# PARTNERSHIP MODELS INVOLVING INDEPENDENT SMALLHOLDERS IN INDONESIAN PALM OIL SUPPLY CHAIN: A BRIEF REVIEW

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***Abstract***

*The palm oil industry has become a major driver of the Indonesian economy. In this respect, independent smallholders play an important role as suppliers of fresh fruit bunches in the palm oil-processing industry. However, independent farmers are in a weak position in the palm oil supply chain, from both economic and global demand perspectives. This study aims to (1) identify the main problems faced by independent smallholders, (2) summarize the findings of previous research that examines aspects of partnerships for independent smallholders, and (3) provide directions for future research on the subject of partnerships involving independent smallholders in the Indonesian palm oil supply chain. This study applies a concise review to achieve its research objectives. The results of the literature review show that the types of problems faced by independent smallholders are quite diverse, among which the most reported are low plantation productivity, lack of capital, including the inputs needed to run plantations, and limited marketing access (oil palm processing industry). Generally, related studies can be grouped into three groups: assessment or evaluation of partnership models, selection of partnership models based on certain aspects, and development of partnership models. Future research directions include the implementation of the proposed partnership model, identification of key success factors of the partnership model, and deployment of quantitative methods to test various scenarios of partnership models for smallholders in the palm oil supply chain.*

***Keywords: Independent smallholders, palm oil supply chain, partnership, review***

## 1. INTRODUCTION

Palm oil is one of Indonesia's most productive and profitable commodities. This can be seen in the development of industries (e.g., food industry, oleochemicals, pharmaceuticals, and energy sectors) that use raw materials derived from palm fruit (Nashr *et al.*,2021). Indonesia is currently the world's leading producer of palm oil (Raharja *et al.*, 2020). Indonesian palm oil is exported overseas, reaching five continents, namely Africa, Australia, America, and Europe, with a major market share on the Asian continent. In 2021–2022, the price of palm oil has increased, causing a significant surge in export value to 29,75 billion US$ in 2022. The area of palm oil plantations in Indonesia has increased each year. It covered 15 338 556 hectares in 2022. Approximately, 55,91% of this area (8.566.738 ha) is managed by private estates, 40,51% (6.213.407 ha) by smallholders, and the remaining (3,58% or around 548.311 ha) is managed by government estates. The production of palm oil in 2022 is 46,82 million tons, which is an increase of 1,29% compared with production in 2021. Of the total production, private estates produced 28,21 million tonnes (60,26%), followed by smallholders with a total production of 16,31 million tonnes (34,84%); and the remaining 2,30 million tonnes (5%) was produced by government estates (Directorate of Food Crops, Horticulture, and Estate Crops Statistics, 2023). Here, smallholders can be divided into plasma smallholders, who collaborate with or receive support from palm oil companies, and independent

smallholders, who manage oil palm plantations with their capital and business (Paonganan, 2023). Although the palm oil industry prioritizes the procurement of palm oil raw materials, mainly from its own plantations and plasma farmers, it still requires supplies from independent smallholders to meet consumer demand or optimize the capacity of its processing factories. Thus, independent smallholders play a vital role in the palm oil industry (Raharja *et al.*, 2020).

At present, global economic challenges require the palm oil industry to produce high-quality processed palm oil products that can compete on prices. Hence, companies should encourage increased efficiency and quality improvement not only in the processing process but also throughout the supply chain (Anwar, 2024). In addition, the palm oil industry and its supply sources (palm oil plantations) face demands to ensure sustainability from an environmental perspective. Related to these demands, independent smallholders are in the spotlight because fulfilling the above demands is the most difficult task. This is due to the weakness of independent smallholders, who have many limitations, including capital, managerial, and technical knowledge in managing their oil palm plantations (Euler *et al.*2016, Jelsma and Schoneveld (2016), Herdiansyah*et al.* 2020, Ichsan *et al.* 2021). In response to this problem, various studies have been conducted to encourage the development of partnerships or institutional systems that could overcome the problems or difficulties faced by independent smallholders. It is crucial to empower partnership smallholders to find the right and the most effective strategy (Raharja *et al.*, 2020).

Theoretically, this issue can be related to supply chain partnerships. The supply chain consists of all parties involved directly or indirectly to meet customer demands (Chopra and Meindl, 2016). It involves the roles of several actors not only as suppliers and processors but also as transporters, warehouses, and retailers. Meanwhile, various definitions of partnership can be found in Li *et al.* (2007), which is essentially collaboration or cooperation between two or more parties. Maheshwari *et al*.,(2006) define a supply chain partnership as a strategic coalition of two or more companies in a supply chain to facilitate joint efforts and collaboration in one or more activities that create value to obtain benefits. In the context of the palm oil supply chain, the partnership was aimed at empowering businesses for smallholders to conveniently provide production inputs, obtain market guarantees, and apply technology to improve production (Munirudin *et al*., 2020). Based on this problem, this research aims to (1) identify the main problems faced by independent smallholders, (2) summarize the findings of research that discusses partnership models involving independent smallholders in the palm oil supply chain, and (3) provide directions for future research related to this topic.

The remainder of this paper is organized as follows. Section 2 presents the methods used in this study. Section 3 presents the results of the data analysis and discusses the research findings. Section 4 summarizes the results obtained to answer the research questions and objectives, including research limitations and suggestions for future research.

## 2. METHODS

This study applies a brief literature review and employs qualitative analysis following the stages presented in Figure 1 (presented on the following page). The stages begin by identifying the roles and positions of smallholders in Indonesia's palm oil supply chain. The identification task is performed on articles, documents, or reports released by reliable sources. Next, relevant questions that do not yet have clear answers are raised as they are formulated as research objectives. In this case, the achievement of research objectives requires data or information derived from the scientific literature or published articles relevant to the research topic. A literature search was carried out on Google Scholar by applying several keywords including 'independent smallholders, ' and 'palm oil smallholders farmers' with the addition of the keywords 'partnership' and also 'institutional' which are considered related to partnerships. To narrow the search process, keywords related to the Indonesian palm oil supply chain were also added. Thus, the above keywords were used to assist in obtaining relevant articles. In addition, the inclusion criteria were English or Indonesian articles published in international or national journals with a peer-review process during the publication process. Exclusion criteria included research articles taken from Indonesian case studies and those published before 2010. After collecting relevant articles, the main problems faced by independent smallholders were identified (to answer Research Objective I). A summary is then presented, including research objectives/focus, study location, methods or approaches used, and research findings or outcomes (to answer research objective II). The results obtained in the last

two steps will be considered to provide recommendations or directions for future research discussing partnerships involving independent smallholders in the Indonesian palm oil supply chain.

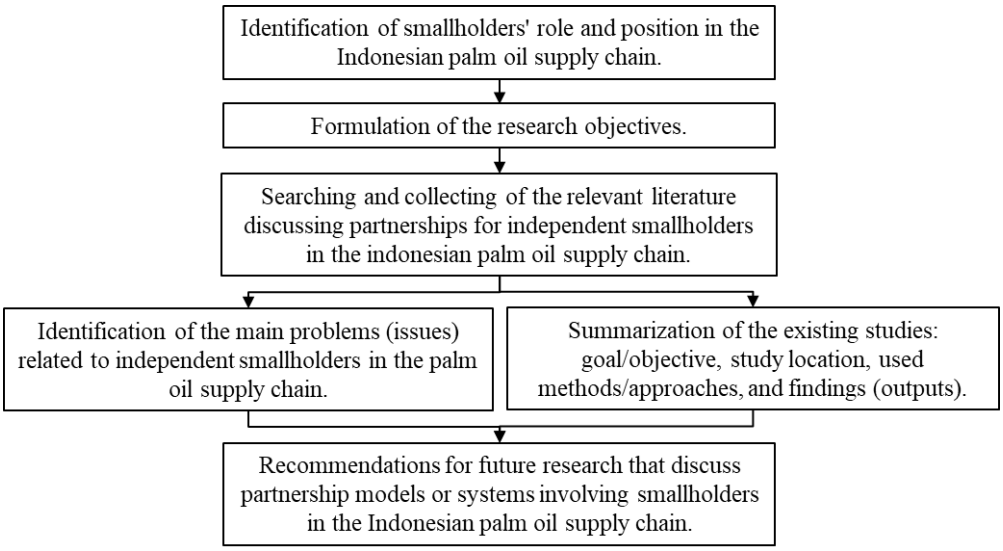


Figure 1: Research Stages

The results obtained from these three stages are presented in the following subsections.

## 3. RESULTS AND DISCUSSIONS

This section is divided into three parts, each of which explains the results obtained for each research objective.

### 3.1 Identification of the problems faced by independent smallholders in the palm oil supply chain.

There are 17 types of problems faced by independent smallholders as outlined in Table 1.

Table 1. The problems faced by the palm oil smallholders

| Article (year) | Types of Problems (Issues)* | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** |
| Yanita *et al.* (2023) | √ | | | | | | | | √ | √ | | | | | √ | | √ |
| Heryani *et al.* (2023) | | | | | √ | | | | | | | | | | | | |
| Herdiansyah *et al.* (2022) | √ | √ | | | | | | | | | | | | | | | |
| Paonganan (2023) | √ | √ | √ | √ | | | | √ | √ | √ | √ | √ | √ | | √ | √ | |
| Afrianto *et al.* (2022) | | | | | | | √ | | | | | | | | | | |
| Nashr *et al.* (2021) | √ | | | | | | | | | | | | | | | | |
| Ichsan *et al.* (2021) | | | | √ | √ | √ | | √ | | | | | | | | | |
| Suparjan and Lathifah (2020) | | | √ | | | | | | | | | | | | | | |
| Raharja *et al.* (2020) | √ | √ | | √ | √ | √ | | | √ | √ | √ | √ | √ | √ | √ | | √ |
| Suparjan *et al.* (2020) | | | √ | | | | | | | | | | | | | | |
| Papilo *et al.* (2020) | √ | | | √ | | | | √ | | √ | | | | √ | √ | | √ |
| Munirudin *et al.* (2020) | √ | | | | | | | √ | | √ | | | | | √ | | √ |
| Napitupulu *et al.* (2019) | | √ | | | | | | √ | | √ | √ | | | | | | |
| Chalil and Barus (2018) | | | | | | | | | √ | √ | | | | | | | |
| Sahara *et al.* (2017) | √ | √ | | | | | | | | √ | | | | | | | |
| Euler *et al.* (2016) | | | | | | | | √ | | | √ | | | | | | |
| Jelsma (2016) | √ | | | | | | | | | | | √ | √ | | | | |
| Suharno *et al.* (2015) | √ | | | | | | | | √ | √ | | | | | √ | | √ |

***** (1) Low productivity, (2) Low-quality production, (3) Low bargaining power, (4) Price discrimination, (5) Unable to access information (price), (6) Limited number of buyers (processors), (7) Conventional ways of information exchange or delivery, (8) Long supply chain (no direct access to industry, limited markets), (9) Lack of managerial skills (e.g., plantation management); (10) Capital limitations (finance, access to funding, input), (11) Low price, (12) Land legality, (13) Poor regulation and support (by government or corporate), (14) Low income, (15) Lack of technical capability (knowledge), (16) Price fluctuation, and (17) Poor agricultural practices.

Then, the listed problems (obstacles) faced by independent smallholders could be sorted according to the number of literature reports as shown in Figure 2.

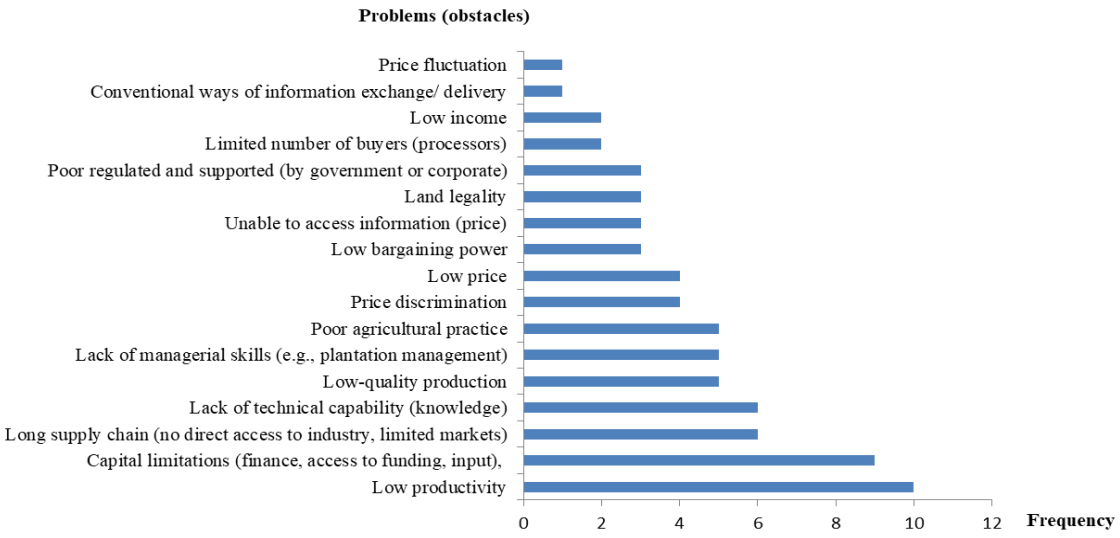


Figure 2: Types of the independent smallholders' problems

Figure 2 shows the three most problematic problems faced by independent smallholders: low productivity, lack of capital, and long supply chain stages. Several problems can be interrelated in cause-and-effect relationships. For example, poor quality of palm fruit can be caused by poor agricultural practices, which, if explored further, are caused by a lack of capital in managing plantations. Identifying the relationships between problems or challenges in the form of a causal hierarchy might be an opportunity for future research. Thus, the findings of these problems become guidelines for stakeholders or future studies in developing partnership systems or institutions that must focus on overcoming the problems of independent smallholders. The following sub-section summarizes previous studies that discuss partnership aspects, including institutional development, involving independent smallholders in the palm oil supply chain.

### 3.2 Summary of previous studies on partnership models for Indonesian palm oil independent smallholders.

From the literature search results, 14 relevant articles published from 2011 to 2023 are presented in Table 2 (on the following page). These reviewed studies have been conducted in the main palm oil-producing regions of Indonesia, including Sumatra Island (mostly in Riau, Jambi, and North Sumatra Provinces). Several studies have been carried out on Kalimantan Island, and one study has been carried out on Sulawesi Island. The majority of these reviewed studies employed qualitative analysis with data sourced from field surveys, including interviews. It was also identified that several studies applied descriptive analysis with statistical testing. In addition, several studies have applied a semi-quantitative approach using multi-criteria decision-making (MCDM) techniques, with the main data coming from focus group discussions (FGD) with experts (stakeholders). However, through the literature search process that we carried out, quantitative approaches such as mathematical analysis, optimization, and simulation techniques have not yet been applied to studies that analyze partnership models that involve smallholders in the palm oil supply chain.

Our review also reveals three main focuses of existing studies. First, studies have focused on the assessment or evaluation of existing partnership systems. Some studies in this first group employed qualitative analysis, while several studies utilized statistical measures. Second, two studies focused on the selection of partnership models, namely, according to farmers' preferences and managerial aspects. Finally, the studies focused on the proposed partnership system, including the development of conceptual models, partnership strategies, and advanced information technology.

Table 2. Summary of studies that discuss independent smallholders in the palm oil supply chain.

| Article (Year)/ Region | Focus/ Perspective of Analysis | Methods/ Approaches | Type* | | |
|---|---|---|---|---|---|
| | | | 1 | 2 | 3 |
| Yanita *et al.* (2023)/ Jambi | Evaluation of the existing partnership system. | Purposive sampling, simple random sampling, and qualitative descriptive | √ | - | - |
| Rahayu *et al.* (2023)/ Riau | Evaluation of two partnerships in oil palm rejuvenation. | Purposive sampling, field survey, and multiple regression model | √ | - | - |
| Syahza *et al.* (2023)/ Riau | Policy proposals to encourage sustainable management of palm oil plantations involving farmers. | Survey research, Participatory approach using Rapid rural appraisal (RAR) | - | - | √ |
| Paonganan (2023)/ 14 Province (in Indonesia) | Challenges faced by small palm oil farmers. | Explorative research, surveys, and qualitative descriptive | √ | - | - |
| Heryani *et al.* (2022)/ South Kalimantan | Development of an institutional model for a palm oil supply chain involving independent smallholders. | Analytical Network Process, Supply Chain Operation Reference (SCOR), Strategic Assumption Surfacing and Testing (SAST) | - | - | √ |
| Afrianto *et al.* (2022)/ - | Developing a digital transformation model to support the operational and transactional activities of oil palm smallholders. | Blockchain technology-based model, As-Is To-Be Model | - | - | √ |
| Witjaksono *et al.* (2021)/ Southeast Sulawesi | Assessment of the palm oil supply chain network involving smallholders. | Qualitative descriptive, food supply chain networking, observation, FGD, survey, and interviews | √ | - | - |
| Raharja *et al.* (2021)/ Jambi | Development of an integrated institutional model to strengthen the position and role of small farmers in the palm oil supply chain. | Soft system methodology, Interpretative structural modelling (ISM), SAST, Business model canvas | - | - | √ |
| Anwar *et al.* (2021)/ Riau | Institutional structuring strategies for smallholders in supporting sustainable economic development | Qualitative analysis: SWOT (strengths, weaknesses, opportunities, and threats), and analysis, Modern Political Economy analysis | - | - | √ |
| Suparjan and Lathifah (2020)/ Central Kalimantan | The choice of partnership model is based on farmer preferences in terms of profitability and social and plantation rejuvenation. | Analytic Network Process (ANP), random sampling | - | √ | - |
| Munirudin *et al.* (2020)/ East Kalimantan | Partnership mechanisms, factors influencing partnering farmers, and the impacts of partnerships for farmers and companies. | Simple random sampling. purposive sampling, and logit equation model. | √ | - | - |
| Chalil and Barus (2020)/ North Sumatera, South Sumatera, Jambi, Riau | The impact of partnership models on inclusive palm oil plantations. | Surveys (to 390 small holders), Mann Whitney test, binomial logit model. | - | - | √ |
| Suharno *et al.* (2015)/ Central Kalimantan | The choice of partnership model is based on management (cooperatives, companies, or individual farmers). | Survey, Focus Group Discussion (FGD), random sampling (farmers), qualitative analysis | - | √ | - |
| Syahza (2011)/ Riau | The institutional arrangement model involves smallholders to encourage economic growth in rural areas. | Surveys, descriptive qualitative, Rapid Rural Appraisal (RRA) | - | - | √ |

*1: Assessment/ evaluation, 2: Model selection, 3: Model development

Based on the discussion in the previous two subsections, several directions for future research on partnerships involving smallholders in the palm oil supply chain are provided in the following subsection.

### 3.3 Directions for future studies on the partnership model for palm oil-independent smallholders.

As previously mentioned, there are many problems faced by smallholders that can hinder the palm oil agro-industry supply chain from achieving global demands or standards, especially in terms of product quality and sustainability. In addition, these problems are obstacles to the achievement of prosperity by

smallholders, which is represented by the potential income that could be obtained. Existing studies have attempted to propose ways to overcome various problems faced by smallholders through partnership models or related ones, such as institutional strategies, but generally, these are conceptual models. Based on the literature searches conducted thus far, no studies have applied a partnership model or system for smallholders in the palm oil supply chain have been found. Thus, this may be an opportunity for future research, including incorporating approaches such as action research, as in Müller (2005). Moreover, no studies have examined the factors that determine the success of a partnership system for smallholders in the palm oil supply chain in Indonesia.

As previously mentioned, quantitative approaches (particularly mathematical analysis, optimization, and simulation techniques) have not yet been applied. In this regard, opportunities for applying optimization techniques or Operations Research in partnership analysis in supply chains were outlined more than two decades ago by Maloni *et al.* (1997). In addition, Chauhan *et al.* (2005) numerically tested the partnership system optimization model with revenue sharing has been numerically tested by Chauhan *et al.* (2005) on generic supply chains, which may be adapted for palm oil supply chains, especially on the upstream side. Ramanathan (2014) attempted a simulation technique to measure collaboration performance (i.e., close to partnership) in the supply chain. Ghadimi *et al.* (2022) then applied simulation techniques with an agent-based system to analyze partnership models in supply chains. One of the advantages of these techniques is that they can test various partnership model scenarios for smallholders in the palm oil supply chain. The study by Huo *et al.* (2022) could be used as a reference for developing analytical models to test partnership systems in agricultural product supply chains. In addition, in facing Industry 4.0, the partnership model proposed by Sjaf *et al.* (2022) can also be referred to.

## 4. CONCLUSIONS

Even though independent smallholders play a strategic role in the palm oil supply chain, they face various problems that can indirectly hamper the power of the national palm oil industry. The results of the literature review revealed several problems faced by independent smallholders, among which the most reported were low productivity of oil palm land, lack of capital, including inputs needed to run oil palm plantations, and limited market access. Most of these problems are related to each other; therefore, solving one problem can solve another problem. Studies that discuss partnerships among oil palm growers can be divided into three groups based on the focus of the study: assessment/evaluation, selection, and model development. Quantitative approaches using mathematical analysis, optimization techniques, and simulations are potentially considered promising applications for future research. These techniques can be used to test various partnership scenarios for smallholders in palm oil supply chains. This brief review is limited to a discussion of partnership models for independent smallholders in the Indonesian palm oil supply chain context. The outcomes of the present research are expected to serve as a catalyst for the future exploration of this important issue. Practically, this study provides basic information to stakeholders, particularly the government, seeking various efforts to overcome the problems experienced by independent smallholders, so that the Indonesian palm oil supply chain has competitiveness and sustainability aspects in line with current global economic demands.

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