Symbiosis Civicus

Symbiosis Civicus, November 2024, 1 (2):10-16
DOI: https://doi.org/10.32663/.....

Optimization of Horticultural Commodity Supply Chains Through a Participatory Approach Among Smallholder Farmers in Suriname

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ARTICLE HISTORY

Received : 2024-05-13
Revised : 2024-11-02
Accepted : 2025-11-02

Keywords:
supply chain, horticulture, smallholder farmers, participatory, community, Suriname

ABSTRACT

Horticultural farming practices among Indonesian-descended farmers in Suriname remain largely traditional and lack an understanding of effective supply chain systems. This community service program aimed to optimize the horticultural supply chain through a participatory, community-based approach. The methods included field observation, online training, formation of a community working team, implementation assistance, and evaluation. The training, attended by 25 participants, showed significant improvements across eight aspects of knowledge and skills, including supply chain comprehension (+104.8%) and digital promotion capabilities (+135.3%). Additionally, a Community Supply Chain Team was established to manage logistics, documentation, and product promotion. Post-training reflection forums indicated that participants felt more confident, motivated to collaborate, and ready to adopt more efficient practices. This training demonstrated that capacity strengthening through collective approaches can improve distribution efficiency, enhance product competitiveness, and empower horticultural farmers in a sustainable manner.

1. INTRODUCTION

Suriname, formerly known as Dutch Guiana, is a country located in South America (BBC, 2023) and a former Dutch colony. It shares borders with French Guiana, Guyana, Brazil, and the Atlantic Ocean. Approximately 75,000 people of Javanese descent currently reside in Suriname (Anonymous, 2025). They are descendants of contract laborers brought by the Dutch colonial government between 1890 and 1939 to work on plantations, particularly in the sugarcane sector. To this day, the Javanese language and culture remain preserved among these communities. One of Suriname's largest cities is Lelydorp, the capital of Wanica District, with a population of approximately 18,223 or around 3.3% of the national total (Maptons, 2025; Sawe, 2017). As the second-largest city in Suriname, it indicates that agriculture continues to be an essential component of the local economy, as is the case in other parts of the country.

Agriculture remains a key pillar of Suriname's economy, especially for commodities such as rice, bananas, coconuts, and tropical fruits. Several of these products are exported, including rice, bananas, oranges, coconuts, and palm oil (Menke & E.Chin, 2025). In 2019, the agricultural sector contributed 5.8% to Suriname's Gross Domestic Product (GDP). The government of Suriname has designated agriculture as a priority sector. The potential for agricultural development remains strong, with 1.5 million hectares of land considered suitable for agricultural production (ITA, 2024). Despite its importance, horticultural farming among Indonesian-descended farmers continues to rely on traditional and manual methods. Their primary challenges are not only in cultivation and post-harvest handling but also in understanding the supply chain system.

Many farmers are unfamiliar with the flow of agricultural products from harvest to end consumers, including aspects such as packaging, storage, transportation, and market access. This lack of knowledge results in lower market value and limited competitiveness both locally and for export. This condition highlights the need for interventions in the form of training and mentoring that address not only technical aspects of farming and post-harvest but also integrated supply chain management. To maximize the benefits of agriculture and forestry sectors sustainably, farmers' capacities must be strengthened across the entire agricultural value chain.

Based on a situational analysis and direct engagement with horticultural farmers in Suriname, two major issues were identified as barriers to increasing efficiency and competitiveness in farming operations. First,

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farmers lacked a comprehensive understanding of the supply chain structure and processes; they focused mainly on production and were unaware of how their products moved from the field to the final consumer, which led to poor understanding of pricing factors and distribution costs. Second, there was a lack of collaboration among farmers at the community level, where each farmer operated individually without coordination for joint distribution or collective price setting—ultimately weakening their bargaining power in the market.

This community service program aimed to enhance farmers' understanding of the horticultural supply chain structure and processes. It also promoted community collaboration in managing logistics and product promotion. Furthermore, the program provided technical and managerial assistance to improve the efficiency and competitiveness of Indonesian-descended horticultural farmers in Suriname.

2. METHOD

This community service initiative was carried out using a participatory, community-based approach that positioned farmers as active subjects throughout the entire process. This approach was chosen to ensure that the proposed solutions would be truly relevant and sustainable according to local needs (Zunaidi, 2024). The implementation methodology consisted of five main stages as follows:

1. Initial Identification and Field Observation
   This initial stage aimed to gain an understanding of the existing conditions of the horticultural supply chain within the target community. Activities included:
   a. Direct observation at partner farming sites
   b. In-depth interviews with farmers to gather information on existing distribution practices, marketing challenges, and their level of understanding regarding supply chain structures
   c. Documentation of initial findings as the foundation for designing training programs and interventions

2. Basic Training on the Horticultural Supply Chain
   The training was designed to be interactive and contextual, aiming to improve farmers' literacy regarding horticultural supply chains. Training materials included:
   a. Mapping distribution flows from farmers to end consumers
   b. Identifying key actors in the local supply chain (collectors, traders, distributors)
   c. Analyzing inefficiency points in the distribution process such as post-harvest damage, waiting times, and hidden costs

   Training methods included group discussions, simulations, and local case studies.

3. Formation and Strengthening of the Community Supply Chain Team
   Following the training, the formation of a community working team was facilitated with three main roles:
   a. Logistics: managing the collection and delivery of products
   b. Promotion: designing joint marketing strategies
   c. Documentation: recording distribution flows and sales outcomes
   This stage also included the formulation of a collective action plan outlined in a written agreement as a form of commitment and accountability among farmers.

4. Implementation Assistance and Collaboration Simulation
   The service team provided intensive assistance during the implementation phase of the joint distribution system. Activities included:
   a. Simulations for setting collective prices
   b. Grouping products based on quality
   c. Recording transactions and distribution flows
   d. Promoting horticultural products in local markets
   Assistance was provided regularly to ensure that each member understood their respective roles and responsibilities.

5. Evaluation and Documentation of Results
   Evaluation was conducted to assess changes in farmers' knowledge, attitudes, and skills as well as the effectiveness of the community supply chain team. Evaluation methods included:
   a. Field observations
   b. Pre- and post-training questionnaires

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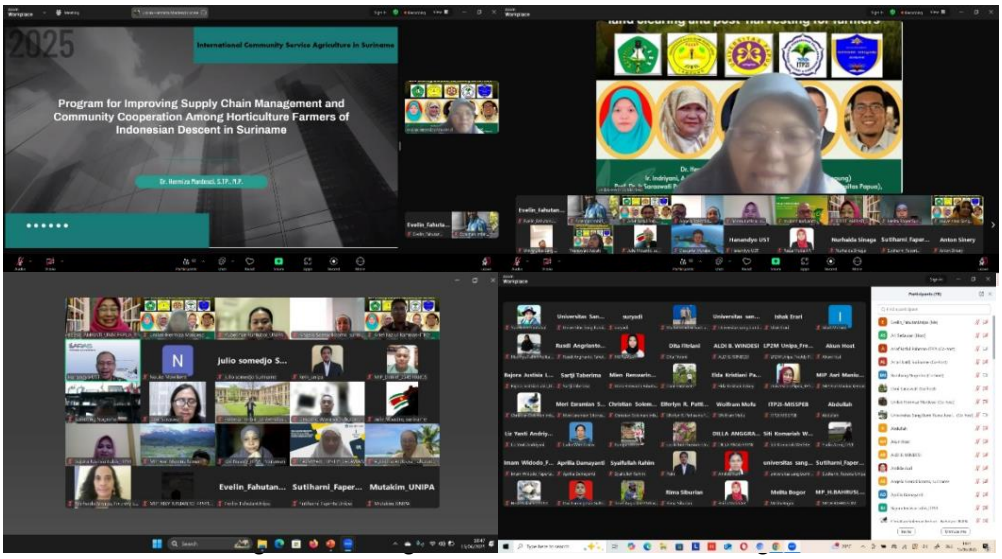
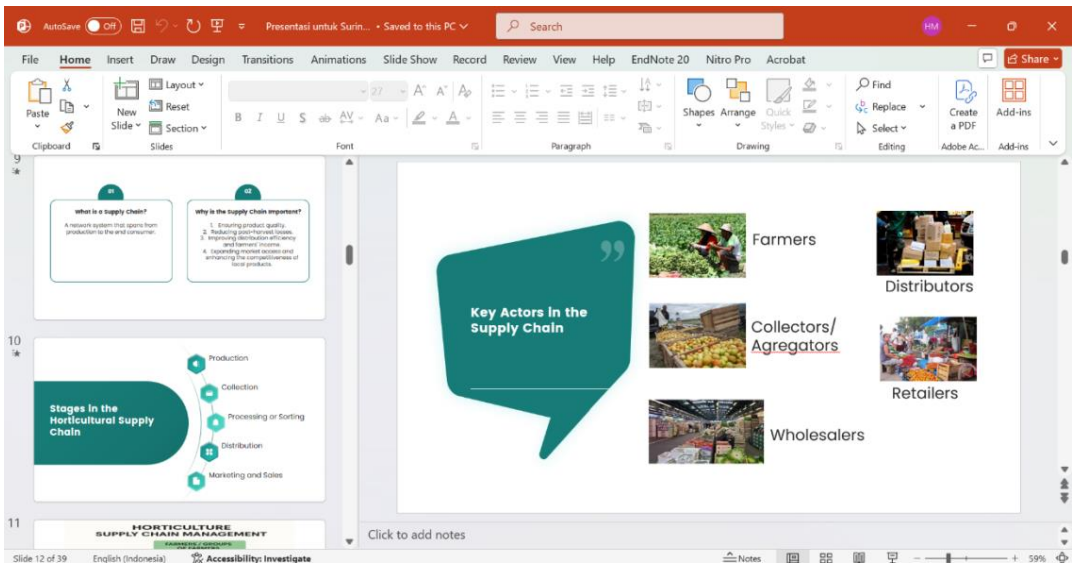
c. Reflective discussion forums with partner farmers
The final outputs of the activities were documented in the form of a narrative report, a map of the local supply chain, and strategic recommendations for strengthening the community-based horticultural distribution system.

3. RESULT AND DISCUSSION

Program Implementation

The Community-Based Horticultural Supply Chain Optimization Training was conducted on June 15, 2025, online via Zoom Meeting. The training was attended by 25 participants, consisting of 20 horticultural farmers of Javanese descent in Suriname, 3 local small-scale traders, and 2 academic representatives. The online training was designed to be interactive, utilizing breakout rooms for group discussions and local case study presentations. Training documentation is shown in Figure 1, and an example of the presentation slides is shown in Figure 2.





Pre- and Post-Training Questionnaire Results

A questionnaire was used to measure changes in participants' knowledge, skills, and attitudes before and after the training. Assessment was conducted using a 1–5 scale (1 = very low, 5 = very high). The average scores before and after training are presented in Table 1.

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Table 1. Average Questionnaire Scores Before and After Training

No	Assessment Aspect	Before	After	Increase (%)
1	Understanding of supply chain structure	2.1	4.3	+ 104,8
2	Knowledge of key distribution actors	2.0	4.2	+110,0
3	Ability to map own distribution flow	1.9	4.0	+110,5
4	Awareness of collective cooperation	2.5	4.5	+80,0
5	Knowledge of product packaging and storage	2.3	4.1	+78,3
6	Ability to record harvest and sales data	2.0	4.4	+120,0
7	Digital product promotion skills	1.7	4.0	+135,3
8	Understanding of collective price formation	1.8	4.3	+138,9

Interpretation and Discussion of Results:

1. Understanding of Supply Chain Structure (+104.8%)
   The increase from 2.1 to 4.3 indicates that the training effectively provided participants with a comprehensive understanding of the product flow from the field to consumers. Previously, farmers focused only on cultivation, but after training, they began to realize the importance of distribution, storage, and marketing stages. Better understanding is expected to reduce harvest losses, in line with Roy (2015), who emphasized that supply chain awareness is essential for efficiency and minimizing post-harvest loss (up to 22%).
2. Knowledge of Key Distribution Actors (+110.0%)
   An increase from 2.0 to 4.2 reflects participants' improved ability to identify the roles of intermediaries such as collectors, traders, and retailers. Recognizing these actors helps build a fairer and more efficient distribution network. Effective communication and technology-supported systems between supply chain actors are essential to reduce risk and enhance performance (El Ouarrak & Hmioui, 2024).
3. Ability to Map Own Distribution Flow (+110.5%)
   Before the training, farmers lacked a structured view of distribution. Afterward, they were able to design distribution schemes based on harvest time, location, and local market access. This enables them to ensure timely deliveries, an essential element of efficient supply chain management (Adiyatomo, 2021; Walewangko, 2013).
4. Awareness of Collective Cooperation (+80.0%)
   This score indicates a shift from individualistic to collective mindsets. Participants realized that collaboration can help reduce costs, coordinate distribution schedules, and improve bargaining power. As Deperiky *et al*. (2021) highlight, supply chain performance relies heavily on cooperation, information sharing, and synchronized decisions among members.
5. Knowledge of Product Packaging and Storage (+78.3%)
   The training introduced simple techniques for maintaining the quality of harvested products. This is crucial, as post-harvest losses were previously a major source of income reduction. Proper packaging and storage not only help preserve product quality and shelf life (e.g., for honey as shown by Aminullah & Salsabilah (2024), but also serve as a medium for product branding and consumer information (Samuddin et al., 2018).
6. Ability to Record Harvest and Sales Data (+120.0%)
   This aspect showed a significant increase, indicating that financial and distribution recording was a new practice for participants. The training encouraged basic documentation to monitor product flow and income. Proper record-keeping contributes to more effective supply chain management, ultimately enhancing agricultural competitiveness (Annisa, 2023).
7. Digital Product Promotion Skills (+135.3%)
   This was the highest increase among all indicators. Participants initially had no knowledge of online marketing. After training, they began using platforms such as WhatsApp and Facebook to reach local markets. Digital marketing has become a crucial tool for agricultural product promotion in rural areas. Tanti & Kuswidiarto (2019) emphasize the importance of developing digital competencies among farmers to effectively use mobile applications and online platforms.
8. Understanding of Collective Price Formation (+138.9%)
   The training opened participants' minds to the possibility of collectively setting product prices based on quality and quantity, reducing their dependence on dominant middlemen. Bhinadi (2012) notes that at the collector level, market structures tend to be oligopolistic, while competition increases further downstream.

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At the producer level, prices are often dictated by buyers, with collectors and retailers following the highest market price.

Perceptions and Satisfaction of Participants

Participants' perceptions and satisfaction regarding the training were generally positive across all groups. Farmers reported gaining new insights, especially on the importance of coordination among farmers and the role of community institutions in negotiating fairer prices. Small-scale business actors appreciated the understanding of supply flows, which helped them develop more efficient raw material procurement strategies. Meanwhile, academic participants viewed the training as an opportunity to bridge practical and academic knowledge, expressing willingness to continue mentoring local agricultural communities.

Table 2. Participants' Perceptions and Satisfaction Scores

No	Statement	Average Score (out of 5)
1	The material was easy to understand	4,6
2	The speaker mastered the subject	4,8
3	The training broadened my knowledge	4,7
4	I will apply what I have learned	4,5
5	The timing and duration were effective	4,2

A total of 92% of participants committed to applying at least part of the training content in their farming or business activities. Farmers mentioned that they would start recording their harvests and collaborate with other farmer groups, while SMEs began exploring local sourcing agreements.

Community Team Formation and Collaboration Simulation

Following the training, a concrete follow-up initiative to strengthen coordination among community members was the establishment of the Community Supply Chain Team. This team plays a strategic role in managing harvests collectively. It was divided into several main functions. First, the logistics team was responsible for collecting harvests from individual farmers and arranging their delivery to predetermined distribution points. Second, the documentation and promotion team focused on designing local product labels that reflect the community's identity, while also formulating collective sales strategies to add market value to their products.

To enhance technical understanding and skills, simulations were conducted that addressed several key aspects of supply chain management. These included collective price-setting based on product quality and classification—ensuring that prices were fair and transparent for all parties involved. Participants also practiced sorting harvests based on size, ripeness, and visual quality, allowing for more structured distribution. Lastly, they designed a more efficient local distribution flow to minimize transportation costs and speed up delivery times to consumers. This initiative marked the initial step toward a more organized, community-empowered horticultural supply chain system.

Reflective Evaluation

A reflective forum held after the training revealed positive responses from participants. Most stated that they now felt more confident in managing the marketing of their agricultural products, thanks to a better understanding of distribution strategies, pricing mechanisms, and the importance of product branding. Moreover, the training sparked a renewed spirit of collaboration, evidenced by strong motivation to establish community-based farmer groups. Participants realized that cooperation among farmers could enhance their bargaining power and improve supply chain efficiency. They also appreciated the flexible, accessible format of the online training, which still delivered practical and relevant content aligned with real-world needs.

4. CONCLUSIONS

The community-based horticultural supply chain optimization training in Suriname successfully improved the knowledge and skills of Indonesian-descended farmers in various aspects of agricultural product distribution and marketing. The participatory approach proved effective in fostering collective awareness, strengthening farmer coordination, and enhancing efficiency in logistics, documentation, and product promotion. Significant improvements in eight indicators of knowledge and skills demonstrate that a structured, contextual, and community-based intervention can address the horticultural distribution challenges faced by smallholder farmers. The establishment of the Community Supply Chain Team represents a strategic step toward a more equitable and competitive distribution system. Moving forward, continued assistance and technology integration are needed to maintain sustainability and expand the program's positive impact.

Acknowledgement

The authors would like to express their gratitude to Universitas Lancang Kuning for the support and funding provided, which enabled the successful implementation of this community service activity. Our highest appreciation also goes to KODELN for facilitating this international engagement initiative in collaboration with partners in Suriname. Special thanks are extended to our partner Stichting Azzam Aliyah in Lelydorp, Wanica, Suriname, for their cooperation, warm welcome, and active participation in supporting this program from beginning to end. All of this support was instrumental in the success of the initiative.

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