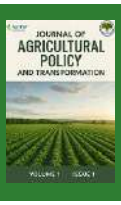

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Member-level Livelihood Outcomes and Governance Pathways in Community Forest Enterprise (CFE) to Achieving Sustainability: Evidence from West Sumatra, Indonesia

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ABSTRACT
Community Forest Enterprise (CFE) in Indonesia aims to improve livelihoods and support forest conservation, but member-level outcomes remain underexamined. This study examines member-level livelihood outcomes and governance pathways for CFE sustainability in West Sumatra, using a mixed-methods approach with 62 members across 10 CFEs. The results showed that among the 62 respondents across 10 CFEs, only 29% have half of their total income from CFE. While 41% of them are still receiving less than 25% of their total income. This suggests that the CFE's position is still in its early stages and that CFE is treated as a supplementary livelihood rather than a main one. Governance participation is high (87% meeting, 77% decision making), and members receive six non-cash benefits, such as job, facility, daily needs, knowledge, and market. Social-oriented CFEs provide more non-cash benefits, while business-oriented CFEs provide more economic benefits. Environmental engagement varies across categories (66% waste management, 67.7% replanting, and 43.5% forest monitoring), with social-oriented CFEs showing higher engagement than business-oriented ones. The study contributes a governance-capability pathway model and reframes Triple Bottom Line (TBL) as multi-value sustainability. Recommendations include inclusive governance and recognition of mixed orientations to improve the CFEs.

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1. INTRODUCTION

Community Forest Enterprises (CFEs) are expected to function as businesses that generate income for members while practicing sustainable livelihood for the community around the social forestry area (SF). Under the SF program (M. R. Fisher et al., 2018), CFEs provide local people with legal access to forest resources (Sahide et al., 2016) and are expected to generate income while strengthening collective governance (Laurens & Perdana Kusuma Putra, 2020). However, the extent to which CFEs deliver sustainable livelihood outcomes remains uncertain, and the mechanism by which individual members' benefits are realized is poorly understood.

Existing studies on CFE have mostly focused on institutional formation (Kurniasih et al., 2021a, 2021b), implementation challenges (Galudra, 2019; Pasaribu et al., 2020; Wijaya et al., 2018), and enterprise outcomes (Gunawan et al., 2022; Rachmina et al., 2024; Suranto et al., 2025). Research has shown how laws (Prihatiningtyas et al., 2023), government and NGO support (Rahayu et al., 2020), and group structure help CFEs to emerge (Amaliyah et al., 2023; Ameridyani et al., 2025). However, there is less attention on member-level outcomes, especially how income from CFEs is distributed among members. This is important because one of the most critical factors in ensuring the CFE's sustainability is whether members can clearly see and feel the benefits (Piabuo et al., 2022, 2025) and believe they are fair (Santos et al., 2025).

In the field, we observed that CFEs vary a lot in their performance. Some enterprises generate stable income for many members. While others are still in early stages and give little or no income to members. Even within the same enterprise, members often experience different economic outcomes. These patterns suggest that CFE sustainability is not only a function of enterprise-level characteristics, such as market access or product type, but also of internal governance structures and members' capacities to engage with the enterprise.

Theoretical perspectives on institutions and governance can help us understand these patterns. Douglass North (North, 1990) argues that economic performance is shaped by the "rules of the game", both formal and informal, that define relationships, reduce uncertainty, and lower transaction costs. In CFEs, formal rules should include membership rights, profit-sharing rules, and governance structure. Informal rules include norms of participation, trust, and expectations about fairness. Members with more education may be better able to understand contracts, manage accounts, negotiate with buyers, and perform higher-value work, thereby lowering transaction costs and increasing their income. Moreover, members who participate more in governance, by attending meetings, making decisions, and taking leadership roles, may gain access to information, influence how benefits are shared, and get positions that lead to higher income. These board members may also gain close control over resources and information, creating a governance pathway that advantages some members.

In fact, even with these ideas, there is still limited evidence on how member-level characteristics and governance participation together shape livelihood outcomes in CFEs. Many studies treat CFEs as a single unit and focus on overall outcomes, such as total revenue or the number of members, rather than individual income and the factors that might explain it. This makes it harder to see internal inequalities and to design interventions that support more equitable and sustainable CFEs.

This study addresses this gap by examining member-level livelihood outcomes and the governance pathways that enable CFEs to become sustainable, focusing on CFEs in West Sumatra, Indonesia. We used a mixed-methods approach (questionnaires and semi-structured interviews with 62 CFE members from several enterprises) to examine economic outcomes (livelihood viability), social outcomes (participation and benefit equity), and environmental outcomes (conservation practices and forest protection engagement). These results suggest that human capital and access to decision-making power are key channels through which CFE income is distributed. They also show that internal governance structures can create unequal outcomes, even among members of the same enterprise.

This study contributes to the literature on CFE in three ways. First, it shifts the focus from enterprise-level outcomes to member-level livelihood outcomes, showing how individual outcomes from CFEs vary and what explains the variations. Second, our study introduced a governance-pathway perspective that links education, participation, and organizational position to income, based on institutional and governance theories. Lastly, it provided empirical evidence from West Sumatra to inform policy and program design. Highlighting the need to address internal inequalities and to build more inclusive governance for more equitable and sustainable CFEs.

The rest of the paper is organized as follows. The next section presents the theoretical framework and conceptual model, using institutional theory, governance theory, and the trajectory view of CFE development. Then, the following sections describe the study area, data, and methods. The results section presents findings across three outcomes (economic, social, and environmental) and qualitative evidence on governance pathways. The discussion section explains these findings in relation to CFE sustainability and equity. The conclusion offers policy implications and recommendations for a more solid, inclusive, and sustainable CFE.

2. Conceptual framework for member-level analysis

This study uses a combined theoretical framework to understand how member-level livelihood outcomes and governance pathways shape CFE sustainability. The framework integrates three perspectives: (1) Douglass North's institutional theory (North, 1990), (2) governance, participation, and conflict interest theory, and (3) the Triple Bottom Line (TBL) framework to wrap the point of view. Together, these perspectives help explain why some members earn more from CFEs, how governance structure creates different pathways, and how sustainability can be seen across economic, social, and environmental dimensions.

Institutional theory and governance inequality. North argues that economic performance is shaped by institutions, the "rules of the game," including formal rules (laws, contracts, profit-sharing, governance structure) and informal rules (norms, trust, fairness) (North, 1990). These rules reduce uncertainty and transaction costs, making cooperation possible (L. A. Fisher et al., 2017). In CFEs, formal rules include membership rights, decision-making procedures, and the board's role (Foundjem-Tita et al., 2018). Informal rules include norms about participation and fairness. When rules are clear and well-enforced, members can work together more effectively and distribute benefits more fairly (Febriamansyah et al., 2021). When rules are weak, transaction costs are high, and benefits may concentrate among a few members.

Conflict of interest theory holds that when individuals hold multiple roles (e.g., board members who both decide and benefit) (Fung & Thompson, 2025), they may prioritize personal interests over collective interests (L. A. Fisher et

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al., 2017). This can lead to unequal outcomes: board members, more years of education, and governance participation are the strongest predictors of CFE income.

Governance theory in democratic organization emphasizes that participation is not only a right but also a way to gain information, influence decisions, and access better roles. Members who participate more may earn more because they have better access and influence. Board members have formal authority and control over resources, creating a direct pathway to higher income. The trajectory view sees CFEs moving through stages: from early formation (low or no income) to more mature operations (stable income). Different CFEs may follow different pathways: business-oriented (focusing on member income) or social-oriented (focused on community and environmental benefits). These pathways reflect different priorities and can lead to different livelihood outcomes.

Triple Bottom Line (TBL) and the governance-capability pathway. The TBL framework expands sustainability beyond economics to include social and environmental dimensions (Piabuo et al., 2025). The **economic dimensions** of CFE sustainability center on tangible contributions to members' income and accountable financial management. Evidence showed that only 11% of CFE operate with proper financial discipline, organizational structure, and business approaches, while the majority lack of transparent financial records and fail to generate sustainable livelihood for members (Piabuo et al., 2022, 2025). To discern CFE position in members livelihood, it is important to see the CFE income proportion. If the proportion is more than 50%, therefore, it is counted as main livelihood income. The vary of income can be explained by the several factors, where analyze it using multivariable regression (Microsoft Excel for Mac Version 16.109.3/26053122) to decide which variables significant the most to influence income from CFE.

A deeper understanding of the economic dimension results in a deeper understanding of the **social dimension**. Although within the same group with gold and platinum classifications, members tended to receive different incomes (Santos et al., 2025). This situation is explained by differences in member governance participation (Goi & Francois, 2022). In this case, the governance we observed was evident in member participation in meetings, decision-making, and board member status. Non-cash benefits are also explored in social dimension.

Moving forward to the **environmental dimension**, we observe how the members practice waste management and how they are involved in the SF activity. Environmental awareness is widely recognized as a key predictor of environmental behavior (Aguirre, 2019; Rahman et al., 2024). Member participation in forest management, including replanting and monitoring, is a core of engagement in sustainable forest management (Aguirre, 2019; Ciccarino & Fernandes, 2024). Environmental awareness, waste management, and engagement in SF, and governance participation were measured as binary variables (yes/no). This approach is consistent with prior studies that model environmental behaviors and engagement as a dichotomous outcome (Gu et al., 2022; Sultana et al., 2021). This information is summarized in Table 1. Dimensions, variables, and analysis of the study in Chapter 3.

Integrating the framework: governance-capability pathway and TBL. Combining these perspectives, the governance-capability pathway model suggests that: (1) education (human capital) helps members understand rules and engage in higher-value activities (economic dimensions; livelihood viability), (2) governance participation gives access to information, influence over decision, and better roles (social dimension: equity and participation), and (3) board member status gives authority control over resources, creating higher income (economic dimension, but may affect social sustainability if benefits as concentrated). The integration also helped us discern CFE's position in West Sumatra across three development categories: formation, operationalization, and sustainability.

The study places primary emphasis on the economic dimension using regression analysis, while describing social and environmental dimensions through qualitative and descriptive analysis. This approach provides a broader sustainability picture across all three TBL dimensions and answers the key questions. Furthermore, we also used the livelihood FAO threshold for the definition of primary income when it represents more than 50% of the income proportion.

3. Materials and Methods

Study site

This study was conducted in West Sumatra, Indonesia, with a focus on CFE in the Limapuluh Kota District. West Sumatra is a province with significant forest cover and active social forestry programs. The CFE scheme was introduced under Indonesia's SF program to provide local communities with legal access to forest resources, generate income, and strengthen collective governance. The study focuses on 10 CFEs across different villages in Limapuluh Kota District. These CFEs represent different types of enterprises (e.g., coffee, candlenut, honey, and handicraft) and hold gold and platinum rankings from the government (the highest classification). The CFEs were selected based on availability, willingness to participate, and variation in enterprise type and development stage. The research was conducted from April 2025 to January 2026.

Research design and data collection

This study used a mixed-methods approach, combining semi-structured questionnaires and semi-structured interviews. The study employed convergent mixed methods design with a follow-up interview. Quantitative questionnaires and qualitative interviews with members were collected simultaneously during the same fieldwork period. After initial review and analysis of these data, in-depth interviews were conducted one month later with selected board members/leaders to clarify emerging findings and deepen interpretation. The integration at two points; first, quantitative member data were interpreted together to compare patterns in income, participation, and environmental practices. Second, the follow-up interviews with board members were used to explain and validate the preliminary findings, especially regarding governance, benefit distribution, and CFE orientation.

Questionnaire data were collected from 62 CFE members across 10 CFEs. The questionnaire included: (1) demographic variables: ages, gender, education years, tenure in CFE, board-member status (yes/no), tenure in CFE, (2) economic variables: income from CFE (monthly/seasonal, in range), total household income (monthly, in ranges). Questionnaires were completed by enumerators through face-to-face interviews with members. Enumerators explained each question and recorded responses. The questionnaire process took approximately 15-20 minutes per member.

Semi-structured interviews were collected from the same 62 members. The interview explored: (2) social dimensions: governance participation, trust, financial transparency, and monthly expenditure questions related to strengthening the income information, (3) environmental dimensions: environmental awareness, waste management activities, and engagement in social forestry activities. Supporting documents, such as meeting notes, activity reports, and government policy documents, are also used in this research. Interviews were conducted in the local language, mixed with Bahasa Indonesia, and were recorded (with permission) or documented in detailed notes. The interview lasted approximately 20-30 minutes per member.

An analytical approach by the TBL dimension. The analysis was organized by the TBL dimension: economic, social, and environmental.

Table 1 Dimensions, variables, and analysis method of the study

Dimension	Variables	Analysis method
Economic: To what extent does the CFE support members' livelihood?	• Income from CFE • Total income • CFE income proportion (percentage of total income from CFE): income from CFE/total income x 100) Supporting variables: • Education years • Governance participation binary (1: yes/0: no) • Board member status: binary (1: yes/0: no)	• Multivariable regression was used to test how education years, governance participation, and board member status predict income from CFE. • Descriptive statistics (mean, media, percentage_ were used to summarize income levels, CFE income proportion, and total income across members and enterprise
Social: who benefit from the CFE? Do members have a voice in decision making?	• Member participation in meeting • Member decision making • Member non-cash benefit exploration	Qualitative analysis of interview transcript was used to explore how members perceive the benefit, trust, and ability to influence the decision making.
Environmental: do member support and engage in SF and forest protection?	• member knowledge for environmental awareness • member activity for waste management • members engage in SF and forest protection	Qualitative descriptive analysis of interview transcript was used to explore members' initiative toward forest protection, specific environmental practice they engage, challenge they face.

Each dimension was analyzed using different methods, depending on the type of available data. Each of dimension has its key question:

a. Economic dimension: livelihood viability. Key question: To what extent does the CFE support members' livelihood? This dimension focuses on income and economic stability. We examined (1) estimation of income from CFE: the monthly income members receive from the enterprise, (2) total income: total household income, including CFE and other sources. Education, governance participation, and board-member status are expected to influence the CFE proportion of income, showing how human capital and governance position affect livelihood viability.
b. Social dimensions: equity and participation. Key question: Who benefits from the CFE? Do members have a voice in decision-making? This dimension focuses on fairness, participation, and relationships. We

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observe: (1) member voice (participation in meetings and involvement in decisions), (2) member non-cash benefit exploration.

Environmental dimensions: forest protection and engagement. Key questions: Do members support and engage in forest protection? These dimensions focus on environmental practices and conservation. We examine (1) members' awareness of forest conservation and environmental issues, (2) practices such as waste management, and (3) engagement in forest protection activities (e.g., replanting, monitoring)

Reliability, scoring, and validation procedure

To enhance the credibility of the assessment, several procedures were implemented throughout the research process. First, sustainability indicators were developed based on the TBL and adapted to the CFE context. Prior to the main data collection, the questionnaire was pilot tested with one CFE to assess question clarity, field applicability, and enumerator understanding. Feedback from the pilot exercise was used to refine the instrument and data collection procedures.

Second, enumerators received training before field deployment to ensure consistent administration of the questionnaire and interviews. During the analysis stage, binary scores were not assigned directly by the enumerator; instead, the two authors assessed them using the completed questionnaires and interview transcripts. The scoring process was conducted by both authors during a workshop, in which we reviewed the available evidence and reached consensus on the final score for each variable. This procedure reduced individual interpretation bias and strengthened the consistency of the assessment. Binay's score in the social and environmental dimension consists of (1) yes (answers such as joined, participated, and practiced) and (0) no (answers such as not joined, not participated, and do not practice).

Finally, quantitative scores were cross-checked against qualitative interview narratives to ensure that the assigned scores accurately reflected the conditions and practices observed within each CFE. This triangulation of data sources enhances the credibility of the findings.

Study area and respondent recruitment

This study was conducted in Limapuluh Kota district, West Sumatra, with a purposive sampling design. This district indicated to have progressive CFE. To initially ensure the CFE has revenue, we followed government official release of CFE classification list. During our research instrument preparation (November 2024 to March 2025) there were 14 CFE that has gold and platinum classification that is proved by the local government officer and government website (gokups.go.id). We contacted all CFE, yet only 10 (71% of total population) CFE are available and voluntary to be interviewed. Furthermore, members were recruited with the assistance of a local board member, with inclusion criteria for being an active member and willing to participate in the interview. We tried to interview as many as active members, yet the representativeness may be less.

The sample size was considered adequate for the study's exploration and mixed-methods purpose, which focus on member-level pattern across multiple CFEs rather than population estimation. Although the sample is relatively small for inferential province or national generalization, it provided sufficient variation across CFEs, member roles, and enterprise pathway to support contextual analysis.

4. Result

CFE and member characteristics

CFE activity in Limapuluh Kota District, West Sumatra, performs various types of enterprises. This type of enterprise initially showed the abundance of resources they have around their village or forest area. As we observed how CFE distributes income to its members, we concluded that CFE has its own pathway for practicing the enterprise.

Table 2 CFE types and its pathway

CFE Code	Enterprise type of product	Established year	Pathway
CFE 01	essential oil	2019	business-oriented
CFE 02	Coffee	2023	business-oriented
CFE 03	oyster mushroom	2020	mixed-oriented
CFE 04	palm sugar	2023	mixed-oriented
CFE 05	organic fertilizer	2022	social-oriented
CFE 06	gambier	2023	business-oriented
CFE 07	coffee	2023	business-oriented
CFE 08	honeybee	2023	social-oriented
CFE 09	crafting	2023	business-oriented
CFE 10	eco-tourism	2019	mixed-oriented

Business-oriented CFEs distribute most of their revenue directly to members, with less to deposit or retained by the group. Social-oriented CFE tends to retain most of the revenue for community activities. Moreover, the mixed-oriented approach advances benefit sharing by distributing the revenue to both members and the community, as explained in the next table.

CFE has its own pathway in running the business. There are five CFE that tends to directly distribute the revenue to the member either direct payment, daily wage, or monthly salary. Two CFE have social-oriented pathway where they are saving the business income and using it for social or common purposes. Combing two pathways, CFE in Limapuluh Kota also perform mixed-oriented pathway where the CFEs can save the income in the organization but also can contribute to the members' income.

Economic dimension

Among the 62 respondents across 10 CFEs, only 29% have half of their total income from CFE. While 41% of them are still receiving less than 25% of their total income. This suggests that the CFE's position is still in its early stages and that CFE is treated as a supplementary livelihood rather than a main one.

Table 3 Income proportion of CFE members

Income proportion	N	Percentage
0%	4	6.5%
25%	22	35.5%
26-50%	18	29%
>50%	18	29%
Total n	62	100%

In contrast, 29% of members received CFE income that accounted for more than 50% of their total household income, indicating that, for this group, CFE income is a primary source of livelihood. This suggests that while most members rely on CFE income as a supplement, a smaller group depends heavily on the CFE for their livelihood. The situation will represent a decent CFE situation if the income from CFE is distributed well among members.

Reversely, if we look at the table below, since the minimum income from CFE is 0,00 IDR and the maximum is 3,600,000 IDR, the standard deviation is 818,074 IDR. This situation suddenly changed, raising the possibility of high-income inequality among CFE members.

Table 4 Respondent average income information

Variables	n	Average	min	Max	SD
Age (year)	62	44.66	22.00	65.00	3
Education (year)	62	12.45	6.00	16.00	12
income from CFE (IDR)	62	1,060,323	0	3,600,000	818,074
CFE income proportion (%)	62	36.99%	0.00%	90.00%	

The multivariable regression analysis identified six predictor variables of the CFE income level. The regression model included age, years of education, training received, governance participation, board member status, and the CFE's tenure year at the time of joining.

Table 5 CFE Multivariable regression result across six variables

Variables	coefficient	p-value
Age	-2910	0.7033
Education_years	82098	0.0085**
training _received	-138575	0.4840
governance participation	837800	0.0004***
Board member (yes/no)	506162	0.0197*
Tenure	83870	0.0771

**p<0.05, **p:<0.01, ***p<0.001*

The results show that members with more years of education reported significantly higher income from the CFE. Specifically, each additional year of education increases CFE income by approximately 82,098 IDR per month. This suggests that human capital, such as skills, literacy, and numeracy, enables members to engage in higher- value activities (processing, accounting, negotiation). Members who participated more actively in governance (decision-

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making, attending meetings) earned significantly higher income from the CFE. Each additional participation increases CFE income by approximately 837,800 IDR. This suggests that active participation provides access to information, better roles, and influence over benefit sharing. This situation is followed by the board member's status. Board members had significantly higher income from the CFE compared with non-board members. Board members earn approximately 506,162 IDR more income than non-board members. This shows us that a formal position in governance translates into economic advantage, likely due to closer access to information, control over resources, and decision-making authority.

Social dimension

Social performance explained members' participation in governance activities, such as attending meetings, participating in decision-making, and exploring the benefits they received beyond cash. Our findings showed that 87% of members actively attended meetings, yet only 77% were involved in decision-making or expressed an opinion, because it was decided by the board members, as explained by a representative of the board members:

"..because not all members are actively involved in managing the business, just a few board members." (R2, CFE01business-oriented)

"..but the one who runs the business is myself, for example, I invited some members to work, yet I am the one who will sell and promote this coffee.." (R34, CFE07 business-oriented)

These explanations show that, in the business-oriented CFE pathway, board members tend to make decisions directly and take responsibility for managing and making business decisions. This finding supported the earlier economic finding that income is influenced by the board member's status. The member used to wait for direction from the board member regarding constraints or other decisions.

"..we just waiting for the board member's decision and direction.." (R32, CFE07 business-oriented)

In contrast, some CFEs can manage and support the member's involvement in decision-making by ensuring that all decisions are made through discussion. This situation occurred in the social-oriented pathway CFE, as explained:

"..from mutual commitment, we create a decision in weekly/monthly meetings. In that meeting, we usually discuss all routine activities, or crucial matters that are mandatory to follow by all members." (R23, CFE05social-oriented).

Beyond governance, we sought to capture how CFE benefits members not only financially but also through other important elements, such as new job opportunities, access to facilities, support for members' daily needs, increased knowledge, and new market access. The member showed the new job opportunity by stating:

"..before joining CFE, I only focused on my livestock and some horticulture that I planted, but after joining CFE, I have a new income stream from this lemongrass field, and have new daily income from this.." (R1, CFE 01business-oriented)

With its business-oriented management, CFE01 has proven that it provides new job opportunities for its members. Other business-oriented CFE members who explained the benefits, other than the case explained to us, were:

"..the improvement we feel is that when we want to pulp the coffee, no longer using traditional mortar, which takes a longer time, now we shift to using the machine from CFE that can be used by members and even non-members." (R6, CFE02 business-oriented)

It served us to prove that business-oriented CFE still has an impact on social dimensions.

In social-oriented CFEs, we found that members tend to view CFEs as a learning platform where they can share and improve their farming skills. They stated:

"When the board member attended a training and gained new knowledge, it was always delivered to other members, so we can all learn." (R23, CFE05 social-oriented)

"After joining the group (CFE), I learned how to make mushroom baglog for free, I can harvest and sell it, and also can eat it with my family." (R15, CFE03 mixed-oriented)

These findings suggest that, despite variation in governance, the non-cash benefits across CFEs also vary. Governance structures may create unequal perceptions of participation, yet, whether business-, social-, or mixed-oriented, CFE provides social benefits to its members.

Environmental dimension

Members' environmental awareness was assessed through interview data. Most members practiced waste management at the production home level. Although most members are not directly involved in SF activities, CFE's efforts in forest conservation, such as replanting and forest monitoring, are visible. The information is summarized in the following table:

Table 6 Environmental dimension variables result

Environmental variable	n (out of 62)	percentage
Waste management	41	66.%
Replanting activity	42	67.7%
Forest monitoring	27	43.5%

Most members (66%) reported practicing waste management, while 34% reported not practicing it. This indicates that waste management is relatively common among members. Members described how they use waste in practical ways for their farms:

"The coffee skin is allocated to the goat breeders so they can use it as goat feed, so the coffee skin waste is still useful." (R33, CFE07, business-oriented)

"The waste of the lemongrass leaves after distillation is used as fertilizer." (R6, CFE01-business oriented)

This suggests that waste management is not just about disposal but also about practical application: members use waste as fertilizer on their farms, creating a circular benefit.

In the environment dimension, we sought to capture members' participation in SF activities (replanting and forest monitoring), as shown in Table 6. Most members (67.7%) participate in replanting activities, while fewer participate in forest monitoring (43.5%). This indicates that members are more engaged in easier activities (replanting, waste management) than in more challenging ones (forest monitoring). Members describe their engagement in replanting activities:

"..as we want to have palm trees for the future, every member should replant the palm tree." (R19, CFE04 mixed-oriented)

*"We received the plant seed from LPHN (*the SF group name*), so we can replant trees around our field."* (R55, CFE10 mixed-oriented)

Those quotes are particularly important. It shows that rep;anitng is enforced through CFE regulation, not just voluntary participation. This showed that CFEs use formal rules to ensure environmental engagement, thereby potentially increasing participation rates. These findings suggest that CFEs achieve moderate to high levels of environmental engagement, particularly for practical or enforced activities, whereas participation in more challenging activities is lower.

5. Discussion: CFEs across dimensions

Board members had significantly higher income from the CFE compared with non-board members. Board members earn approximately 506,162 IDR more income than non-board members. This shows us that a formal position in governance translates into economic advantage, likely due to closer access to information, control over resources, and decision-making authority. This pattern is not merely about individual capability; it also reflects how institutional structures within CFEs allocate economic benefits. North's institutional theory argues that institutions (the "rule of the game") shape economic performance by reducing transaction costs and enabling cooperation (North, 1990). CFEs, the institutional rules include formal governance structures and informal norms. Education represents human capital that helps members understand and navigate these formal rules, thereby lowering transaction costs and enabling them to engage in higher-value activities. Board-member status is a formal institutional position that confers authority, access to information, and control over resource allocation. Together, human capital and institutional position create a pathway to economic advantage.

However, this finding also reveals a tension with North's theory. North assumes that institutions reduce transaction costs for all participants, enabling collective benefits (North, 1990). But in CFEs, institutions appear to create unequal access to economic benefits, where board members and educated members capture disproportionate advantage. This tension is explained by the conflict of interest theory, which predicts that when individuals hold multiple roles (e.g., board members who both govern and receive benefits), they may prioritize personal interests over collective interests (Fung & Thompson, 2025; Wong et al., 2020). This situation may create a self-reinforcing advantage where board members use their decision-making authority to allocate benefits in ways that favor themselves. This is not necessarily intentional corruption; it may reflect unconscious bias, information asymmetry, or structural incentives that favour those in power. Thus, we admitted our study needs a future research agenda. Since income data were self-reported and often provided in ranges, they may be affected by recall, response, and social desirability biases. Seasonal income variation may also reduce precision. As a result, the income estimates should be interpreted as approximate indicators of livelihood support rather than exact financial measurements.

The social dimension situation should control the economic dimension's situation, with high governance participation indicating that most members have a voice in CFE decisions, which is better. This extends TBL theory, which is not just about economic, social, and environmental dimensions; it encompasses multiple forms of value within each

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dimension. Economic value includes cash and non-cash benefits (job, market). Social value included participation and non-cash social benefits (knowledge and well-being). This suggests TBL should be reframed as multi-value sustainability (Siegner et al., 2023).

Social-oriented CFEs provide more non-cash benefits, while business-oriented CFEs provide more economic benefits. This reveals a trade-off: business-oriented CFEs achieve higher economic outcomes but lower social benefit, while social-oriented CFEs achieve higher non-cash benefit but lower economic outcomes. CFEs may face a sustainable difficulty in maximizing both simultaneously (Bong et al., 2019; Coffman & Umemoto, 2010).

In environmental dimensions, higher participation in waste management (66%) and replanting (67.7%) than forest monitoring (43.5%) reveals a difficulty-participation gradient: easier activities have higher participation. Members describe waste as practical *("we use waste for fertilizer..)* and replanting as enforced *("we have a regulation where every member should replant")*. This suggests two mechanisms drive engagement: (1) direct benefit, practical application, and (2) obligation, formal enforcement. This supports TBL theory (different pathways lead to different profiles) but reveals a theoretical tension: institutions may create pathway-specific benefits rather than universal ones (Estrin et al., 2012).

6. Conclusion

This study examined member-level livelihood outcomes and governance pathways for achieving CFE sustainability in Limapuluh Kota District, West Sumatra, Indonesia. Using a mixed-method approach with 62 members across 10 CFEs, the study analyzed economic, social, and environmental outcomes across different CFE pathways. CFE across different pathways varies by dimension. The economic dimension showed that CFE remain as supplementary livelihood for the members, where only 29% of the total members received more than 50% income proportion from CFE. Our study also presented a challenge in distributing income more equitably among members. Board member status, years of education, and governance participation significantly influence this result. This finding challenges North's institutional theory, in which, in the CFE case, institutions appear to create unequal access to economic resources, with board members and educated members capturing disproportionate advantage.

The social dimension suggested that 87% of members actively attended meetings, yet only 77% were involved in decision-making. The social dimension also highlighted that socially oriented CFEs provide more non-cash benefits, while business-oriented CFEs provide more economic benefits. Members showed that non-cash benefits include CFE as a learning platform, access to facilities, support for members' daily needs, and potential for market access.

Environmental dimensions showed that engagement in practical activities (waste management, 66%, and replanting, 67.7%) is higher than in challenge activities such as forest monitoring (43.5%). Mixed-oriented CFEs achieved balanced outcomes; business and social-oriented showed trade-offs. This study contributes by identifying a governance-capability pathway, showing social capital substitutes formal institutions in early social-oriented CFEs, documenting non-cash benefits, and reframing TBL as multi-value sustainability with pathway trade-offs.

To improve the situation, we suggest to the policy maker: (1) the program should recognize mixed-oriented CFEs as a valid pathway and support CFEs to balance economic, social, and environmental goals: support for both direct payment to members and community activities, training on balancing economic and social objectives, recognition that CFEs do not need to maximize all dimensions simultaneously, (2) program should inclusive governance mechanism to ensure all members, not just board members, access benefit and decision making: transparent decision making, clear rules for benefit sharing, opportunities for all member to participate, anticipate the elite capture while in initiating phase.

Although this study revealed CFEs in member-level outcomes, it has several limitations. The income data are self-reported rather than audit- or paper-based. The sample size is also quite small, and the results might not be applicable in other areas of Indonesia. Because we focus on the member level, we do not have enterprise revenue data, which limits enterprise-level analysis. We recommend that future scholars integrate member-level and enterprise-level analyses in a broader yet focused perspective.

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