Jurnal Penelitian Pertanian Tanaman Pangan
Vol. 5 No. 2, Agustus 2021: 159-170 *DOI: http//dx.doi.org/10.21082/jpptp.v5n2.2021.p159-170*

Sustainable Partnerships in Cassava Production and Industrial Sector: A Heckprobit Analysis of Indonesian Farmers

Kemitraan Berkelanjutan di Dalam Sektor Produksi dan Industri Ubikayu : Analisis Heckprobit Petani Indonesia

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Naskah diterima 2 November 2020, direvisi 13 April 2021, disetujui diterbitkan 2 Agustus 2021

ABSTRAK

Kemitraan merupakan instrumen untuk mengatasi ketidakmampuan perorangan untuk menyelesaikan masalah pembangunan yang terkait dengan sektor pertanian dan rantai komoditas. Meskipun sangat dianjurkan, kemitraan berkelanjutan jarang terjadi di sektor ubi kayu Indonesia. Pengetahuan juga terbatas karena kurangnya literatur yang relevan mengenai kemitraan di sektor ubi kayu. Studi ini mengkaji alasan penghentian kemitraan (antara industri dan petani produsen ubi kayu) yang pernah ada di sistemproduksi ubi kayu dan mengkaji apa yang menentukan kesediaan petani untuk ikut serta dalam kemitraan dimasa datang. Studi ini menggunakan sampling acak sistematis untuk menyurvei 140 petani produsen ubi kayu di Kabupaten Lampung Tengah dan Lampung Timur pada bulan November 2018 hingga April 2019. Petani di wawancarai dan diberikan kuesioner. Data kuantitatif dianalisis dengan analisis heckprobilt. Hasil studi menunjukkan bahwa kemitraan berakhir karena kedua belah pihak tidak memiliki visi yang sejalan dalam bekerja sama. Berbagai variabel (seperti hambatan penjualan, rendahnya harga, ketidakakuratan timbangan, tingginya harga transaksi, dan potongan penjualan) menunjukkan kompleksnya pertimbangan petani untuk mengikuti kemitraan. Implikasi dari penelitian ini adalah sulit tercipta kemitraan dimasa datang bila petani dan industri memiliki visi dan prioritas yang berbeda.

Kata kunci: Kemitraan, determinan partisipasi, ubi kayu, analisis heckprobit, Indonesia

ABSTRACT

Partnerships are instruments to overcome the inability of individual smallholders to solve the development problems associated with agricultural sectors and commodity chains. While vigorously advocated, a sustainable partnership is rare in the Indonesian cassava production and industrial sector. Knowledge of partnership from the sector is also limited. This study explores the reasons for previous partnerships in the cassava production and industrial sector discontinued and examine what factors determine farmers' willingness to partake in partnerships. The study administered a systematic random sampling to survey for 140 cassava farmers in Central and East Lampung Districts from November 2018 to April 2019. Farmers were interviewed and given a structural questionnaire. The quantitative data were analyzed by heckprobit regression. The results of the study show that the partnership ends because the two parties do not have the same vision for working together. Various variables (barriers to selling to non-industries, low prices, inaccurate weighing scales, high transaction costs, and discounted prices.) indicate the complexity of farmers' considerations for joining the partnership. This research impliesthat it is difficult to create partnerships in the future if farmers and industry have different visions and priorities.

Keywords: partnership; cassava sector; determinant of participation; heckprobit; Indonesia

INTRODUCTION

Partnerships have the potential outcomes to deliver multiple benefits that can contribute to sustainable agriculture development. Refers to a process of collaboration between actors and stakeholders, partnerships aim to restructure and build new social relationships among the actors or stakeholders, and thus, instigating a more efficient and competent practice of agribusiness management (Vermeulen et al. 2008; Bitzer and Glasbergen 2015; Marquis et al. 2019). Partnerships are smallholder farmers inclusive but require governments, businesses, NGOs, and other supporting institutions to involve (Jones 2004; Purbo et al. 2019).

Smallholder farmers often have low education levels, inadequate skills and knowledge, insufficient capital, and limited access to affordable farming inputs. Although smallholders are large, weak farmer organizations and little bargaining powers render them unable to determine market and price (Poole 2017; Dessie et al. 2019). Therefore, smallholders are encouraged to partake in partnerships. However, FAO (2016) argued

that despite the potential, partnerships face many criticisms and potential downfalls because of the lack of evidence-based results.

Indonesian cassava farmers are generally smallholder farmers, and they are the leading producers in the cassava sector (the Indonesian Ministry of Agriculture 2016; the Indonesian Ministry of Agriculture 2019). Compared to other tropical crops (e.g., coffee, palm oil, and cocoa), cassava is more adaptive. Cassava grows on all islands in Indonesia throughout the year on almost all soil, temperature, and humidity (the Indonesian Ministry of Agriculture 2016; the Indonesian Ministry of Agriculture 2019). It can also grow well in semi-arid lowlands and offer employment to the local people, which further discourages the people from commuting to the highlands encroaching the protected forests. Therefore, cassava also contributes to environmental protection. According to Prasmatiwi (2009), unemployment is one of the leading causes of deforestation (in the highlands) in Indonesia. Many encroachers come from various regions that far from the forests (even from Java to Lampung Sumatra).

Partnerships are not new arrangements for the cassava sector. They have been implementing since the 1980s in Lampung Province (Kompas 2008; Sugino and Mayrowani 2009; Widjaya and Hasanuddin 2017), which is the most significant cassava-producing region in the country. The province contributes around 33.93% to domestic cassava production and 27.71% to national cassava harvesting area (the Indonesian Ministry of Agriculture 2016; the Indonesian Ministry of Agriculture 2019). In the province, partnerships involved cassava farmers and tapioca mills industries. Sugino & Mayrowani (2009) and Widjaya & Hasanuddin (2017) argued that the partnerships improved farmers' welfare and secured cassava supply for the industries. However, the local extension officers claimed that barely is an ongoing partnership in the cassava sector. Field observations further confirmed the claim, and contrary to the previous research, the partnerships were transient and rather unavailing. The causes are uncertain yet.

Many studies on cassava in Indonesia revolved around the themes and issues of farming, marketing, food, and land (See, for example, Asnawi 2014; Destianto and Pigawati 2014; Mun'im 2016; Siburian, Sebayang, and Sihombing 2013; Thamrin, Mardhiyah, and Marpaung 2015). Only a few studies found on partnerships, highlighting some positive impacts of the collaboration that benefited the actors involved (Sugino and Mayrowani 2009; Widjaya and Hasanuddin 2017). As mentioned above, however, the benefits may not be relevant anymore. Besides, many studies on Indonesian cassava are weak in terms of their methods of analysis. The research may not eliminate biases during the evaluations. As a consequence, the knowledge of the Indonesian cassava sector remains fragile and limited, particularly on partnerships.

The common biases observed are selection bias and probability bias. Literature associates selection bias with an erroneous sampling method that leads to improper randomization, meaning the samples collected are not random and do not represent the population (Ruben and Fort 2012; Van Rijsbergen et al. 2016; Stata Corp 2018). Probability bias arises because of a researcher neglecting probability while testing people's decisions (Greenstone and Gayer 2009; Khandker et al. 2009; Alderete 2019).

This study focuses on exploring partnerships in the cassava production and processing industrial sector of Lampung Province. First, the study aims to explore why the previous partnerships discontinued. Whether farmers willing to (re) engage in partnerships is also uncertain. If they are unwilling, the farmers are likely to preclude themselves from participation, and promoting partnerships in the sector be ineffectual. Therefore, second, the study aims to investigate what factors determines cassava farmers' willingness to partake in partnerships by applying reliable methods (to eliminate biases). The next part of this article provides theoretical perspectives on partnerships in the agricultural sector, followed by the overview of the Indonesian cassava production and industrial sector, research methods, results and discussions, and conclusions and the implications of the findings.

MATERIALS AND METHODS

Respondent Selection

Central Lampung and East Lampung Districts are the cassava production centres of Lampung Province, contributing 24.17% and 21.73% to the province, respectively (BPS-Statistics Lampung Province 2019). The cassava farmers were surveyed in both districts. Based on information during field visits (pre-survey), the farmers collectively engaged in the previous partnerships through their farmer groups, called *kelompoktani (Poktan)*.

A *poktan*is a formal farmer organization, legalized by the government and registered in a village. The members of a *poktan*mostly live in the same village. According to Lestari et al. (2018), the characteristics (e.g., livelihoods, norms, and cultures) of farmers who live in the same village may not differ significantly. To survey

the farmers, Cochran (2007) suggests a systematic random sampling through which the study followed four stages. The first stage was to identify the villages where farmers with partnership experiences live. Field visits further verified that the farmers live in three villages in Central Lampung District, which are Bina Karya Putra Rumbia, Bandar Sakti, and TanjungAnom.

The second stage was to get the names of the farmers, either with partnership experiences or without partnership experiences. The local extension service, *poktan* village offices, and collecting traders helped to name the farmers. The third stage was to make a list of farmer names based on the villages where they live. The names were then sorted alphabetically and numbered. The fourth and final step was to survey farmers with semi-closed questionnaires. The survey was from November 2018 to April 2019, and the respondents were farmers with odd numbers on the lists. The total respondents surveyed are 140 farmers (see Table 1).

Table 1 shows that the numbers of farmers with and without partnership experiences are equal.The farmers with partnership experiences (70 respondents) were surveyed from three different villages in central Lampung districts. The farmers without partnership experiences (70 respondents) were also surveyed from different villages but in East Lampung District.

Method of Analysis

To answer the first research objective, the researcher interviewed farmers with partnership experiences. The researcher asked them why their partnerships with tapioca mills industries were discontinued. The researcher then categorized the answers and applied statistical descriptive to describe the information.

To answer the second research objective, the researcher collected data from both farmers with and without partnership experiences. As mentioned earlier, biases (i.e., selection bias and probability bias) may exist during the evaluation. Therefore, a proper method needs to use to correct them. In this study context, probability bias relates to the likelihood of farmers changing their willingness. For example, in the survey, some respondents said they were unwilling to partake in a partnership. It is possible, however, that the respondents change their response from unwilling to willing to even engage in a partnership.

A conventional quantitative method (e.g., a simple regression) less considers selection bias and probability bias, leading to systematic errors and wrong conclusions (Stata Corp 2018; Alderete 2019). As suggested by Alderete (2019) and Stata Corp (2018), this study applies heckprobit regression to correct the biases and further examine the correlations between independent and dependent variables. The study further applies heckprobit regression through three stages. The first stage was to determine the dependent variable and its symbol in the regression. Farmers' willingness to take part in partnership acts as the dependent variable, symbolized as Y in the regression. In the questionnaire, respondents had two options to answer: yes (= willing) and no (= unwilling). Binary codes then represent the answer in the regression with 1 (= yes) and 0 (= no).

The second stage was to include independent variables hypothesized, influencing farmers' willingness to take part in partnerships. The independent variables come from various relevant studies (Etsay, Negash, and Aregay 2019; Nyongesa et al. 2016; Miheretu and Yimer 2017; Ibnu, Offermans, and Glasbergen 2018). The study tests 16 independent variables, including age (years), farming experience (years), production land (hectares), the average cassava price (Rupiahs) and production (kilograms) from 2014 to 2018, the number of families (people), the distance of production to industries (kilometers), transaction cost (rupiahs), barriers to selling (to industries and non-industries)' and 'input constraints.' The study measured barriers to selling (to industries and non-industries)' and 'input constraints' with binary codes 1 (= there are barriers/constraints) and 0 (= there are no barriers/constraints). Industries refer to cassava processors such as tapioca mills industries, whereas non-industries refer to local traders or village collectors. Barriers to selling relate to specific circumstances that discourage the farmers from having transactions with the buyers (e.g., low prices and inaccurate weighing scales). Input constraints refer to

Table 1. The type and number of respondents, and survey locations

The Type of Respondents	The Number of Respondents	Survey Location	
		Village	District
Farmers with partnership experiences	70	Bina Karya Putra Rumbia	Central Lampung
		Bandar Sakti	Central Lampung
		TanjungAnom	Central Lampung
Farmers without partnership experiences	70	Raman Endra	East Lampung
		Labuhan Ratu	East Lampung
		Sumber Agung	East Lampung

the farmers' difficulties in attaining farming inputs because of, for example, the issues of price, scarcity, and counterfeit.

The other variables apply either binary or nominal code, including farmers' side jobs (1 = there are side jobs, 0 = there are no side jobs), farmers' desire to leave cassava production (1 = want to leave, 0 = do not want to leave), the types of commodity planted (1 = different types, 0 = only cassava), and land status (0 = rent, 1 = self-owned, 2 = profit sharing). Table 2 further outlines the list of the independent variables, denoted as *xj* in the heckprobit regression.

The third stage was to determine a controlled variable. Partnership experiences may affect the willingness of farmers to take part in future partnerships. Since only 50% of the respondents with partnership experiences, the study evaluates farmers' willingness based on the experiences. Therefore, partnership experiences act as a controlled variable. Through this procedure, the analysis will be more reliable (Stata Corp 2018). T1 further represents the controlled variable in the regression (see Table 2).

The following mathematical equations model heckprobit regression:

$$Y_j = (x_j\beta + u1_j > 0) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 1$$
$$z_i + u2_i > 0 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 2$$

Equation 1 is the central equation of the regression, embodied with a probit function to consider the probability bias. The equation tests the effects of the independent variables (x1-x16) on the dependent variable (Y) with random error *u1*. An estimate shows the strength of the influence of independent variables on the dependent variable (i.e., the regression coefficient) in the regression model. To be considered significant, the estimate needs to have a p-value of 0.05 or lower. The value of the estimate (positive or negative) reveals the direction of the influences of an independent variable on the dependent variable. The interpretation of the estimate is a one-unit change in an independent variable leads the dependent variable change by the value of its. The higher the estimate, the more substantial the variable's contribution to the dependent variable (Stata Corp 2018).

Equation 2 is the selection model equation, with covariate *zj* and random error *u2*, to accommodate the selection bias. In principle, heckprobit regression transfers the bias from the central equation to the selection model equation. The higher the bias, the higher are the interactions between the independent variables and the controlled variable (T1) in equation 2. However, the bias does not interfere with the central equation (Stata Corp 2018). This study used the statistical program STATA version 15 to calculate the heckprobit regression and integrate both equations.

RESULTS AND DISCUSSIONS

The Empirical Context

The Indonesian Ministry of Agriculture classifies cassava (*Manihot esculents*) as a food crop. It is one of the staple foods and ranks third after rice and corn in terms of the importance (as the source of carbohydrate). Cassava consumption at a household level is small, which is only 2.82 kilograms per capita per year (the Indonesian

Table 2. The variables used in the analysis

Variable	Type	Description
Y	Dependent	Willingness to take part in partnership in the future (binary variables; 1 = yes or willing, 0 = no or unwilling)
T1	Controlled	Partnership experience (binary variable; 1 = have experience, 0 = no experience)
x1	Independent	Barriers to selling to industries (binary variables; 1 = there are barriers, 0 = there are no barriers)
x2	Independent	The distance of production location to industries (kilometers)
x3	Independent	Barriers to selling to non-industries (binary variables; 1 = there are barriers, 0 = there are no barriers)
x4	Independent	Age (years)
x5	Independent	Farming experience (years)
x6	Independent	Education (years)
x7	Independent	Family number (people)
x8	Independent	Production land (hectares)
x9	Independent	Average cassava production in 2014-2018 (kilograms)
x10	Independent	Average cassava price in 2014-2018 (rupiahs/kilogram)
x11	Independent	Transaction cost (rupiahs)
x12	Independent	Side job (binary variables; 1 = there are side jobs, 0 = there are no side jobs)
x13	Independent	The types of commodities planted (binary variables; 1 = different types, 0 = only cassava)
x14	Independent	Land status (nominal variable; 0 = rent, 1 = self-owned, 2 = profit sharing)
x15	Independent	Desire to leave cassava production (binary variables; 1 = want to leave, 0 = do not want to leave)
x16	Independent	Input constraint (binary variables; 1 = there are constraints, 0 = there are no constraints)

Ministry of Agriculture 2019). However, the other contributions of cassava to the country are prodigious. First, cassava contributes to the national economy as the primary material for the industries. Many industries rely on cassava such as food, tapioca mills, textile, paper, bioethanol, bio-plastics, cosmetics, and animal feed factories (the Indonesian Ministry of Agriculture 2016; the Indonesian Ministry of Agriculture 2019). Second, cassava contributes to the livelihoods of rural communities, as the production takes place in rural areas where rainfall and irrigation are limited (Thamrin et al. 2015). There are no official data on the definite number of cassava farmers in Indonesia. However, assuming there are three dependents per household, cassava farming is an essential livelihood source for over 489 thousand rural households or 1.4 million individuals across the country.

In the country, cassava production concentrates in eight provinces, which together contribute 91.21% to the national production. Lampung Province is the highest contributor (33,93%), followed by Middle Java (16,68%), East Java (15,71%), West Java (9,21%), North Sumatra (6,10%), Yogyakarta (3,99%), Southeast Nusa (3,25%), and South Sulawesi (2,34%) (the Indonesian Ministry of Agriculture 2019).

For the past seven years (2011-2017), the national average of the cassava land area was 978,969.86 hectares, with an average production of 22,386,159.57 tons per year. The average productivity of cassava in Indonesia was 22.691 tons per hectare and slightly fluctuated.The national data (2011-2017) indicates that cassava productivity slightly increases, whereas cassava production and harvesting area decreased. Based on the data, cassava production, productivity, and harvesting areas are likely to gradually decline from 2017 to 2023 (the Indonesian Ministry of Agriculture 2019). This information suggested that many farmers are leaving the cassava farming system.

Although declining, the domestic cassava production is still surplus, meaning the fresh cassavas produced exceeds the local market's demand. The production surplus reached 1.03 million tons in 2015 and then plummeted to 327.27 thousand tons in 2016. However, the surplus increased again to 656.17 thousand tons in 2017 and to 923.85 thousand tons in 2018 (the Indonesian Ministry of Agriculture 2019). The production surplus, which reduces farm-gate prices, is likely to continue to the next few years. This trend suggests that more cassava production cannot find the market, and this explains why many farmers are leaving the cassava farming system. Other food crops (e.g., rice and corn) may not provide a better opportunity for the farmers. Rice needs sufficient water (from rainfall or irrigation) and requires much more skills and knowledge for the farmers to develop. At the same time, the national corn production is also surplus (the Indonesian Ministry of Agriculture 2016; the Indonesian Ministry of Agriculture 2019).

While the domestic cassava production is a surplus, the import of cassava products is growing (the Indonesian Ministry of Agriculture 2016; the Indonesian Ministry of Agriculture 2019). From 2000 to 2015, the average cassava import grew by 76.32% per year, higher than the average export that only increased by 67.41% per year. In 2003, imports were the highest, reaching the value of US $33.56 million. The sector industries contribute to cassava imports by purchasing cassava starch, cassava shredded, and cassava pellets from Thailand, Vietnam, and Myanmar.

The salient facts mentioned reflecting the fundamental weaknesses of the cassava sector. On the current free domestic market, the production surplus shows that the linkage between producers (farmers) and markets (tapioca industries) is still weak. The farmers have difficulty in selling their products, whereas the industries have difficulty in securing the supply of fresh cassava. Many cassava industries operate below their manufacturing capacities (Kompas 2008; Detik Finance 2015; Kabarbisnis 2018). The on-going import further reflects that the competitiveness of Indonesian cassava is also weak. Animal feed factories, for example, prefer to import cassava flours from neighboring countries because their prices are lower (Detik Finance 2015; Kabarbisnis 2018; the Indonesian Ministry of Agriculture 2019).

Respondents' Profile

Table 3 shows the statistic descriptive of the respondent characteristics. The table illustrates that the average age and farming experience of respondents were 45.97 years and 23.93 years, respectively. The respondents have an average of 7.98 years of formal education, which means they did not complete an education level equal to junior high school. On average, respondents' practice on 1.29 hectares of land. Most farmers own the land (mean=1.01) that they cultivate with cassava and other cash crops such as corn and vegetables (mean=0.43). In 2014-2018, the average production of fresh cassava was 21,511.18 tons, and the average selling price was 853.84 rupiahs per kilogram. The table also shows that barriers to selling exist, but input constraints associated with cassava production are less problematic (mean=0.06). While most farmers stated that they have no desire to leave cassava production (mean=0.45), only half of the respondents are willing to partake in future partnerships (mean= 0.54).

Table 3. The statistic descriptive of respondent characteristics

Variable		Observation	Mean	Std. Dev.
Y	Willingness to take part in partnership in the future	140	0,54	0,50
T1	Partnership experience	140	0,50	0,50
x1	Barriers to selling to industries	140	0,43	0,50
x2	The distance of production location to industries	140	6,09	5,13
x3	Barriers to selling to non-industries	140	0,62	0,49
x4	Age	140	47,76	11,55
x5	Farming experience	140	23,93	11,01
x6	Education	140	7,98	3,40
x7	Family number	140	3,37	1,12
x8	Land	140	1,29	1,20
x9	Average cassava production in 2014-2018	140	21.511,18	20.946,07
x10	Average cassava price in 2014-2018	140	853,84	189,80
x11	Transaction cost	140	45.970,36	177.063,40
x12	Side job	140	0,55	0,50
x13	The types of commodities planted	140	0,43	0,50
x14	Land status	140	1,01	0,27
x15	Desire to leave cassava production	140	0,45	0,50
x16	Input constraint	140	0,06	0,25

Theoretical Perspectives on Partnerships in the Agricultural Sector

The agricultural sector of developing countries faces many issues, which often relate to structural problems and poor infrastructure. These problems link to various failures associated with the insufficiency of single-actor approaches to address the difficulties of local economic and rural development (FAO 2016). The development studies literature suggests that single agribusiness system actors are inadequate to overcome different coordination and market failures. According to the literature, these failures arise from information asymmetries between producers and buyers, imbalance market power, imperfect competition, and lacking economies of scale. These failures lead to high transaction costs, which further imply that the current development rather biases against smallholders (Kirsten and Sartorius 2002).

Research suggests that partnerships may respond well to not only the failures but also the limited capabilities of governments to provide public goods and convey social and economic improvement (Kolk et al. 2008; Utting and Zammit 2009). According to Ros-Tonen et al. (2007), partnerships engage different actors, leverage new resources, and instigate win-win solutions. Partnerships can benefit each of the partners based on their comparative's advantages. Although partners may not share the same goals, development efforts driven by partnerships have the potential to escalate the effectiveness of each partner's efforts (Bäckstrand 2006; Van Tulder and Fortanier 2009). Partnerships offer a framework to bring together the key actors in commodity chains to design and implement effective responses to the sustainability challenges (Kirsten and Sartorius 2002; Cheyns 2011). Partnerships can also provide smallholders with market access and services, and this may enable them to respond to changing market demands and enhance their participation in decision-making (FAO 2016; Millard 2017).

However, other studies are more cautious. According to Pattberg (2010) and Witte et al., (2005), although agenda-setting is clear, the picture of partnerships is obscure concerning the actual outputs and outcomes achieved. Partnerships also less perform in policy and rule implementation (Pattberg 2005; Bäckstrand 2006; Pattberg 2010), and therefore the value of partnerships as a response to the government's limitation seems to be equivocal. Although aiming to improve service provisions, increase effectiveness, and reduce costs, partnerships often overlook power imbalances in the commodity chains. Partnerships are prone to endorse more powerful actors, unusually large businesses, and under-represent smallholders in the chains (Bäckstrand 2006; Bitzer et al. 2008). Therefore, partnerships manifest a limited notion of development (Blowfield 2003; Reed and Reed 2009).

Researchers question to the role of smallholders in influencing the objectives of partnerships and the accountability of the partnerships in distributing generous benefits to the beneficiaries. Some argued that smallholders are less involved in crucial decision-making processes (Rein and Stott 2009; Gregoratti 2011). The others claimed that partnerships are driven by supply-side incentives to accommodate corporates or businesses' needs rather than smallholders' demands (Hale and Mauzerall 2004). These imply that partnerships

may not differ considerably from conventional strategies associated with top-down approaches by more powerful actors (Blowfield and Dolan 2008).

Literature review above shows that the theoretical perspectives on partnerships still open to debates. Th study contributes to the debates by analyzing ho partnerships unfold in practices, at producer levels, the context of Indonesian cassava production ar industrial sector. As relevant studies on partnerships a rare in the analyzed context, this study sheds light c the capacity of partnerships (and how to improve then to promote sustainable change in the Indonesia cassava production and industrial sector.

Thereasons for Farmers to Discontinue Partnershi

Based on the interviews, in the last 22 years (1985-2017 cassava farmers, and tapioca mills industries in Centr Lampung District had experienced various partnership Most partnerships lived for less than two years; only a few could last for over five years. However, no partnership could endure for over ten years. Some partnerships even survived for several months or less than one year.

According to the respondents, the partnerships happened either with or without mediation. In a mediated partnership model, third parties such as government (extensions) and non-governmental organizations (e.g., financial institutions) facilitated the collaboration between the farmers and the industries. This model was dominant in that 80.28 per cent of the respondents engaged in mediated partnerships. In a partnership without mediation, third parties (either public or private) were absent from the partnership processes, involving only 19.72 per cent of farmer respondents. According to the farmers, liaison officers from tapioca industries came to *poktan* and offered the collaboration.

Figure 1 further illustrates the benefits that partnerships offered to the farmers. Some respondents (22.22%) said that the partnerships helped them with cash to buy inputs. The other respondents (20.83%) stated that the partnerships offered financial help to buy inputs and facilitated transportation services. Others claimed that the partnerships (13.89%) only helped with transportation services. Many respondents (43.06%), however, insisted that the past partnerships had no benefits.

Based on the interviews, collaborative issues seem to exist between the partners. Most farmer respondents (71.4%) said that they did not want to continue the partnerships. In contrast, the rest (28.6%) stated that the industries ended the partnerships (Figure 2). This

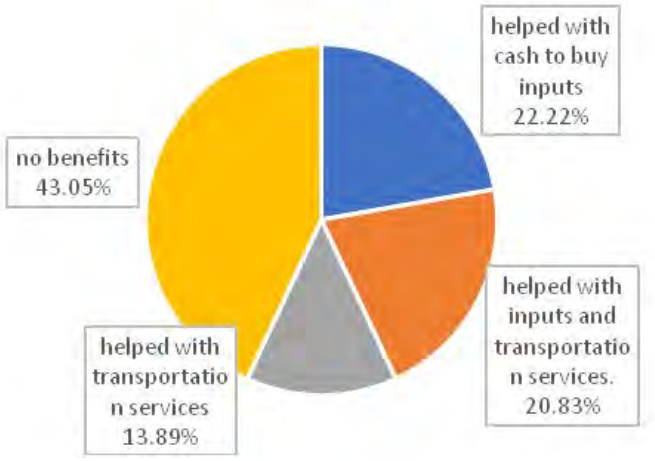

Figure 1. The benefits of the past partnerships

information suggests that the previous partnerships ended at the will of either the farmers or the tapioca mills industries.

Of the farmers who did not want to continue the partnerships, 15.71%, stated that they preferred to discontinue the partnerships because they depended not only on cassava. In other words, the farmers less valued the partnerships because they had alternative incomes from other crops. The other producers (12.86%) informed when the contracts expired, the partnerships were also over, and they did not look for any further information. Some farmers (11.61%) claimed that they did not want the partnerships, as the collaboration did not follow the agreements.

The other cassava growers (10%) insisted that they did not like the partnerships because of the inconvenience of practicing under a formal agreement/ contract. The farmers (8.57%) also reasoned that they had market alternatives (e.g., local traders or village collectors), and therefore the partnerships were unnecessary. Some producers (4.29%) claimed that the benefits of the partnerships were unclear, and the administrations were weak. The others (2.86%) argued that the industries had little coordination with the farmers, leading the cassava producers to consider that a partnership was collaboration in the paper. The rest (1.43%) admitted that they feared debt burdens from loans offered by the industries or financial institutions through the partnerships.

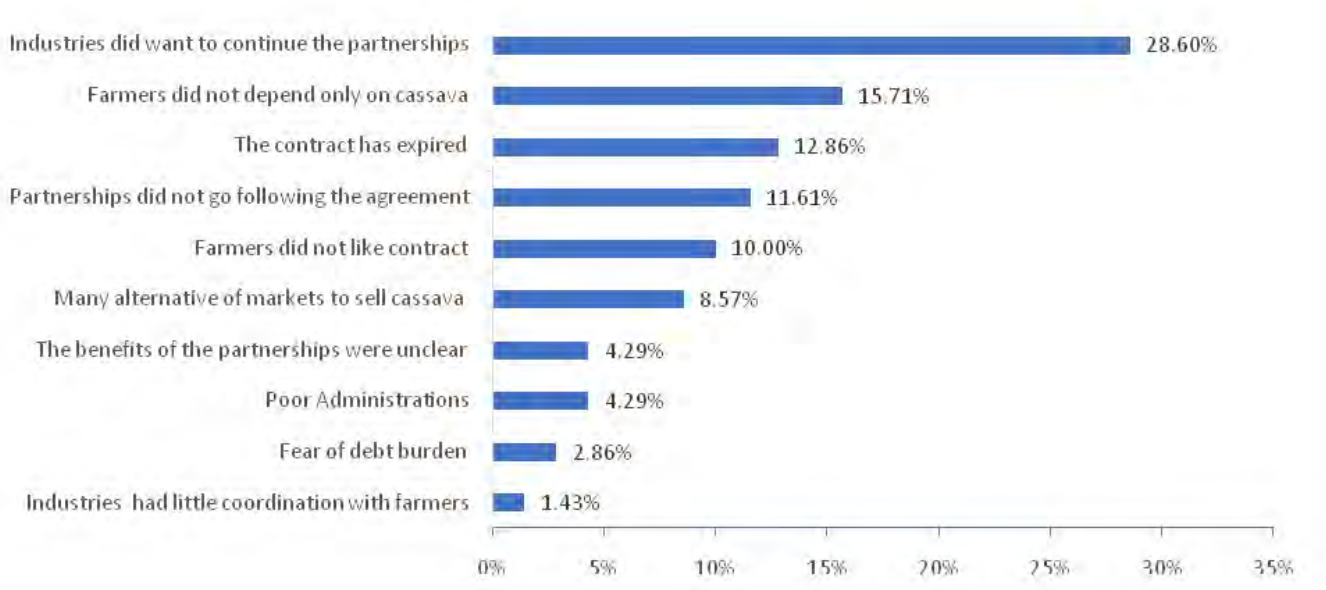

Figure 2. Farmers' reasons for discontinuing partnerships

Farmers' Willingness to Partake in Partnerships in the Future

Table 4 presents the results of heckprobit regression. The first part of the table shows the results of the central equation, and the second part displays the results of the selection model equation. The results of the central equation indicate that the desire to leave cassava production (x15, p-value=0.00) has a significant effect on farmers' willingness to take part in partnerships. The regression coefficient is negative (-1.11), suggesting that the more farmers' desire to leave cassava production, the lower their willingness to engage in partnerships. If the desire increases by one unit (from 0 to 1), the willingness of farmers to take part in partnerships declines by 1.11. This finding further implies that farmers, who consider cassava as an essential part of their livelihoods, generally be willing to take part in partnerships.

The types of commodities planted (x13, p-value=0.01) influences the willingness of the farmers to take part in partnerships. The regression coefficient is also negative (-0.91), suggesting that the more farmers cultivate different types of commodities in their lands, the lower the willingness of the farmers to engage in partnerships. If the type of commodity increases by one unit (from 0 to 1), the willingness of farmers to take part in partnerships declines by 0.91. This finding further implies that farmers, who focus more on cassava cultivation, be willing to take part in partnerships. According to the farmers, they need to secure the market and expect better prices from engaging in partnerships. However, farmers who grow various commodities (not only cassava) have more choices in fulfilling their household needs and be unwilling to take part in the partnership. These farmers grow maize and vegetables, and, based on the interviews, they value more freedom. They prefer to practice without a formal agreement/ contract.

Barriers to selling to non-industries (x3, p-value=0.04) also influence the willingness of farmers to partake in partnerships. Barriers to selling to non-industries are associated with low prices, inaccurate weighing scales, high transaction costs, and discounted prices. According to farmers, non-industries such as local traders or village collectors often offer low prices and use inaccurate weighing scales. They often must pay additional, unofficial charges that lead to high transaction costs to deal with the non-industry buyers. If they have insufficient cash to pay the charges or loss in bargaining, they receive discounted prices. The table further shows that the regression coefficient is positive (0.69), meaning that the higher the barriers, the higher the farmers' willingness to engage in a partnership. If barriers to selling to non-industries increase by one unit (from 0 to 1), the willingness to take part in partnership increases by 0.69. This finding further implies that farmers expect partnerships can eliminate these barriers.

However, barriers to selling to industries (x1) and the distance of production location to industries (x2) have a little influence on farmers' willingness to take part in partnerships. According to some farmers, they barely have a direct relationship with the industries. To minimize

Table 4. The results of heckprobit regression analysis

Variable		Coef.	Std. Err.	z	P>z	[95% Interval]	Conf.
Y	Willingness to take part in partnership in the future						
x1	Barriers to selling to industries	0.29	0.33	0.86	0.39	-0.37	0.94
x2	The distance of production location to industries	0.06	0.06	0.99	0.32	-0.06	0.18
x3	**Barriers to selling to non-industries**	**0.69**	**0.34**	**2.02**	**0.04***	**0.02**	**1.36**
x4	Age	-0.03	0.02	-1.45	0.15	-0.06	0.01
x5	Farming experience	0.03	0.02	1.21	0.23	-0.02	0.08
x6	Education	-0.08	0.05	-1.63	0.10	-0.18	0.02
x7	Family number	0.18	0.14	1.27	0.21	-0.10	0.47
x8	Land	-0.12	0.17	-0.75	0.45	-0.45	0.20
x9	Average cassava production in 2014-2018	0.00	0.00	-0.42	0.67	0.00	0.00
x10	Average cassava price in 2014-2018	0.00	0.00	1.88	0.06	0.00	0.00
x11	Transaction cost	0.00	0.00	-0.36	0.72	0.00	0.00
x12	Side job	0.30	0.32	0.95	0.34	-0.32	0.93
x13	**The types of commodities planted**	**-0.91**	**0.37**	**-2.47**	**0.01***	**-1.63**	**-0.19**
x15	**Desire to leave cassava production**	**-1.11**	**0.36**	**-3.05**	**0.00***	**-1.82**	**-0.40**
_cons		-1.66	1.23	-1.36	0.18	-4.07	0.74
T1	Partnership experience						
x1	Barriers to selling to industries	0.05	0.24	0.20	0.84	-0.43	0.53
x2	The distance of production location to industries	0.02	0.02	1.04	0.30	-0.02	0.07
x3	Barriers to selling to non-industries	0.40	0.25	1.57	0.12	-0.10	0.89
x4	Age	-0.02	0.02	-1.06	0.29	-0.05	0.01
x5	**Farming experience**	**0.04**	**0.02**	**2.51**	**0.01***	**0.01**	**0.07**
x6	Education	0.04	0.04	1.05	0.29	-0.03	0.11
x7	Family number	0.04	0.10	0.34	0.73	-0.17	0.24
x8	Land	-0.24	0.14	-1.72	0.09	-0.52	0.03
x9	Average cassava production in 2014-2018	0.00	0.00	1.26	0.21	0.00	0.00
x10	Average cassava price in 2014-2018	0.00	0.00	0.80	0.42	0.00	0.00
x11	Transaction cost	0.00	0.00	-1.37	0.17	0.00	0.00
x12	Side job	0.12	0.25	0.50	0.62	-0.36	0.61
x13	The types of commodities planted	-0.34	0.25	-1.37	0.17	-0.82	0.14
x15	Desire to leave cassava production	-0.13	0.25	-0.53	0.60	-0.61	0.35
_cons		-1.13	0.92	-1.23	0.22	-2.94	0.68
/athrho		13.21	27.64	0.48	0.63	-40.95	67.38
rho		1.00	0.00			-1.00	1.00

LR test of indep. eqns. (rho = 0): chi2(1) = 2.19 Prob > chi2 = 0.1390

* Significant at 95% confidence interval

transportation costs and with urgent cash, they sell cassava to the nearest village collectors that they called as *agenlapak*. For other farmers, if they do not need urgent cash, the farmers wait and keep their cassava unharvested. Local traders usually contact the farmers to meet in cassava plantations. On the spots, the traders estimate the price, bargain with the farmers, and often pay in cash. In this way, the farmers reduce both transportation and transaction costs, which further explain why the variables (x1 and x2) have little effects.

Age (x4), farming experience (x5), education (x6), family number (x7), land (x8), the average cassava production (x9) and price (x10), and transaction cost (x11) have little effects on farmers' willingness to take part in partnerships. These findings suggest that the respondents' characteristics associated with the variables do not substantially differ. Farmers' side job (x12) has a little impact on the willingness, reflecting farmers have dual objectives. Their objectives are to dedicate to cassava farming activities and to pursue non-farming activities or side jobs. These dual objectives weaken their willingness to engage in partnerships. The other variables, land status (x14) and input constraint (x16), were removed from the regression model because of multicollinearity.

Furthermore, the results of the selection model equation reveal that x5 (farming experience) has a significant, positive effect on the controlled variable T1 (partnership experiences). This result suggests that selection bias occurs during the evaluation but overall insignificant (athrho P-value = 0.63). The table further shows that the athrho coefficient, which represents the magnitude of the corrected selection bias, has a value of 13.21. The value is positive, meaning that the selection bias – if not corrected – is likely to increase.

CONCLUSION

This study contributes to the literature on partnerships from the Indonesian cassava production and industrial sector. The study explores the previous partnerships in the sector and analyzethe determinant of farmers' willingness to take part in future partnerships. The first conclusion is that the previous partnerships ended because the partners had poor vision and reason for collaborating. Reflected by the collaborative issues, the partners did not play well together. Monitoring and evaluation by the public sector are also weak, which, to some extent, contributes to the misalignment of the partners' objectives. As their goals misaligned, either the farmers or the industries eventually refrained from the partnerships.

The second conclusion is that the complexity of the system where farmers operate determines their willingness to take part in partnerships. Barriers to selling to non-industries reflect the complexity, including low prices, inaccurate weighing scales, high transaction costs, and discounted prices. The higher the barriers, the stronger the willingness of farmers to take part in partnerships.

The third conclusion is that strong interrelations between agricultural decisions and between food requirements influence farmers' willingness. Farmers have to decide what types of commodities they cultivate, to what extent they rely on cassava, and whether they leave the cassava production. Farmers, who decide to rely more on cassava as a critical source of their incomes and livelihoods, be willing to engage in partnerships with off-takers to secure the market and expect a better price.

The implications of the findings are twofold. First, it is difficult to achieve sustainable partnerships if partners have no shared vision, which leads to ineffective decision-making processes. The partners may further go in differing directions that meet their own needs but not the strategic needs and direction of the partnerships. In the previous partnership contexts, the farmers went to the local traders for transactions or searched for income alternatives. In contrast, the industries opted to find fresh cassavas from anywhere, including neighboring provinces.

Second, it is also challenging to achieve sustainable partnerships if partners have different priorities or values. On the one hand, most cassava farmers are small farmers, and their priority is to earn cash to fulfil their household needs. Diversifying their crops, farmers reduce their dependence on cassava, but they are less interested in partnerships. On the other hand, the industries make up businesses with a profit orientation, and they find opportunities available to survive the businesses. These differences may not be apparent at the start but are likely to be a sticking point that breaches the agreements at the end.

Finally, this study proposes three recommendations that may improve the current condition of cassava production and industrial sector. First, the public sector, especially the provincial government, may need the policy on cassava trading among regions and on investments, particularly in the regions where industries are limited. Second, future research needs to study a partnership model that can lead to more sustainable cassava production and better collaboration. Third, partnerships should promote new coordination practices along the commodity chain. Partnerships must, therefore, engage in a more honest and holistic dialogue that addresses all sustainability challenges of the cassava chain. In other words, partnerships have to facilitate a system that can find the balance between, for example, the economic interests of each of the actors.

ACKNOWLEDGEMENTS

The study benefited from the workshop on how to write international quality publication supported by Newton Fund, British Council, the University of Diponegoro, and the Directorate General of Higher Education (DIKTI) of the Ministry of Education and Culture of Indonesia. The authors thank Seun Kolade for his valuable comments on earlier drafts of this paper in the workshop.

REFERENCES

Alderete MV. 2019. Examining the drivers of internet use among the poor: The case of Bahía Blanca city in Argentina. Technol Soc.:101179.

Asnawi R. 2014. Analisis fungsi produksi usahatani ubikayu dan industri tepung tapioka rakyat di Provinsi Lampung.

Bäckstrand K. 2006. Multi stakeholder partnerships for sustainable development: rethinking legitimacy, accountability and effectiveness. Eur Environ. 16(5):290–306.

Bitzer V, Francken M, Glasbergen P. 2008. Intersectoral partnerships for a sustainable coffee chain: Really addressing sustainability or just picking (coffee) cherries? Glob Environ Chang. 18(2):271–284.

Bitzer V, Glasbergen P. 2015. Business–NGO partnerships in global value chains: part of the solution or part of the problem of sustainable change? Curr Opin Environ Sustain. 12:35–40.

Blowfield M. 2003. Ethical Supply Chains in the Cocoa, Coffee and Tea Industries. Greener Manag Int.(43).

Blowfield ME, Dolan CS. 2008. Stewards of virtue? The ethical dilemma of CSR in African agriculture. Dev Change. 39(1):1–23.

BPS-Statistics Lampung Province. 2019. Lampung Province in Figures 2018. Bandar Lampung, Indonesia.

Cheyns E. 2011. Multi-stakeholder initiatives for sustainable agriculture: limits of the 'inclusiveness' paradigm. Gov through Stand Orig drivers limitations.:210–235.

Degrande A, Gyau A, Foundjem-Tita D, Tollens E. 2014. Improving smallholders' participation in tree product value chains: experiences from the Congo Basin. For Trees Livelihoods. 23(1–2):102–115. doi:10.1080/14728028.2014.886867. https://doi.org/10.1080/14728028.2014.886867.

Dessie AB, Abate TM, Mekie TM, Liyew YM. 2019. Crop diversification analysis on red pepper dominated smallholder farming system: evidence from northwest Ethiopia. Ecol Process. 8(1):50. doi:10.1186/s13717-019-0203-7. https://doi.org/10.1186/s13717-019-0203-7.

Destianto R, Pigawati B. 2014. Analisis Keterkaitan Perubahan Lahan Pertanian Terhadap Ketahanan Pangan Kabupaten Magelang Berbasis Model Spatio Temporal SIG. Geoplanning J Geomatics Plan. 1(1):21–32.

Detik Finance. 2015. Ini yang Bikin RI Rajin Impor Singkong Tiap Tahun. [accessed 2019 Jan 17]. https://finance.detik.com/berita-ekonomi-bisnis/2937423/ini-yang-bikin-ri-rajin-impor-singkong-tiap-tahun.

Etsay H, Negash T, Aregay M. 2019. Factors that influence the implementation of sustainable land management practices by rural households in Tigrai region, Ethiopia. Ecol Process. 8(1):14. doi:10.1186/s13717-019-0166-8. https://doi.org/10.1186/s13717-019-0166-8.

FAO. 2016. Public–private partnerships for agribusiness development – A review of international experiences, by Rankin, M., Gálvez Nogales, E., Santacoloma, P., Mhlanga, N. & Rizzo, C. Rome, Italy.

Greenstone M, Gayer T. 2009. Quasi-experimental and experimental approaches to environmental economics. J Environ Econ Manage. 57(1):21–44.

Gregoratti C. 2011. Global nuts and local mangoes: a critical reading of the UNDP Growing Sustainable Business Initiative in Kenya. Agric Human Values. 28(3):369–383.

Hale TN, Mauzerall DL. 2004. Thinking globally and acting locally: can the Johannesburg partnerships coordinate action on sustainable development? J Environ Dev. 13(3):220–239.

Ibnu M, Offermans A, Glasbergen P. 2018. Certification and Farmer Organisation: Indonesian Smallholder Perceptions of Benefits. Bull Indones Econ Stud. 54(3):387–415. doi:10.1080/00074918.2018.1506093. https://www.tandfonline.com/doi/full/10.1080/00074918.2018.1506093.

Jones HC. 2004. Greater Than Its Parts: Partnerships Evolving With Theory. For Trees Livelihoods. 14(2–4):313–324. doi:10.1080/14728028.2004.9752500. https://doi.org/10.1080/14728028.2004.9752500.

Kabarbisnis. 2018. Industri doyan singkong impor, ini penyebabnya. [accessed 2019 May 29]. https://www.kabarbisnis.com/read/2888234/industri-doyan-singkong-impor-ini-penyebabnya.

Kallio MH, Kanninen M, Rohadi D. 2011. Farmers' Tree Planting Activity In Indonesia—Case Studies In The Provinces Of Central Java, Riau, And South Kalimantan. For Trees Livelihoods. 20(2–3):191–209. doi:10.1080/14728028.2011.9756706. https://doi.org/10.1080/14728028.2011.9756706.

Khandker S, B. Koolwal G, Samad H. 2009. Handbook on impact evaluation: quantitative methods and practices. The World Bank.

Kirsten J, Sartorius K. 2002. Linking agribusiness and small-scale farmers in developing countries: is there a new role for contract farming? Dev South Afr. 19(4):503–529.

Kolk A, Van Tulder R, Kostwinder E. 2008. Business and partnerships for development. Eur Manag J. 26(4):262–273.

Kompas. 2008. Petani Ubi Kayu Dapat Kredit Rp 11 Miliar. [accessed 2019 Jan 5]. https://regional.kompas.com/read/2008/04/05/02121014/about.html.

Legan D, Vandeven MH. 2003. Sampling techniques. New York: John Wiley & Sons.

Lestari W, Kristiana L, Paramita A. 2018. Stunting: Studi Konstruksi Sosial Masyarakat Perdesaan dan Perkotaan Terkait Gizi dan Pola Pengasuhan Balita di Kabupaten Jember. J Aspir. 9(1):17–33. doi:https://doi.org/10.22212/aspirasi.v9i1.985.

Lombard C, Leakey RRB. 2010. Protecting The Rights Of Farmers And Communities While Securing Long Term Market Access For Producers Of Non-Timber Forest Products: Experience In Southern Africa. For Trees Livelihoods. 19(3):235–249. doi:10.1080/14728028.2010.9752669. https://doi.org/10.1080/14728028.2010.9752669.

Marquis E, Guitman R, Black C, Healey M, Matthews KE, Dvorakova LS. 2019. Growing partnership communities: What experiences of an international institute suggest about developing student-staff partnership in higher education. Innov Educ Teach Int. 56(2):184–194.

Miheretu BA, Yimer AA. 2017. Determinants of farmers' adoption of land management practices in Gelana sub-watershed of Northern highlands of Ethiopia. Ecol Process. 6(1):19. doi:10.1186/s13717-017-0085-5. https://doi.org/10.1186/s13717-017-0085-5.

Millard E. 2017. Still brewing: Fostering sustainable coffee production. World Dev Perspect. 7–8:32–42. doi:https://doi.org/10.1016/j.wdp.2017.11.004. http://www.sciencedirect.com/science/article/pii/S2452292917300899.

Mun'im A. 2016. Analisis pengaruh faktor ketersediaan, akses, dan penyerapan pangan terhadap ketahanan pangan di kabupaten surplus pangan: pendekatan partial least square path modeling. J Agro Ekon. 30(1):41–58.

Nxumalo KKS, Oladele OI. 2013. Factors affecting farmers' participation in agricultural programme in Zululand district, Kwazulu Natal Province, South Africa. J Soc Sci. 34(1):83–88.

Nyongesa JM, Bett HK, Lagat JK, Ayuya OI. 2016. Estimating farmers' stated willingness to accept pay for ecosystem services: case of Lake Naivasha watershed Payment for Ecosystem Services scheme-Kenya. Ecol Process. 5(1):15. doi:10.1186/s13717-016-0059-z. https://doi.org/10.1186/s13717-016-0059-z.

Pattberg P. 2005. The institutionalization of private governance: How business and nonprofit organizations agree on transnational rules. Governance. 18(4):589–610.

Pattberg P. 2010. Public–private partnerships in global climate governance. Wiley Interdiscip Rev Clim Chang. 1(2):279–287.

Poole N. 2017. Smallholder agriculture and market participation. United Kingdom: Food and Agriculture Organization of the United Nations and Practical Action Publishing.

Prasmatiwi FE. 2009. Analisis Ekonomi dan Keberlanjutan Usahatani Kopi di Kawasan Hutan Kabupaten Lampung Barat. Disertasi, Universitas Gajah Mada.

Purbo RK, Smith C, Bianchi R. 2019. Lessons Learned from Public–Private Partnerships in Indonesia's Water Sector. Bull Indones Econ Stud. 55(2):193–212. doi:10.1080/00074918.2018.1550250.

Reed AM, Reed D. 2009. Partnerships for development: Four models of business involvement. J Bus Ethics. 90(1):3.

Rein M, Stott L. 2009. Working together: Critical perspectives on six cross-sector partnerships in Southern Africa. J Bus Ethics. 90(1):79–89.

Van Rijsbergen B, Elbers W, Ruben R, Njuguna SN. 2016. The ambivalent impact of coffee certification on farmers' welfare: a matched panel approach for cooperatives in Central Kenya. World Dev. 77:277–292.

Ros-Tonen MAF, Van Den Hombergh H, Zoomers A. 2007. Chapter One. Partnerships for sustainable forest and tree resource management in Latin America: The new road towards successful forest governance? In: Partnerships in Sustainable Forest Resource Management: Learning from Latin America. Brill. p. 3–35.

Ruben R, Fort R. 2012. The impact of fair trade certification for coffee farmers in Peru. World Dev. 40(3):570–582.

Siburian DP, Sebayang T, Sihombing L. 2013. Analisis Usahatani Dan Pemasaran Ubi Kayu Dan Ubi Jalar Di Simalungun (Studi Kasus: Desa Pematang Kerasaan Rejo Kecamatan Bandar dan Kelurahan Tiga Runggu Kecamatan Purba). J Soc Econ Agric Agribus. 2(4).

Stata Corp. 2018. Selection Model Heckoprobit. [accessed 2019 Mar 18]. http://www.stata.com/Manuals14/Svysvyestimation.Pdf.

Sugino T, Mayrowani H. 2009. The determinants of cassava productivity and price under the farmers collaboration with the emerging cassava processors: A case study in East Lampung, Indonesia. J Dev Agric Econ. 1(5):114–120.

Taylor BM, Van Grieken M. 2015. Local institutions and farmer participation in agri-environmental schemes. J Rural Stud. 37:10–19.

Thamrin M, Mardhiyah A, Marpaung SE. 2015. Analisis usahatani ubi kayu (Manihot utilissima). AGRIUM J Ilmu Pertan. 18(1).

the Indonesian Ministry of Agriculture. 2016. Cassava outlook 2016. Jakarta, Indonesia.

the Indonesian Ministry of Agriculture. 2019. Outlook of staple food commodities 2019. Jakarta, Indonesia.

Van Tulder R, Fortanier F. 2009. Business and sustainable development: from passive involvement to active partnerships. Doing Good or Doing Better.:211.

Utting P, Zammit A. 2009. United Nations-business partnerships: Good intentions and contradictory agendas. J Bus Ethics. 90(1):39.

Vermeulen S, Nawir AA, Mayers J. 2008. Rural Poverty Reduction through Business Partnerships? Examples of Experience from the Forestry Sector. Environ Dev Sustain. 10(1):1–18. doi:10.1007/s10668-006-9035-6. http://link.springer.com/10.1007/s10668-006-9035-6.

Widjaya S, Hasanuddin T. 2017. Faktor-Faktor Yang Berhubungan Dengan Keputusan Petani Beralih Kemitraan Dalam Berusahatani: Kasus Petani Kemitraan Tebu Di Pt Gunung Madu Plantataions Beralih Ke Kemitraan Ubi Kayu Di Pabrik Bumi Waras. J Ilmu-Ilmu Agribisnis. 5(1).

Witte JM, Reinicke WH, Reinicke W. 2005. Business unusual: Facilitating United Nations reform through partnerships. United Nations Publications.