart, & Flores, 2008; Jena et al., 2012), or gross margin (Bachmann, 2012; Beuchelt & Zeller, 2011). Although these studies use the same concept, they show conflicting results. Bachmann (2012), C. M. Bacon (2010), A. Blackman and Rivera (2011), and Blackmore and Keeley (2012) for example, conclude that certification contributes to higher profits for farmers. Christopher M. Bacon et al. (2008), Beuchelt and Zeller (2011), Valkilia (2009) however, argue that the economic effect of certification is not clear and dependent on the type of certification, the price of uncertified commodities and the existence and size of a price premium. Jena et al. (2012) in their study about the profitability of coffee certification even reveal a negative contribution of certification to net incomes. Therefore these presented studies share one important limitation as they only focus on production costs and therewith neglect the costs of certification in their calculations. Therefore these studies can be expected to present an incomplete understanding of the effects of certification on profitability.

Studying the profitability of sustainability certification while including the costs of certification is not entirely new, but results from existing studies often conflict. Some studies pointed out that certification adoption is profitable for farmers (Nua, Yusif, Hidayat, & Hanna, 2013; WWF, 2012), while other studies revealed that
certification we developed a conceptual framework (see Figure 1), which adopts four starting points:

First, the profitability of certified and non-certified oil palm plantations depends on: (1) investment costs, such as the cost of establishing the plantation and purchasing agricultural equipment, (2) operating costs, like the cost for fertilizer and labour, and (3) benefits resulting from the revenues of selling Fresh Fruit Bunch (FFB). Certified farmers have additional costs related to certification, but also additional benefits in the form of a premium fee (resulting from the certificate) and, for the certified independent smallholders, a premium price (resulting from higher quality FFB).

Second, we assume that profitability may be influenced by governmental policies or programs such as fertilizer subsidies, and relationships between farmers and market chains, for example in the form of contract farming (Simmons, Winters, & Patrick, 2005) or, specifically for Indonesia, Nucleus Estate Smallholder schemes (NES).

Third, we also assume that social economic characteristics, such as relatively high education, long working experience, good access to agricultural extension programs, tenancy, and the presence of non-farm income may contribute to smallholder’s profit (Rahman, 2003).

Fourth, following Simula et al. (2004), we distinguish between direct costs and benefits and indirect costs and benefits of certification (see Figure 2). The direct costs refer to all costs associated with the certification process, such as auditing costs and costs to prepare for the certification process. Indirect costs result from activities that are required as part of the certification, such as document recording, and the costs for soil and water conservation.

Direct benefits are monetary benefits directly resulting from certification (premium fee and premium price). The indirect benefits consist of monetary benefits (e.g. cost reductions resulting from economies of scale, higher revenues following better FFB quality, and reductions in FFB depreciation resulting from better harvesting practices and post-harvesting treatments) and non-monetary benefits. The latter relate to human capital (for example, better knowledge), social capital (e.g. participation in farmer organizations) and natural capital (e.g. better environmental quality) (see Hidayat et al., 2015 for more information).
In the first step we calculated the present nominal values of costs and benefits based on interviews with farmers. In these interviews we asked the farmers about the quantity of their FFB production kapling = 2ha year, the latest price received for their FFB, and the latest input costs. The farmers were asked to specify quantities of products used and sold in the past \(^1\) and we approached quantities of products in the future by interviewing farmers and agronomists. Palm oil experts. These quantities are multiplied with current prices to specify past and future costs and benefits in cash flow.

Directly summing up these values to calculate the overall NPV of a plantation for its entire lifetime would neglect the influence of time preference. Therefore, in the second step we corrected all costs and benefits resulting from the first step for time preference. We multiplied the numbers for costs and benefits from the first step by the compounded interest factor for the years in the past till the present time. We multiplied values in the future by the discount factor for the years between the current plantation’s age and 25 years. The used formula of NPV equals:

\[
NPV = \sum_{t=0}^{z}PV_B - \sum_{t=0}^{n}PV_C
\]

Where, \(PV_B\) = present value benefit year-\(t\); where compounding is used if \(0 \leq t \leq z\) (for the past), and discounting is used if \(z \leq t \leq n\) (for the future).

\[
NPV = \sum_{t=0}^{z}PV_B + \sum_{t=z+1}^{n}PV_C
\]

\[
= \sum_{t=0}^{n}PV_C(1+FT)^{-t}
\]

\[
= \sum_{t=0}^{n}PV_C(A\%)^{-t}
\]

Where, \(PV_B = \) present value benefit year-\(t\); where compounding is used if \(0 \leq t \leq z\) (for the past), and discounting is used if \(z \leq t \leq n\) (for the future).

Following our earlier mentioned interpretation of profitability we consider certification profitable if the NPV of certified farmers is higher than the NPV of non-certified farmers (see Figure 3). However, to be sure that differences in NPV can be attributed to certification, we included three control variables that are largely believed to influence profit in our analysis:

Socio-economic characteristics to control for the potential effects of education, experience and the receipt of governmental support on profits. These characteristics were included in a regression analysis \(^7\). We define the average of last year’s monthly profit (\(B-C\)) as dependent variable whereas the independent variable of interest is the status of certification (1=in the process to certification, but not fully certified yet and 3=full compliance/certified) (CERT). Subsequent independent variables include: government support (GOV_USED), education (EDU), experience (EXP), income from other activities than oil palm plantation (OTH), status of smallholders (STATUS), ownership of other oil palm plantations (OPTH), and productivity per kapling (PROD). The equation of the regression analysis equals:

\[
\text{INCOME_MON} = (1\times \text{CERT}, \text{GOV_USED, EDU, EXP, OTH}) + \text{STATUS, OPTH, PROD})
\]

4. Research Methods

In order to assess the profitability of certification adoption, we interviewed five groups of smallholders: (1) certified scheme smallholders, (2) non-certified scheme smallholders, (3) certified independent smallholders, (4) non-certified independent smallholders and (5) prospective independent smallholders. The surveyed smallholder groups were selected using cluster sampling techniques. We interviewed 214 smallholders, 50 being drawn from each of the certified and noncertified groups (both scheme and independent) and 14 from the prospective smallholders. To guarantee data reliability we conducted interviews aimed at certification of the data with 7 informants: the head of a farmer association (N=1) and cooperative (N=1), plantation workers (N=2), experienced smallholders (N=2), and a Nucleus Company representative (N=1).

To analyse whether certified smallholders gain more profit than non-certified smallholders, we calculated and compared the Net Present Value (NPV) of all smallholder groups through a two-step approach.

\[\text{NPV} = \frac{PV - CT}{(1+\text{Discount factor})^{t}}\]

Where, \(PV\) = Past value, \(CT\) = Current costs, \(t\) = number of years, \(\text{Discount factor}\) = \((1+\text{Real discount rate})^{-t}\), \(\text{Real discount rate}\) = \(\text{Nominal discount rate} - \text{Inflation rate}\).

Although we see that it may be reasonable to include the age of a plantation as independent variable, it could not be done for this case, as we have already included the experience of farmers (in years) as an independent variable. The majority of farmers are under their first plantation cycle. Therefore, the plantation cycle age is the same for the majority of cases similar. Including both would result in severe multicollinearity problems. The selection of variables results from the literature overview provided in section on the conceptual framework and relies on Rahman (2003); Simmons et al. (2005).
If the variable certification (CERT) significantly influences last year’s monthly profit (B), we can conclude that certification explains variation in profitability.

Organization. To see whether differences in NPV mainly result from certification or from a better organizational structure in which the certified farmers are emplaced, we included the NPV of so-called independent farmers (who are organized already, but not certified yet) in our analysis. We calculated the NPV values for this group and performed an independent T-test to statistically compare the differences in profit between the different smallholder groups.

Pre-condition before certification. Hidayat et al. (2015) observed that certified smallholders may have been better off in terms of productivity before they became certified compared to non-certified farmers. In a first step, we therefore used the independent T-test to compare the productivity of certified smallholders before and after certification adoption. If this test indeed reveals no significant differences between the productivity before and after certification adoption, we can conclude that the certified smallholders have been better off, and continue to control for the influence of productivity on profitability. In the second step, we also included the benefits from receiving premium fees in the calculation of the NPV of certified scheme smallholders.

The adoption of certification is profitable if the certified NPVs are higher than the non-certified NPVs of the controlling groups (i.e. non-certified smallholders, prospective smallholders and preliminary smallholders, those who were better off already before joining certification).

NPV values for the certified smallholders are 35% or $48,919.72 higher than the non-certified smallholders (those who were better off already before joining certification).

NPV certified scheme (O) = (A - d)

NPV non-certified scheme (R) = (A - d)

NPV certified independent (B) = (B - b)

Profitability of certification for independent smallholders corrected by influence of organization on profit

The adoption of certification is profitable for the smallholders if O, P, Q, R and S are positive.

NPV of certified scheme smallholders is 35% or $48,919.72 higher than the NPV of the non-certified smallholders. For independent smallholders, certification is even more profitable as the NPV of certified independent smallholders is 89% or $39,279.38 higher than for the non-certified independent smallholders (Table 1). Although the certified scheme smallholders can be considered the most profitable palm oil farmers, the independent smallholders generally gain most when they become certified (e.g. a 89% increase in profit).
produce around 19 ton/year/ha. The certified scheme smallholder’s premium fee is received and managed by the farmer organizations that also pay the certification costs. In terms of operating and investment costs, the certified scheme smallholders pay relatively lower costs than the non-certified scheme smallholders (see Table 3). This results in lower costs for the plantation’s establishment and lower costs for spraying. The latter can be explained by referring to their centralized plantation management system that allows for purchasing large quantities for lower prices and changing agricultural practices that require less chemical usage.

Table 2. Benefits of the oil palm smallholders, average value per year/ha

<table>
<thead>
<tr>
<th>Smallholder group</th>
<th>FFB selling ($/year/kapling)</th>
<th>Premium fee ($/year)</th>
<th>Total benefit ($/year/kapling)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certified scheme</td>
<td>6,492.39</td>
<td>-</td>
<td>6,492.39</td>
</tr>
<tr>
<td>Non-certified scheme</td>
<td>4,900.45</td>
<td>-</td>
<td>4,900.45</td>
</tr>
<tr>
<td>Certified independent</td>
<td>4,950.64</td>
<td>197.14</td>
<td>5,147.78</td>
</tr>
<tr>
<td>Non-certified independent</td>
<td>3,037.33</td>
<td>60.00</td>
<td>3,197.33</td>
</tr>
<tr>
<td>Prospective independent</td>
<td>4,280.38</td>
<td>177.02</td>
<td>4,457.40</td>
</tr>
</tbody>
</table>

Note: *) The average is counted by considering the period in which the smallholders have adopted the certification: for the scheme smallholders this equals 6 years and for the independent smallholders 13 years.

The difference between the NPV of the certified and non-certified independent smallholders’ results from higher benefits, and not from lower costs as was the case for the scheme smallholders. A higher productivity, resulting from changing practices, again explains why certified independent smallholders have higher benefits than the non-certified independent smallholders. (On average, the productivity of the non-certified smallholders equals 12 ton/year/ha, compared to 15 ton/year/ha for the prospective independent smallholders.) Moreover, a stronger organization opens opportunities for the independent smallholders to bypass middlemen through directly selling their FFB to a Miller Company. This results in higher selling prices that lie around $17 (per ton FFB) higher than the prices for FFB received by the non-certified smallholders. Additionally, the certified independent smallholders receive a premium price of about $3/ton FFB (average premium price of the last year) or $197.14/year/kapling from the Affiliated Miller Company. The sale of Green Palm certificates (i.e. premium fees) offers another source of capital for the certified independent smallholders. The prospective independent smallholders do not receive premium fees from the Green Palm certificate sales yet, but they do benefit from higher FFB prices as they are already affiliated to a miller company (see Table 2).

Table 3. Costs for Indonesian oil palm smallholders, average value per year

<table>
<thead>
<tr>
<th>Costs structure</th>
<th>Certified scheme</th>
<th>Non-certified scheme</th>
<th>Certified independent</th>
<th>Non-certified independent</th>
<th>Prospective independent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment costs</td>
<td>351.27</td>
<td>380.37</td>
<td>380.85</td>
<td>295.26</td>
<td>271.47</td>
</tr>
<tr>
<td>Land clearing</td>
<td>74.78</td>
<td>79.18</td>
<td>85.64</td>
<td>51.96</td>
<td>51.96</td>
</tr>
<tr>
<td>Agricultural Equipment</td>
<td>276.48</td>
<td>380.93</td>
<td>47.37</td>
<td>32.88</td>
<td>39.10</td>
</tr>
<tr>
<td>Plantation establishment</td>
<td>-</td>
<td>-</td>
<td>9.68</td>
<td>9.94</td>
<td>9.94</td>
</tr>
<tr>
<td>Land clearing</td>
<td>-</td>
<td>-</td>
<td>22.02</td>
<td>6.98</td>
<td>6.94</td>
</tr>
<tr>
<td>Rehabilitation of Plantation</td>
<td>-</td>
<td>-</td>
<td>11.73</td>
<td>7.87</td>
<td>6.44</td>
</tr>
<tr>
<td>FFB collecting place</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>30.75</td>
<td>-</td>
</tr>
<tr>
<td>Contribution of farmers to association /costs of certification</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Operating costs</td>
<td>1,990.14</td>
<td>1,529.85</td>
<td>1,439.04</td>
<td>1,020.78</td>
<td>1,341.39</td>
</tr>
<tr>
<td>Plantation maintenance</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Spraying</td>
<td>76.12</td>
<td>176.51</td>
<td>102.45</td>
<td>138.46</td>
<td>158.54</td>
</tr>
<tr>
<td>Irrigation and tapak kuda/ maintenance</td>
<td>7.97</td>
<td>22.62</td>
<td>8.26</td>
<td>39.75</td>
<td>39.75</td>
</tr>
<tr>
<td>Fertilizer application</td>
<td>442.14</td>
<td>469.04</td>
<td>744.05</td>
<td>625.38</td>
<td>605.94</td>
</tr>
<tr>
<td>Pruning</td>
<td>88.64</td>
<td>105.01</td>
<td>75.24</td>
<td>78.14</td>
<td>36.42</td>
</tr>
<tr>
<td>Management Fee</td>
<td>16.98</td>
<td>112.49</td>
<td>80.68</td>
<td>-</td>
<td>71.11</td>
</tr>
<tr>
<td>Road maintenance</td>
<td>45.77</td>
<td>35.59</td>
<td>54.08</td>
<td>-</td>
<td>77.74</td>
</tr>
<tr>
<td>Harvesting</td>
<td>385.83</td>
<td>358.59</td>
<td>192.59</td>
<td>143.05</td>
<td>125.93</td>
</tr>
<tr>
<td>Weighing</td>
<td>99.90</td>
<td>40.34</td>
<td>-</td>
<td>-</td>
<td>35.56</td>
</tr>
<tr>
<td>Transportation costs</td>
<td>527.76</td>
<td>211.52</td>
<td>145.63</td>
<td>-</td>
<td>170.16</td>
</tr>
</tbody>
</table>

The cost structure also differs between scheme and independent certified farmers (see Table 3).

1 The average is counted by considering the period in which the smallholders have adopted the certification: for the scheme smallholders this equals 6 years and for the independent smallholders 13 years.
2 Standard deviation: overall—28%; certified scheme—14%; non-certified scheme—20%; certified independent—17%; prospective independent—29%; non-certified independent—34%
3 Coefficient of variation (CV): overall—28%; certified scheme—11%; non-certified scheme—22%; certified independent—15%; prospective independent—24%; non-certified independent—42%. The CV for the non-certified independent is relatively high due to variation in input use, as a consequence of differences in capital ownership. It further implies higher CV of profit gained by non-certified independent smallholders.
4 Tapak kuda (horsetail) is a technique of soil and water conservation in oil palm plantation which located on sloped areas (3–28°)
Table 5. The results of the T-test analysis for fertilizer expenses, productivity, price, and profit among smallholder groups

<table>
<thead>
<tr>
<th></th>
<th>Prospective vs non-certified smallholders</th>
<th>Prospective vs non-certified independent smallholders</th>
<th>Non-certified vs certified independent smallholders</th>
<th>Non-certified vs certified scheme smallholders</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>Mean Difference</td>
<td>Sig. (2-tailed)</td>
<td>Mean Difference</td>
</tr>
<tr>
<td>Fertilizers expenses ($)</td>
<td>0.002</td>
<td>194.6123</td>
<td>0.383</td>
<td>57.7739</td>
</tr>
<tr>
<td>Productivity (kg/can/ year)</td>
<td>0.000</td>
<td>13.0732</td>
<td>0.003</td>
<td>-7.3866</td>
</tr>
<tr>
<td>Price ($/kg)</td>
<td>0.000</td>
<td>17.84</td>
<td>0.601</td>
<td>-0.14</td>
</tr>
<tr>
<td>Profit ($/kg/ year)</td>
<td>0.000</td>
<td>1799.28</td>
<td>0.013</td>
<td>-882.924</td>
</tr>
</tbody>
</table>

Table 6. The result of the T-test analysis of the certified smallholders before and after the certification adoption

<table>
<thead>
<tr>
<th>Scheme smallholders</th>
<th>t-test for Equality of Means</th>
<th>Independent smallholders</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t</td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td>Productivity</td>
<td>1.271</td>
<td>0.219</td>
</tr>
<tr>
<td>FFB sale ($/Revenues)</td>
<td>1.096</td>
<td>0.287</td>
</tr>
</tbody>
</table>

Table 7. The results of the T-test analysis for fertilizer expenses, productivity, price, and profit among smallholder groups corrected by influence of organization on profit

<table>
<thead>
<tr>
<th>Scheme smallholders</th>
<th>(O)=(A-a)= $</th>
<th>(R)=(A-d)</th>
<th>(P)=(B-b)</th>
<th>(Q)=(A-c)</th>
<th>(C)= $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certified scheme ($187,854.23)</td>
<td>48,919.72</td>
<td>48,584.39</td>
<td>$19,308.82</td>
<td>$356.63</td>
<td>$19,308.82</td>
</tr>
<tr>
<td>Non-certified scheme ($83,603.19)</td>
<td>51,243.97</td>
<td>2,282.54</td>
<td>$546.35</td>
<td>$546.35</td>
<td>$546.35</td>
</tr>
</tbody>
</table>

Note: *) It is analysed based on price in 2014

Figure 4. Summary of profitability of the certification adoption under actual condition

Figure 5. Profitability of certification adoption in the self-funded scenario

Table 7 further specifies the certification costs for scheme and independent smallholders in the self-funded scenario. These costs are much lower for the scheme smallholders (50%) than for the independent smallholders. This results from the fact that some costs are necessary to be paid by independent smallholders but not by the scheme smallholders (for example data verification costs, certification group establishment (Association), RSPO membership costs, compliance to legal aspects (Cultivation Registration Certificate/Surat Tanda Daftar Budidaya/STDB) and the operating costs of farmer associations). Moreover, due to the connectedness of scheme smallholders with their Nucleus Company, some certification costs, like the costs of training and internal audits, can be saved as they are taken up by the Nucleus Company.
Next to monetary benefits, certification contributed positively to non-monetary aspects. These aspects include ease of selling FFB, participation in farmer organizations, access to knowledge and training, better safety and health, environmental conservation and biodiversity.

Both independent smallholders and scheme smallholders argue that certification enhances the exchange of knowledge and participation of smallholders in farmer organizations. Farmer organization meetings and for independent smallholders also incentive for ICS participation of certified independent smallholders in farmer organizations increases after they become certified. Through these regular meetings, members have the opportunity to become informed about activities undertaken by the farmer organization, which contributes to transparency and accountability, and about recent developments in, or affecting, the palm oil sector.

Table 8. Benefits of certification in the self-funded scenario

<table>
<thead>
<tr>
<th>Smallholder group</th>
<th>Premium price ($/year)</th>
<th>Certified scheme</th>
<th>Certified independent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>197.4$12+</td>
</tr>
</tbody>
</table>

Note: *) The average is counted by considering the period in which the smallholders have adopted the certification: for the scheme smallholders this equals 6 years and for the independent smallholders 13 years.

In the scenario we assume that the smallholders receive the premium fees and prices (see section 4). This implies that the certified scheme smallholders receive a premium fee in the worth of $37.35/year, while the certified independent smallholders maintain their $197.4/year premium price and $60.0/year premium price (Table 8).

To transform certification into a profitable investment project for the scheme smallholders in the self-funded scenario, a minimum premium fee of $8.6/ton CPO, which is roughly twice as much as the fee that is currently received by the scheme smallholders’ organization ($4/ton CPO), is necessary. The minimum premium fee decreases if the scheme smallholders adopt certification from the beginning of the plantation period, as this may allow costs to be distributed over a longer period. In the case of early adoption, a minimum premium fee of $8.5/ton CPO is necessary to maintain the same profitability compared to the pre-condition before certification (break-even point). As this is a significantly high amount compared to the current fees, it is questionable whether certification will be profitable for scheme smallholders in the self-funded scenario.

In the long-term, the receipt of a premium price is uncertain as it relies on the policies of affiliated companies to provide an incentive for independent smallholders of being certified and applying the best management practices. If the independent smallholders do not receive premium prices anymore, but nonetheless pay all certification costs themselves, certification adoption is no longer profitable for them: the NPV will go down by 5%. In this case, the independent smallholders need to receive a minimum of $29.7/ton CPO to reach the break-even point. Considering the rate of the actual premium fee for independent smallholders, which reaches $15/ton (Wangtrakulskul & Yodprijit, 2013), the sustainability certification may only be profitable for independent smallholders if they receive a premium fee that is 93% higher than the actual premium fee. However, this seems to be an unrealistic situation, particularly as the supply of Crude Sustainable Palm Oil (CSPO) is already much higher than the demand, leading to an oversupply of 55/1. Given this oversupply, it is unlikely that premium fees will increase dramatically. Therefore, certification will not be profitable for independent smallholders in the self-funded scenario where premium prices will be cut.

1 CSPO production in 2014: 11,909,121 tonnes; CSPO uptake in 2014:5,349,666 tonnes (http://www.rspo.org/about/impact).
in the self-funded scenario. A collapse of premium prices implies that the independent smallholders would need $29.7/ton CPO premium fee to reach a breakeven position. This amount of fee is however twice as much as the current premium fee. Considering the current oversupply of sustainable palm oil (SPO), it seems that a 100% increase in premium fee is not realistic. Therefore, it is very unlikely that certification remains profitable for independent smallholders if they do not receive premium prices anymore in the self-funded scenario.

The practical relevance of this study is two-fold. First, it may support the RSPO’s intention to bring in more smallholders. The results indicate that in the present situation, certification is financially profitable for all types of smallholders. Given the fact that financial considerations are among the most important drivers for smallholders to join certification, communication of the results may result in higher smallholder adoption rates and make smallholders decide to invest upfront costs with the prospect of high profits. Although investment costs for independent smallholders can be substantially limited by making use of hand-tools and family labour, the time needed to develop a well running plantation will be relatively high. It may be good to smoothen the access of independent smallholders to credits. We have also seen that certification adoption is not only profitable for farmers with young plantations, but also for farmers with old plantations (20-25 years). This indicates that certification as an investment project already offers tangible benefits in the short term. What we have furthermore seen is that certification (although still being profitable) does not significantly contribute to a better productivity for the scheme smallholders. The explanation is that these smallholders are already well off in terms of productivity before they became involved in the certification process. The question why the certification process with its trainings and focus on Good Agricultural Practices (GAP) does not succeed to increase the productivity of this group of smallholders needs further investigation. Possibly, the plantation’s age may play a role in this, or the level and intensity of trainings that are (sometimes) already provided to scheme smallholders by the affiliated companies.

Second, it may contribute to better targeting certification programs (privately e.g. RSPO and publicly e.g. ISPO) for the benefit of the smallholders. We furthermore found that the organization of farmers around a miller company significantly contributes to higher profits. Such an organization assures higher FFB prices, lower costs, and better opportunities to structurally sell FFB. In the current structure, however, it is impossible for independent smallholders to become organized around a miller company without being in the process towards certification. Certification in this scenario will still be profitable, but also implies a rather long and sometimes difficult process to comply with all formal requirements. Organization on the other hand, would be a faster less complicated process if it is focused around an agreement between farmer groups and a miller company. Investing in organization may therefore be an effective form of government involvement. As our results indicate that governmental provision of seeds and fertilizer does not contribute to farmer’s profits. A further exploration of the ineffectiveness of current governmental programs to increase profits, and the potential role of the organization of farmers around miller companies is therefore an interesting topic for further research. Furthermore, if certification will turn out to be a self-funded project, it is absolutely crucial that premium prices will be maintained. Otherwise, certified farmers will need unrealistically high amounts of premium fee, which most smallholders will not be able to pay.

This study reveals the importance of relations between farmer organizations, certification and the ability of farmers to improve their profit. However, the exact interrelations between these components, as well as their effects (individually, but also collaboratively) on smallholder’s livelihoods remains unclear. Particularly the question whether strengthening the organization of farmers, without certification, would contribute significantly and positively to the smallholders’ livelihoods, and how and to what extent certification could potentially play an additional role in this, deserves further investigation. An example of such a study applied to coffee certification can be found in Bins, Offermans, and Glasbergen (2016).

In research, it may also be interesting to investigate how profit would change if the institutional arrangements between certified scheme smallholders and their affiliated companies would change (and if smallholders would really pay all costs, including RSPO membership fees). Methodologically, our approach could benefit from a more longitudinal approach in which we do not only calculate real quantities, but also real costs and benefits during the entire life time of a plantation. This approach would then also ask for the inclusion of different scenarios for discount rates as these are inherently uncertain and depend on global and national developments in economy (for example inflation) and politics. Moreover, stricter selection on sampling bias may be applied for example by considering information and knowledge flows about certification, ownership of the produced palm oil and independent smallholder plantations (scenarios with better insight into the effects). In addition, it might also be important to monetize non-market costs such as opportunity costs of smallholders to actively involve in organization, and non-market benefits of certification such as environmental improvements, and better health and to internalize them in the calculation of economic benefit analysis. By doing so, we approach the potential benefits of certification on a national/public scale instead of on an individual scale.


