

# Community development of a business ecosystem in sacha inchi products, case study of purwakarta farmers through the one village one CEO program

Handian Purwawangsa<sup>1</sup>, Mohammad Iqbal Irfany<sup>2\*</sup>, Alim Setiawan Slamet<sup>2</sup>, Bintoro Pujio Prawiro<sup>3</sup>, Daffa Aqomal Haq<sup>2</sup>, and Prima Gandhi<sup>4</sup>

<sup>1</sup>Faculty of Forestry and Environment, IPB University, Bogor, 16680, West Java, Indonesia

<sup>2</sup>Faculty of Economics and Management, IPB University, Bogor, 16680, West Java, Indonesia

<sup>3</sup>Directorate of Agromaritime Community Development, IPB University, Bogor, 16680, West Java, Indonesia

<sup>4</sup>Graduate School of International Food and Agricultural Studies, Tokyo University, Tokyo, 184-8588, Japan

**Abstract.** Sacha Inchi (*Plukenetia volubilis*) represents a significant opportunity for economic, social, and environmental transformation in Indonesia due to its health benefits and versatility. This study examines the development of a sustainable business ecosystem for Sacha Inchi in Parakanlima Village, Purwakarta Regency, under the One Village One CEO program. In collaboration with Bumdes Panca Mandiri and supported by academic and local stakeholders, the program successfully introduced cultivation practices and innovative by-products like Sachifit. This study employed a mixed-method approach that included surveys and Focus Group Discussions (FGDs) with 30 purposively selected respondents. The results reveal that *Sacha Inchi* cultivation has improved household resilience, generated 80 new jobs, and increased monthly incomes by 27%. Socially, it has empowered communities through knowledge-sharing, leadership development, and youth engagement. Environmentally, the initiative reclaimed 28 hectares of abandoned land, promoted organic farming practices, and enhanced biodiversity. The findings underscore the critical role of multi-stakeholder collaboration in fostering sustainable agricultural innovation. Scaling this model to other regions can maximize its socio-economic and environmental benefits, contributing to Indonesia's broader sustainable development goals.

## 1 Introduction

Sacha Inchi (*Plukenetia volubilis*) is a plant with significant economic potential in Indonesia, particularly due to its extensive health benefits. Sacha Inchi oil is exceptionally rich in omega-3, which is widely recognized as an essential fatty acid necessary for supporting brain

---

\* Corresponding author: [iqbal.irfany@apps.ipb.ac.id](mailto:iqbal.irfany@apps.ipb.ac.id)

function, reducing inflammation, and lowering the risk of heart disease. According to research from [1], Sacha Inchi oil is highly popular in the European Union due to its high omega-3 content. This oil is one of the best sources of omega-3 (45–55%) and contains a high proportion of unsaturated fatty acids (35–65%) [2]. This popularity highlights a substantial market potential for Sacha Inchi products from Indonesia.

Despite its vast potential, Sacha Inchi cultivation in Indonesia remains limited. The main suppliers of Sacha Inchi to the European Union currently come from Peru, Thailand, and Colombia. However, Indonesia's climate is highly suitable for cultivating this crop, with an ideal altitude range of 200–1500 meters above sea level. Due to a lack of knowledge and infrastructure, the cultivation of this plant has not been extensively developed in Indonesia. In fact, Sacha Inchi can thrive in various regions across Indonesia that offer favorable agro-climatic conditions.

The development of Sacha Inchi in Indonesia not only offers economic benefits but also has substantial social and environmental impacts. Economically, Sacha Inchi cultivation can enhance household resilience to economic fluctuations, create employment opportunities, and promote rural industrialization. Socially, it can empower rural communities by improving their skills and income. Environmentally, Sacha Inchi can be cultivated on marginal lands that are less productive for other crops, thereby optimizing land use efficiently.

To achieve these benefits, the development of Sacha Inchi requires a multi-stakeholder approach. Collaboration among the government, academia, the private sector, and local communities is crucial to provide adequate training and mentoring. Three key areas need to be addressed in the development of this commodity: seed selection, environmental inputs, and pest and disease control [3]. High-quality seeds are essential to ensure optimal yields. Environmental inputs such as planting patterns, planting holes, fertilizers, soil types, and pollinators must also be well-managed to support plant growth. Pest and disease control is critical to minimize losses and maintain high productivity.

Parakanlima Village in Purwakarta Regency serves as an exemplary model for Sacha Inchi development in Indonesia. In this village, four farmer groups, each consisting of 20 members, were established following the emergence of Sacha Inchi during the COVID-19 pandemic. These farmer groups have been introduced to and trained in Sacha Inchi cultivation and processing. Value-added products, such as packaged roasted nuts and Sacha Inchi leaf tea, have also been introduced to maximize the economic potential of this crop.

The collaboration between Parakanlima Village, the Village-Owned Enterprise (BUMDes) Panca Mandiri, and the One Village One CEO program has successfully created a sustainable rural business ecosystem. The One Village One CEO program aims to promote local economic development by appointing a village-based leader to coordinate various economic activities. In Parakanlima, this program has successfully introduced an innovative product, Sachifit, as a processed Sacha Inchi product. In its implementation, this program intervenes to improve upstream subsystem activities, such as cultivation activities, while supporting subsystems, such as institutions, to downstream subsystems in product processing and marketing with involving farmers, youth and BUMDes. This demonstrates that, with the right approach, Sacha Inchi development can yield widespread positive impacts.

Nevertheless, challenges remain in developing Sacha Inchi in Indonesia. The primary challenges include the lack of knowledge and skills among local farmers regarding Sacha Inchi cultivation and processing. Additionally, inadequate infrastructure and limited market access are significant barriers. Coordinated interventions are necessary to overcome these obstacles. Both government and private sector actors must collaborate to provide the required training, mentoring, and infrastructure support.

This study aims to analyze the economic, social, and environmental impacts of the One Village One CEO program on the development of Sacha Inchi in Parakanlima Village. This

analysis is expected to provide deeper insights into how a multi-stakeholder approach can be employed to develop high-potential agricultural commodities such as Sacha Inchi. Consequently, the findings of this study can serve as a reference for policymakers and agribusiness practitioners in developing similar models in other regions with comparable potential.

## **2 Method**

This study was conducted in Parakanlima Village, Purwakarta, focusing on the Sacha Inchi business ecosystem with an emphasis on noodle production as a value-added product. Data were collected using two methods: survey and Focus Group Discussion (FGD). The survey targeted economic, social, and environmental variables, such as income levels, employment opportunities, and production capacity. Meanwhile, FGDs were employed to gain qualitative insights into community perceptions, challenges, and stakeholder roles within the ecosystem. These complementary approaches ensured a comprehensive understanding of the business dynamics.

A purposive sampling strategy was used to select 30 respondents actively involved in Sacha Inchi cultivation, processing, and marketing. This method allowed the researchers to focus on participants who were most relevant to the study objectives. By narrowing the sample to key stakeholders, the study aimed to uncover actionable insights that could inform scalable strategies for rural development. Purposive sampling is recognized for its utility in exploring complex phenomena with limited resources, especially in rural contexts [4].

Data analysis involved descriptive statistics to summarize quantitative findings and thematic analysis for qualitative data from FGDs. This dual approach provided a balanced view of the economic, social, and environmental impacts of Sacha Inchi noodle production. While the purposive sample may limit generalizability, the methods employed are well-suited for understanding specific community dynamics and offering practical insights for future interventions. The study used descriptive statistical analysis to explain the results.

## **3 Result and discussion**

### **3.1 Social impact of the sacha inchi business ecosystem**

The social impact of the Sacha Inchi business ecosystem in Parakanlima Village is profound, as it not only empowers the local community but also creates new opportunities for social mobility. The introduction of Sacha Inchi farming, coupled with the One Village One CEO program, has enabled farmers and local youth to improve their socio-economic status, transition from informal jobs, and build sustainable livelihoods through agriculture. A study analyzing farmers' perceptions of socio-economic factors in Sacha Inchi cultivation found that economic considerations were a major factor in the development of Sacha Inchi farming, with a perception value of 50.66%. This suggests that farmers recognize the economic potential of Sacha Inchi, which can lead to improved income and social standing [3].

#### *3.1.1 Community empowerment and social mobility*

Community empowerment is central to the success of the Sacha Inchi initiative. In Parakanlima, a cooperation was established with four existing farmers' groups, each consisting of 20 members. These groups have become the foundation for Sacha Inchi cultivation. Through collaboration, knowledge sharing, and cooperative efforts, these groups

have empowered their members to improve both their agricultural skills and their ability to manage the business aspects of farming [5]. Empowerment, in this case, refers to enhancing individuals' capacity to make decisions, control their resources, and shape their future. As a result, many participants have been able to increase their income and improve their social mobility.

The social mobility that has occurred is not just financial but also social, as individuals who once held low socio-economic positions have seen their status rise. Before the introduction of Sacha Inchi, many in the village worked in informal sectors such as motorbike taxis, event organizing, or low-paying jobs in the service industry. However, as the Sacha Inchi program gained traction, many members of the community shifted from these unstable and low-income sources of employment to more secure, agriculture-based livelihoods. This transition has significantly altered the community's socio-economic landscape, providing individuals with the opportunity to move up the social ladder through increased earnings, stability, and community leadership roles [6].

### *3.1.2 Youth involvement and new leadership*

Another key aspect of this empowerment is the involvement of youth in the Sacha Inchi business ecosystem. Many young people in Parakanlima had previously migrated to cities in search of better job opportunities. However, the development of the Sacha Inchi industry has encouraged a new generation to stay in the village, contributing to both the cultivation and the processing of Sacha Inchi. This shift is also seen in the formation of a youth-led community dedicated to Sacha Inchi development, with a focus on building leadership within the village itself. The youth have taken up roles not only in farming but also in product development, marketing, and innovation. The significance of youth engagement in agriculture as a mechanism to sustain local economies and foster leadership has been highlighted in recent studies, emphasizing the role of entrepreneurial approaches in improving rural livelihoods [7].

The One Village One CEO program has played a crucial role in facilitating this transformation by fostering local leadership. It has enabled a locally driven approach to decision-making, which has led to greater investment and innovation. The community now has its own leaders—trained in business management and agriculture—who are committed to the long-term success of the Sacha Inchi initiative.

### *3.1.3 The role of collaboration and stakeholders*

The collaboration between the four farmers' groups, BUMDes (village-owned enterprises), IPB University, and students has been vital to the growth and sustainability of the Sacha Inchi business ecosystem. As shown in Figure 1, these stakeholders have provided critical support in terms of training, mentorship, and infrastructure development. IPB University, along with students participating in the Merdeka Belajar Kampus Merdeka program, has contributed to increasing the knowledge base of farmers and enhancing the quality of Sacha Inchi products. These partnerships have made it possible for local farmers to access the latest agricultural techniques, improve processing methods, and learn how to effectively market their products. The combined efforts of all these actors have helped establish a sustainable and thriving rural business ecosystem based on Sacha Inchi. Studies underline that collaboration between academic institutions, local communities, and enterprises can significantly contribute to the success of agricultural innovations and the creation of sustainable rural economies [8]

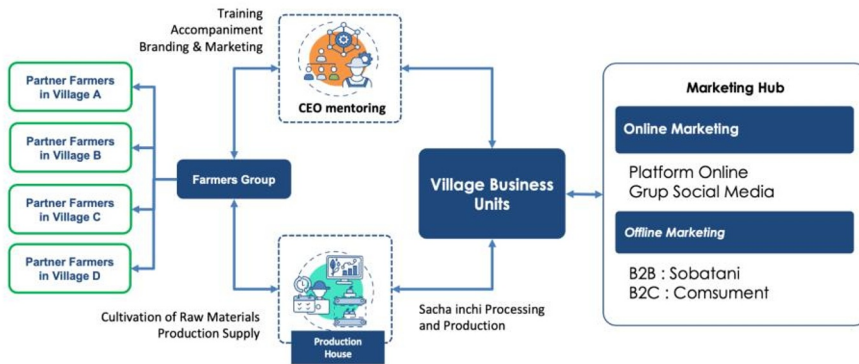


Fig. 1. The role of BUMDes, IPB and students in developing the village business ecosystem.

### 3.2 Economic impact of the sacha inchi business ecosystem

The economic impact of Sacha Inchi cultivation in Parakanlima Village has been transformative, especially in terms of building resilience for local households. Rural resilience, which consists of resilience, adaptation and transformation, helps maintain system stability and minimize losses to rural communities facing unexpected risks and challenges [9]. One economic sector that can operate during a pandemic is agriculture. In this case, the Parakanlima community cultivates sacha inchi the COVID-19 pandemic disrupted many sectors of the economy, particularly those reliant on informal labor, such as motorbike taxis, event services, and daily wage work. As primary income sources disappeared, agricultural activities, particularly the cultivation of Sacha Inchi, provided a viable alternative livelihood, allowing families to adapt to the financial challenges brought on by the pandemic.

Table 1. Achievements of implementing the One Village One CEO program for

Indicators	Achievements of Implementing Program	
	Before (2020)	After (2022)
People Involved	4	200
People's Average Monthly Income	2.600.000	3.300.000
Absorption of New Workers	0	80
Average Production Amount Per Month	0	500 kg

This transition underscores the role of economic diversification in rural areas. Sacha Inchi, a high-value and low-risk crop, has proven to be a sustainable option for farmers, helping them maintain a steady income stream even in times of uncertainty. By moving away from traditional low-value crops to a more lucrative and less volatile agricultural product, farmers have been able to buffer their household income against broader market fluctuations. This resilience is evidenced by the increase in the number of people involved in Sacha Inchi farming, as listed on Table 1, rising from just 4 participants in 2020 to 200 participants by 2022. This wide adoption is indicative of the program's success in promoting sustainable farming practices that are attractive to the local community.

Moreover, the shift from informal service-based employment to formal agricultural production has resulted in the creation of new jobs. Beyond the cultivation phase, new roles have emerged in the processing and marketing of Sacha Inchi products. A total of 80 new workers were employed across various functions, including cultivation, processing, and packaging. This job creation has significantly contributed to the local economy, as evidenced by the increase in average monthly incomes—from IDR 2,600,000 to IDR 3,300,000 for participants involved in the Sacha Inchi business. This income boost is especially vital in rural areas where incomes are typically much lower than in urban regions.

The creation of new jobs has further stimulated rural industrialization. Small-scale businesses, including processing plants, packaging companies, and distribution networks, have sprung up in response to the growing demand for Sacha Inchi products. These new enterprises have contributed to the diversification of the local economy, reducing its dependence on traditional, low-value agricultural commodities. Furthermore, the partnership with academic institutions, such as IPB University, has provided technical guidance, helping to establish a knowledge base that supports the growth of these new industries. By fostering innovation, this partnership ensures that the Sacha Inchi business is not only viable but can thrive in a competitive market, enhancing the region's long-term economic sustainability.

### **3.3 Environmental impact of the sachu inchi business ecosystem**

The environmental impact of Sacha Inchi farming in Parakanlima Village has been equally significant, offering both ecological and sustainability benefits. One of the most notable contributions has been the reclamation of 28 hectares of abandoned land. Previously unsuitable for conventional crops, these lands are now being utilized for Sacha Inchi cultivation, turning them into productive agricultural areas. This reclamation process is a critical step towards sustainable land use, as it optimizes land that was once considered unproductive, while also reducing the pressure on other, more fertile areas of farmland.

Sacha Inchi is particularly beneficial from an environmental perspective because it requires minimal chemical inputs. Unlike many commercial crops that rely heavily on synthetic fertilizers and pesticides, Sacha Inchi thrives with fewer agrochemical treatments [10]. This makes it an environmentally sustainable crop, supporting organic farming practices that reduce the ecological footprint of agriculture. The plant's resilience to pests and diseases, combined with its ability to grow in various soil types, means that it can flourish with fewer inputs, making it an attractive option for eco-conscious farmers.

The environmental benefits extend beyond the farm itself, contributing to soil health and biodiversity. Sacha Inchi's cultivation can improve soil structure and reduce soil erosion, which are critical issues in many farming regions. Additionally, by being cultivated in areas where other crops struggle to grow, Sacha Inchi plays a role in enhancing the local ecosystem. The plant supports soil fertility and increases arbuscular mycorrhizal, helping to create a more balanced and resilient farming landscape [11].

Another environmental advantage is the potential of Sacha Inchi to serve as a model for other sustainable crops. As more farmers adopt Sacha Inchi farming practices, it encourages the integration of other environmentally friendly crops into agricultural landscapes. This creates a diversified and resilient ecosystem, reducing the risk of monoculture farming and promoting long-term environmental sustainability. The introduction of Sacha Inchi into these regions is not just about economic gain; it is about creating a farming system that works in harmony with nature, reducing the reliance on harmful chemicals and enhancing the overall health of the agricultural environment [12]. Socially, this initiative has empowered the Parakanlima community, increasing opportunities for community socio-economic status mobility from low to high levels due to increased income and social status and forming a new

community led by youth focused on developing Sacha Inchi. Social mobility is the movement of the position of a person or group of people from one layer to another.

Apart from economic fulfillment, youth mobility towards the sacha inchi business was triggered by the loss of jobs providing Parakanlima community services due to COVID-19. The pandemic has impacted human health, the economy, and jobs. Furthermore, Indonesia has the greatest percentages of self-employed people (28%) and jobless workers (23%) in the East Asia and Pacific (EAP) area between April and July 2020. Lastly, when looking at job losses by sector, Indonesia had the highest regional loss of jobs among service workers (24%) and the second-largest loss of jobs among industrial workers (35%) [13]. The COVID-19 pandemic impacted firms financially, organizationally, and in marketing including decreased turnover and income [14].

This also triggered the emergence of a community of Sacha Inchi activists in the Parakanlima community. Activities carried out by the Sacha Inchi community include meetings to discuss Sacha Inchi cultivation, product processing, and marketing of the Sacha Inchi community. Sacha inchi creates opportunities for poor people to get new job opportunities.

Apart from having an economic and social impact, Sacha Inchi also impacts land use. Community interest in developing sacha inchi opens up opportunities to expand sacha cultivation. The Parakanlima community develops this commodity on abandoned land in their village. The land expansion is quite significant, reaching 28 hectares. Land that was previously abandoned has become productive land in its development.

## 4 Conclusion

Sacha Inchi has emerged as a transformative commodity in Parakanlima Village, demonstrating its potential to drive rural development across economic, social, and environmental dimensions. Economically, the cultivation and processing of Sacha Inchi have increased household incomes by 27%, created 80 new jobs, and stimulated rural industrialization by establishing small-scale businesses. Socially, the initiative has empowered local communities, fostering social mobility, and engaging youth in leadership roles through the One Village One CEO program. Environmentally, Sacha Inchi cultivation has reclaimed 28 hectares of abandoned land, reduced dependency on chemical inputs, and enhanced biodiversity. This case study highlights the effectiveness of a multi-stakeholder approach in achieving sustainable agricultural development. The collaboration between local farmers, BUMDes, IPB University, and students underpins the success of the Sacha Inchi business ecosystem, offering a replicable model for other regions. Future research should explore the scalability of this model in diverse agro-climatic settings and its long-term impacts on community resilience and environmental sustainability. By addressing the existing challenges of knowledge gaps, infrastructure limitations, and market access, stakeholders can ensure the broader adoption of Sacha Inchi as a sustainable and high-value agricultural commodity. This study reaffirms the critical role of agricultural innovation in advancing rural economies while promoting ecological harmony.

## References

1. N.R.M. Rodzi, L.K. Lee, Sacha Inchi (*Plukenetia Volubilis* L.): recent insight on phytochemistry, pharmacology, organoleptic, safety and toxicity perspectives. *Heliyon*. **8**, 9, (2022). <https://doi.org/10.1016/j.heliyon.2022.e10572>

2. C. Fanali, L. Dugo, F. Cacciola, M. Beccaria, S. Grasso, M. Dacha, L. Mondello, Chemical Characterization of Sacha Inchi (*Plukenetia volubilis* L.) Oil. *J. Agric. Food Chem.* **59**, 24, 13043-13049 (2011). <https://doi.org/10.1021/jf203184y>
3. S.A. Andayani, T.F. Prasetyo, A.A. Wijaya, M.D. Sukmasari, S. Umyati, M.F. Nainggolan, Prediction Model of Sacha Inchi crop development based on technology and farmers' perception of Socio-Economic factors. *Sustainability*, **16**, 2680 (2024). <https://doi.org/10.3390/su16072680>
4. L.A. Palinkas, S.M. Horwitz, C.A. Green, J.P. Wisdom, N. Duan, K. Hoagwood, Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Adm. Policy Ment. Health.* **42**, 533–544 (2015). <https://doi.org/10.1007/s10488-013-0528-y>
5. P.G. Matthews, R.D. Fish, J. Tzanopoulos, Overcoming barriers to agri-environmental management at landscape scale: Balancing farmer coordination and collaboration with the aid of facilitators and pioneers. *Journal of Environmental Management.* **369**, 122278, (2024). <https://doi.org/10.1016/j.jenvman.2024.122278>
6. M.I. Irfany, H. Purwawangsa, A.S. Slamet, B.P. Prawiro, D.A. Haq, Sustainable Rural Business Ecosystem of Pineapple Commodity in Peatland and Mangrove Ecosystem with One Village One CEO (OVOC) Program. In *Proceedings of the Frontier in Sustainable Agromaritime and Environmental Development Conference*, Bogor, Indonesia, December 14-15, December 14-15 (2024). <https://doi.org/10.1088/1755-1315/1359/1/012049>
7. H. Purwawangsa, M.I. Irfany, A.S. Slamet, E. Rustiadi, B.P. Prawiro, D.A. Haq, Sustainable Rural Business ecosystem: Sago noodles in Airputih Village, Bengkalis Island. In *Proceedings of the Frontier in Sustainable Agromaritime and Environmental Development Conference*, Bogor, Indonesia, December 14-15, December 14-15 (2024). <https://doi.org/10.1088/1755-1315/1359/1/012054>
8. A.S. Slamet, H. Purwawangsa, B.P. Prawiro, M. Isbayu, M.I. Irfany, D.A. Haq, Community-based business ecosystem of coffee with the One Village One CEO Program at Cikajang Garut. In *Proceedings of the 3rd International Conference on Innovation in Technology and Management for Sustainable Agroindustry*, Bogor, Indonesia, September 19-20, September 19-20 (2024). <https://doi.org/10.1088/1755-1315/1358/1/012040>
9. Y Li, A systematic review of rural resilience. *China Agricultural Economic Review.* **15**, 1, 66-77 (2022). <https://doi.org/10.1108/caer-03-2022-0048>.
10. A. Cardoso, A.M.M. Obolari, E. Borges, C.J. da Silva, H. Rodrigues, Environmental factors on seed germination, seedling survival and initial growth of sachá inchi (*Plukenetia volubilis* L.). *Journal of Seed Science.* **37**, 111-116 (2015). <https://doi.org/10.1590/2317-1545V37N2145054>
11. A.M. de la Sota Ricaldi, S. Rengifo Del Águila, R. Blas Sevillano, Á. López-García, M. Corazón-Guivin, Beta diversity of arbuscular mycorrhizal communities increases in time after crop establishment of Peruvian Sacha Inchi (*Plukenetia volubilis*). *Journal of Fungi.* **9** (2023). <https://doi.org/10.3390/jof9020194>



12. N. Kodahl, Sacha inchi (*Plukenetia volubilis* L.)—from lost crop of the Incas to part of the solution to global challenges?. *Planta*. **251** (2020). <https://doi.org/10.1007/s00425-020-03377-3>
13. R.A. Putra, K. Ovsiannikov, K. Kotani, COVID-19-associated income loss and job loss: Evidence from Indonesia. *Journal of Asian Economics*. **87**, 101631 (2023) <https://doi.org/10.1016/j.asieco.2023.101631>
14. L. Maha, I.C. Stoian, S. Bejenar, The resilience of Romanian companies in the context of the COVID-19 pandemic: Relevant experiences and good practices. *Heliyon*. **9**, 11, (2023). <https://doi.org/10.1016/j.heliyon.2023.e21951>