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ANALYSIS OF QUALITY MANAGEMENT IN THE SUSTAINABLE PALM OIL INDUSTRY IN RIAU: A QUALITATIVE STUDY OF INDEPENDENT FARMERS

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ABSTRACT

This study aims to analyse quality management in the sustainable palm oil industry in Riau Province, focusing on the practices of independent palm oil farmers. Using a qualitative approach through surveys and in-depth interviews with 30-40 farmers selected through purposive sampling, this study explores the understanding, challenges, and quality management strategies applied by farmers. The results indicate that while farmers' understanding of quality standards and cultivation practices is already quite good, there is a gap between theory and practice due to limitations in capital, access to technology, and institutional support. Training and mentoring have proven effective in improving knowledge and quality management practices; however, challenges such as fluctuations in TBS prices and inadequate infrastructure still hinder optimal implementation. Key factors influencing quality management include raw material quality, workforce competence, institutional support, and infrastructure. Recommended strengthening strategies include capacity building through training, institutional strengthening, accelerated certification, infrastructure improvement, and multi-stakeholder synergy. The findings of this study provide a comprehensive overview of the quality management conditions of independent oil palm farmers in Riau and serve as the basis for policy recommendations and training programmes to support the sustainability and competitiveness of the oil palm industry.

Keywords: Quality Management, Palm Oil Industry, Sustainability Management, Quality Management Strategy

INTRODUCTION

Statistical data shows that Indonesia is one of the world's largest producers of palm oil. Based on the latest data from the Foreign Agricultural Service, United States Department of Agriculture (USDA), Indonesia's palm oil production is estimated to reach an impressive 46.5 million metric tons. This figure is equivalent to approximately 58 per cent of global palm oil production in the same year. The palm oil industry, as one of the main sectors in the global economy, faces complex challenges related to transparency and security in its supply chain. As global demand for palm oil derivatives increases, the need for a system that ensures transparency and security at every stage of production becomes increasingly urgent.

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The palm oil industry in Indonesia, particularly in Riau Province, is a strategic sector that contributes significantly to the regional and national economy. With a plantation area of over 3.4 million hectares and crude palm oil (CPO) production of approximately 8.74 million tonnes in 2022, Riau is the main centre of national palm oil production (BPS Riau, 2023). Most of this production comes from smallholder farmers who manage their plantations independently and play a crucial role in the palm oil industry's supply chain. However, increased production quantities are not always accompanied by improved product quality, which remains the primary challenge in achieving a sustainable palm oil industry.

Quality management in the sustainable palm oil industry is crucial to maintaining product quality to meet increasingly stringent certification standards such as ISPO and RSPO. These standards not only require physical product quality but also environmental and social sustainability aspects in the production process (Syaiful Hadi et al., 2022). However, the consistent implementation of quality management at the smallholder farmer level still faces various challenges, ranging from limited knowledge, technology, to inadequate institutional support. Traditionally, quality philosophy has focused on developing and implementing a broad organisational culture emphasising customer focus, continuous improvement, human resource empowerment, and data-driven decision-making.

Previous studies have highlighted technical factors that influence palm oil quality, such as operational facilities, equipment, labour, and raw materials (Putri Dewi Ayu, 2021; Hidayat et al., 2023). However, these studies have primarily focused on the company or processing plant level, while aspects of quality management at the smallholder farmer level have received less in-depth attention. In fact, independent farmers are at the forefront of production and play a crucial role in determining the quality of raw materials entering the factory.

In addition, the theory of sustainable quality management emphasises the importance of integrating social, economic, and environmental aspects into quality management (Nahriyah, 2024). Phenomena in the field show a gap between farmers' understanding of quality and the actual practices they implement. Many farmers are unable to optimally implement quality management due to limited resources and a lack of continuous assistance.

The success or failure of an effort to improve product quality is greatly influenced by the quality of the product itself. In achieving success in competition, it is not only skills in management and resource development that determine success, but also product quality. Product quality plays a very important role for companies, serving as the key to success in achieving a competitive edge in the market.

A qualitative approach through surveys and in-depth interviews is highly relevant for exploring the experiences, perceptions, and challenges of independent farmers in implementing quality management. This method allows researchers to obtain rich and in-depth data on quality management practices, the obstacles faced, and the strategies used by farmers in the context of sustainability (Hidayat et al., 2023).

The purpose of this study is to explore the quality management practices implemented by independent oil palm farmers in Riau, identify the challenges and

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obstacles they face, and explore the strategies and support needed to strengthen sustainable quality management. Thus, this study is expected to provide a comprehensive overview that can serve as a basis for developing more effective policies and training programmes.

Quality management at the farmer level is not only related to technical aspects such as seed selection, fertilisation, and pest control, but also involves social and economic management, such as involvement in farmer groups and partnerships with factories (Syaiful Hadi et al., 2022). Therefore, this study will also examine how these aspects interact in quality management practices.

The main challenges faced by independent farmers in implementing quality management include limited access to information, high production costs, and a lack of price incentives from mills for high-quality products (Nahriyah, 2024). This study will explore how farmers overcome these challenges and the role of training and institutional support in encouraging behavioural and practice changes.

By filling the existing research gap, particularly in the qualitative aspects at the smallholder farmer level, this study makes an important contribution to the development of a sustainable palm oil industry in Riau. The research findings are expected to serve as a reference for stakeholders in designing targeted interventions to improve product quality and farmer welfare.

METHODS

This study uses a qualitative approach with survey and in-depth interview methods to gain a comprehensive understanding of quality management practices among independent palm oil farmers in Riau Province. The qualitative approach was chosen because it is able to explore the experiences, perceptions, and challenges faced by farmers in depth, as well as provide a rich context related to sustainable quality management (Nugraheni and Pangaribuan, 2008; Hidayat et al., 2023). Surveys were used to collect primary data in the form of quantitative and qualitative information from a number of independent farmer respondents, while interviews aimed to explore aspects that were not covered by the surveys. The study population consists of all independent oil palm farmers actively managing oil palm plantations in several production centres in Riau, such as Pelalawan and Rokan Hulu districts (INSTIPER Repository, 2021; UIR Journal, 2021). The sampling technique used purposive sampling, with criteria including farmers who have at least five years of experience and have participated in training or mentoring related to quality management. A sample of 30–40 farmers was selected for the survey and interviews, in accordance with the research capacity and recommendations from qualitative literature (Nugraheni and Pangaribuan, 2008).

The data collection instrument was a semi-structured questionnaire designed based on quality management indicators, such as understanding of quality standards, cultivation practices, pest control, and waste management (Hidayat et al., 2023; Nahriyah, 2024). This questionnaire is accompanied by a semi-structured interview guide that allows researchers to further explore farmers' motivations, constraints, and strategies in implementing sustainable quality management. Secondary data was also

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collected from government reports, non-governmental organisations, and scientific literature to strengthen the analysis.

Data collection was conducted directly in the field using a face-to-face method, which allowed for clarification and further exploration of information. The survey was conducted first to obtain a general overview, followed by in-depth interviews with selected respondents considered representative of various conditions and experiences (Journal of Geography Education, 2016; UIR Repository, 2021). All data were analysed thematically by identifying patterns, themes, and relationships between concepts emerging from the survey and interviews.

Data analysis used a descriptive qualitative approach focused on understanding the context and meaning of quality management practices at the farmer level. The analysis process was conducted iteratively, from data collection, coding, categorisation, to drawing conclusions. This approach aligns with qualitative research standards that emphasise internal validity and data credibility (Soeratno and Arsyad, 1995; Hidayat et al., 2023). The analysis results are expected to provide a comprehensive overview of the actual conditions of quality management among independent oil palm farmers in Riau, along with relevant development recommendations.

RESULTS AND DISCUSSION

This study uses a qualitative approach with survey and in-depth interview methods to understand quality management practices among independent oil palm farmers in Riau Province. This approach is effective in exploring farmers' experiences, perceptions, and constraints in implementing sustainable quality management (Nugraheni and Pangaribuan, 2008; Hidayat et al., 2023). Surveys provide a general overview, while in-depth interviews reveal motivations and obstacles that are not covered by surveys.

Understanding and Practicing Quality Management

The survey results show that most independent farmers have a basic understanding of the importance of raw material quality, especially ripe, clean, and timely harvested Fresh Fruit Bunches (FFB). As many as 80% of respondents stated that they were aware of the quality standards that must be met in order for FFB to be accepted by factories at a reasonable price. However, in-depth interviews revealed that this understanding was still conceptual and not yet fully and consistently applied in daily practice, especially in pest control and waste management (Nahriyah, 2024; UIR Repository, 2021).

The quality management practices implemented by independent farmers vary. Around 65% of farmers carry out integrated pest control and use organic fertilizers as part of their efforts to maintain the quality of their plantations. However, some farmers still rely on traditional methods that are less environmentally friendly and less effective. Waste management is also a concern, with only 50% of farmers managing waste properly in accordance with sustainability principles. This aligns with the findings of Hidayat et al. (2023), who stated that sustainable cultivation practices still need to be improved among smallholder farmers. Based on the interview results, training and mentoring provided by the government and civil society organizations are the main factors supporting improved understanding and quality management practices. Approximately 70% of farmers reported having participated in training sessions on

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quality standards and sustainable cultivation techniques. However, limitations in capital, access to technology, and fluctuations in TBS prices remain significant barriers hindering the consistent application of quality management (INSTIPER Repository, 2021; UIR Journal, 2021).

Table 1. Level of Understanding and Practice of Quality Management Among Independent Farmers in Riau

Aspect	Level of Understanding (%)	Level of Practice (%)
TBS Quality Standards	80	65
Integrated Pest Management	75	65
Use of Organic Fertilizer	70	60
Waste Management	60	50
Harvest Recording	55	45

The table above shows a gap between understanding and practice of quality management at the level of independent farmers. Although knowledge of quality standards and sustainable cultivation practices is quite high, implementation in the field is still limited by external factors such as capital and technology. This indicates the need for more intensive and sustainable training programs, as well as adequate institutional support to facilitate access to technology and economic incentives.

Factors Affecting Quality Management

From the thematic data, the five main factors influencing quality management at the independent farmer level are raw material quality, workforce competence, access to training and technology, institutional support, and infrastructure and logistics. Table 2 below summarizes farmers' perceptions of these factors:

Table 2. Factors Affecting Quality Management of Independent Palm Oil Farmers in Riau

Factor	Persentase Responden (%)	Description
Raw Material Quality (TBS)	35	The ripeness and cleanliness of the fruit greatly determine its quality (a dominant factor in product quality).
Labor Skills	25	Farmers' knowledge and experience in cultivation
Access to Training and Technology	5	Modern training and tech support the practice
Institutional Support	20	The role of cooperatives and partners in mentoring
Infrastructure and Logistics	15	Road and transportation conditions affect quality

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Raw Material Quality (TBS)

The quality of raw materials in the form of Fresh Fruit Bunches (FFB) is the most dominant factor influencing quality management. Most farmers understand that ripeness, cleanliness, and proper harvesting time are crucial in determining the quality of the final product (Nahriyah, 2024). However, suboptimal harvesting practices, such as harvesting unripe fruit and delayed transportation, still occur frequently. This leads to a decline in palm oil quality and impacts farmers' selling prices (SPKS, 2023). This raw material quality management aligns with findings at PT. Sawit Riau Makmur, which show that raw materials significantly influence palm oil quality (t-calculated = 9.244 > t-table 1.675) (UIN Suska Repository, 2012).

Labor Skills

The competence of farmers is also an important factor in quality management. Knowledge and skills in integrated pest control, fertilization, and waste management contribute to improving the quality of fresh fruit bunches (Hidayat et al., 2023). Approximately 70% of farmers who participated in training and mentoring reported an improvement in their ability to apply sustainable farming practices. However, there is still a gap between knowledge and practice due to limited capital and access to technology (SPKS, 2023). This is consistent with the analysis results that labor has a significant positive effect on product quality.

Access to Training and Technology

Operational facilities and equipment used at the independent farmer level also affect product quality, although the effect tends to be negative if the equipment is outdated or inadequate. Research at PT. Sawit Riau Makmur shows that operational facilities and equipment have a negative effect on palm oil quality (t count < t table) (UIN Suska Repository, 2012). This emphasizes the importance of investing in modern equipment and technology to improve production efficiency and quality.

Institutional and Infrastructure Support

Institutional support through cooperatives, farmer groups, and partnerships with palm oil companies are supporting factors that strengthen quality management. Farmers who are members of farmer groups and receive regular assistance tend to be more consistent in implementing quality standards (INSTIPER Repository, 2021). However, inadequate infrastructure, such as road conditions and transportation facilities, remains the main obstacle causing damage to fresh fruit bunches (FFB) before they reach the factory (SPKS, 2023). This factor indicates the need for infrastructure improvements to support a quality supply chain.

The Impact of Training on Quality Improvement

Survey results show that training conducted by BPDPKS and IPB Training since early 2024 has had a significant positive impact on improving farmers' knowledge and skills in managing the quality of Fresh Fruit Bunches (FFB). Approximately 78% of respondents stated that the training material helped them understand quality standards, proper harvesting techniques, integrated pest control, and environmentally friendly waste management. In-depth interviews reinforce these findings, with farmers citing training as the primary factor driving changes in cultivation practices toward better quality (PPID Riau, 2025; BPDPKS, 2024).

Training not only enhances knowledge but also encourages behavioral and practice changes in the field. Farmers who participated in the training are more

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disciplined in fruit sorting, harvest recording, and waste management. This has led to improved TBS quality and better market value. However, interviews also revealed that capital constraints and limited access to technology still hinder the consistent implementation of optimal practices (InfoSAWIT, 2024).

While training has positive impacts, in-depth interviews highlighted several challenges hindering the full implementation of quality management. Limited capital to purchase new tools or technology, unstable FFB price fluctuations, and inadequate infrastructure conditions are the main obstacles. This indicates the need for continued support in the form of access to financing, price incentives, and infrastructure improvements so that the training can have maximum impact (BPDPKS, 2024; InfoSAWIT, 2024).

These findings underscore the importance of training as a key tool in improving the quality of palm oil products at the smallholder level. However, to ensure the sustainability and consistency of quality improvements, training must be supported by ongoing mentoring programs, access to technology, and adequate incentive policies. Collaboration between the government, training institutions, and the private sector is essential to build a sustainable quality management ecosystem in Riau.

Challenges Faced by Farmers

One of the main challenges faced by independent palm oil farmers is limited capital. The majority of farmers manage less than three hectares of land, so the small scale of their businesses limits their ability to invest in modern technology and equipment that can improve production quality (SPKS, 2023). This situation also affects farmers' ability to purchase quality fertilizers and pesticides and to access training and assistance optimally.

Smallholder oil palm farmers in Riau also face challenges in terms of low-quality Fresh Fruit Bunches (FFB) and weak bargaining power in the market. FFB prices, which follow the regulations set by processing plants, often do not benefit farmers, forcing many to sell their harvest to middlemen at very low prices (SIAR, 2021). This reduces farmers' motivation to consistently improve product quality due to minimal economic incentives.

Land legality issues are a significant obstacle for independent farmers. Most independent oil palm plantations are located within forest areas or do not have clear ownership documents, making it difficult for farmers to obtain the ISPO certification required by the government within the next five years (Auriga, 2019). This uncertainty regarding land status also hinders farmers' access to assistance programs and business loans.

Inadequate infrastructure, particularly road access and transportation facilities, also poses a challenge in maintaining the quality of FFB until it reaches the factory. Damage to the fruit during transportation causes a decline in quality and selling price (SPKS, 2023). In addition, access to modern technology for cultivation and processing is still limited, especially for farmers with small capital.

Although there are various training and partnership programs from the government and palm oil companies, their implementation is not yet uniform and has not fully reached all independent farmers. Institutions such as cooperatives and farmer groups still need to be strengthened in order to provide better assistance and market access (Musim Mas Group, 2023). This gap reinforces the need for multi-stakeholder synergy in supporting farmers.

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Strategy for Strengthening Quality Management

One of the main strategies for strengthening quality management is to increase farmers' capacity through comprehensive training covering the entire oil palm cultivation cycle, from the selection of superior planting materials, land management, harvesting techniques, to integrated pest control in accordance with Good Agricultural Practices (GAP) principles (BPDPKS, 2024; Agricom, 2025). This training is not only theoretical but also includes field practice to reinforce farmers' understanding of quality standards and sustainability. Intensive mentoring from government and private institutions also helps farmers overcome technical and administrative challenges.

The establishment of institutions such as Village Unit Cooperatives (KUD) and Farmer Group Associations (Gapoktan) is an important strategy to strengthen farmers' bargaining position and facilitate access to production facilities, technology, and markets (SPKS, 2023; Katadata, 2020). These institutions also play a role in organizing training, mentoring, and facilitating sustainability certification such as ISPO and RSPO. Synergy between farmer institutions, companies, and the government strengthens the systematic implementation of quality management.

Accelerating ISPO certification in smallholder oil palm plantations is a priority to improve quality and sustainability standards (Pertanian.go.id, 2023). The government and stakeholders are encouraging the implementation of the Smallholder Oil Palm Replanting Program (PSR) and strengthening the institutions that administer certification. Premium price incentives for farmers with ISPO-certified plantations are also proposed as motivation to improve the quality of fresh fruit bunches (FFB) and sustainable cultivation practices (Madaniberkelanjutan.id, 2022).

Improvements in infrastructure, particularly road access and transportation facilities, are crucial to maintaining the quality of FFB until it reaches the factory (SPKS, 2023). Additionally, access to modern technology such as mechanical harvesting tools and precision fertilization systems needs to be promoted to enable farmers to enhance production efficiency and quality. Collaboration with research institutions and palm oil companies in technology transfer is part of the strategy to strengthen farmers' technical capacity (Agricom, 2025).

Strengthening quality management also requires synergy between local and central governments, companies, non-governmental organizations, and farmer groups (WRI Indonesia, 2023). Supportive policies such as revising TBS purchase price regulations to include ISPO certification indicators and a transparent incentive system are key to success. A joint roadmap between the central and local governments for certification and farmer training will accelerate the transformation of the sustainable palm oil sector in Riau (Madaniberkelanjutan.id, 2022).

CONCLUSION

This study reveals that independent oil palm farmers in Riau have a fairly good understanding of quality management, particularly regarding the standards for Fresh Fruit Bunches (FFB) quality and sustainable cultivation practices such as integrated pest management and waste management. However, there is a gap between conceptual

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understanding and the implementation of practices in the field, which is influenced by limitations in capital, access to technology, and institutional support. The main factors affecting quality management include the quality of raw materials, workforce competency, institutional support, infrastructure, and operational facilities, with raw material quality and workforce competency being the dominant factors.

Training and mentoring have been proven to have a significant positive impact on improving farmers' knowledge, skills, and quality management practices. Ongoing training helps farmers adopt better cultivation techniques and environmentally friendly waste management, although challenges such as limited capital, FFB price fluctuations, and infrastructure conditions still limit the consistency of implementation. In addition, farmers face various challenges, including small-scale operations, weak bargaining positions, land legality issues, and limited access to technology, all of which contribute to barriers in improving product quality.

Effective strategies for strengthening quality management include capacity building through training and mentoring, strengthening farmer institutions, accelerating ISPO certification, improving infrastructure and access to technology, as well as multi-stakeholder synergy among government, the private sector, and community organizations. This holistic approach is expected to enhance production quality and support the sustainability of the oil palm industry in Riau. Integrated policy recommendations and programs are needed to overcome obstacles and maximize the potential of independent oil palm farmers in implementing sustainable quality management.

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