



UNPACKING THE SYSTEMIC CHALLENGE: A MULTI-METHODOLOGICAL SYSTEMS ANALYSIS OF TEA COOPERATIVE IN INDONESIA

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Abstract. Cooperatives in Indonesia continue to face persistent performance challenges despite ongoing improvement efforts from various stakeholders. Given the complexity and multi-actor nature of these issues, this study employs a Systems Thinking approach that integrates Critical Systems and Soft Systems methodologies. The research begins by mapping everyday agricultural processes through a Rich Picture to capture the dynamics of tea-farming activities. It then applies Critical Systems Heuristics (CSH) to surface diverse stakeholder perspectives, particularly those of tea farmers and tea pickers, regarding potential system improvements. Data were collected qualitatively through interviews and participatory focus group discussions with members and administrators of the Paninggaran Berdikari Makmur Cooperative in Pekalongan, Central Java. Member checking was conducted at each analytical stage to ensure validity. The combined methodological approach effectively supported problem structuring by amplifying the voices of less-empowered actors within the cooperative system. Incorporating CSH proved especially valuable in revealing power asymmetries and enabling more inclusive reflection on system boundaries. Overall, the study demonstrates that integrating Critical and Soft Systems approaches enhances stakeholders' understanding of cooperative dynamics and provides a stronger foundation for designing more equitable and effective interventions.

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INTRODUCTION

Cooperatives constitute one of the fundamental pillars sustaining the Indonesian economy. Nonetheless, compared to other forms of business entities, cooperatives remain the most problematic economic organization in Indonesia (Halilintar, 2018). As one of the world's largest tea producers (Kementerian Pertanian, 2021), Indonesia sees significant cooperative involvement within the tea plantation sector. This involvement is particularly prominent in the smallholder plantation segment, which consistently contributes the largest share to the national tea production structure and exhibits relatively low fluctuation over time *Badan Pusat Statistik* (2024).

In analyzing the challenges within this sector, Dalimunte (2011) mapped at least seven determinant factors related to stakeholder involvement that often manifest as problems in Indonesian cooperatives: member motivation, a lack of collective goals, ineffective role distribution, profit distribution issues, leadership challenges, weak entrepreneurial spirit, and low management skills. Furthermore, Patimah & Trimo (2019) highlighted several critical issues facing the smallholder tea agroindustry, including a lack of government assistance for factory infrastructure, limited processing machinery, raw material supply shortages, inadequate hygiene standards, the absence of written Standard Operating Procedures (SOP), limited product distribution, narrow marketing reach, and the emergence of competitors purchasing raw materials at higher prices.

As a tea-producing region, Paninggaran Village established a production cooperative known as *Koperasi Paninggaran Berdikari Makmur* (KPB), which focuses on premium tea production. Although KPB has positively impacted the welfare of farmers and tea pickers through price stabilization, the implementation of market intermediary models, machinery assistance, business and branding training, plantation management and processing training, and connections with off-takers, it continues to face challenges similar to those identified by Dalimunte (2011) and Patimah & Trimo (2019). Specifically, KPB confronts tangible obstacles such as members driven solely by material motivation, ineffective role distribution, raw material supply shortages, a lack of discipline among tea pickers regarding SOP implementation, and limitations in human resource availability and capability.

Considering the complexity of the issues at KPB, a systems approach can be utilized to identify and structure problems along with their underlying causes. A systems approach offers methods capable of simplifying the thought process and managing the cognitive handling of complex realities (Reynolds & Holwell, 2020). Consequently, this research aims to identify and structure the problems and their causes within the tea agroindustry system at *Koperasi Paninggaran Berdikari Makmur* using systems approach methods. This structured analysis is intended to make the problems more comprehensible, thereby facilitating better decision-making by stakeholders.

METHOD

Participants and Data Collection Procedures

This study employed a purposive sampling technique, specifically a judgmental approach, to select respondents who possess a comprehensive and in-depth understanding of the Paninggaran Berdikari Makmur Cooperative (KPB) system. To identify these key stakeholders, a snowball sampling method was applied, where initial informants recommended other relevant individuals until data saturation was reached (Birnacki & Waldorf, 1981).

The data collection and validation process was carried out in three sequential stages:

1. *Direct Observation*: Primary data collection began with direct observation of the daily operational activities at KPB. The observational data were processed to construct a Rich Picture, visualizing the systemic interactions as demonstrated by Setianto et al. (2014).
2. *Structured Interviews*: Following the observations, structured interviews were conducted with the selected stakeholders. These interviews aimed to verify the observational findings and gather deeper insights into the systemic issues.
3. *Data Validation and Conceptual Modeling*: The credibility of the collected data was ensured through source triangulation and member checking, wherein the findings were presented back to the informants for confirmation and alignment (Sugiyono, 2013; Ule et al., 2023). Finally, the validated interview data were utilized to verify the conceptual models derived from the Rich Picture and Critical Systems Heuristics (CSH) analysis.

Cooperative and Agroindustry

Agro-industrial cooperatives are designed to serve members' needs and bridge farmers with broader stakeholder networks, prioritizing long-term community benefits over mere profit (Bérubé et

al., 2012). By integrating upstream and downstream agricultural sectors, they stimulate productivity and farmer income (Masyhuri, 2000). However, cooperative sustainability in Indonesia is frequently hindered by multidimensional challenges. These include internal constraints such as weak management, limited capital, and a lack of grassroots representation (Nurliza et al., 2020), as well as external structural obstacles like inconsistent raw material supply, rural marginalization, and inadequate infrastructure (Soekartawi, 2001).

System Thinking Approach

The agribusiness sector is a complex network of interrelated subsystems, such as inputs, production, marketing, etc., making Systems Thinking an ideal approach to address its multifaceted challenges (Nurmalina, 2017). Unlike traditional linear methods, Systems Thinking effectively tackles complex, real-world problems involving multiple actors. Reynolds & Holwell (2020) categorize systems approaches into hard, soft, and critical systems. To thoroughly identify and structure the specific problems at KPBM, this study employs a hybrid methodology by integrating the soft systems approach to capture diverse epistemological perspectives with the critical systems approach to address inherent power dynamics, as shown in Table 1.

Table 1 Boundary critique questions of Critical Systems Heuristics (CSH)

No	Element	Questions (is and ought mode)	Dimension
1	Beneficiaries	Who are/ought to be the actual beneficiaries of the system, i.e. belong to the group of those whose interest and values are served?	Motivation
2	Purposes	What is/ought to be the actual purpose of the system?	Motivation
3	Measure of success	What are/ought to be the system's measures of success?	Motivation
4	Decision maker	Who is/ought to be the decision maker, i.e. in control of the conditions of success of the system?	Power Control
5	Resources	What resources are/ought to be under the control of the system?	Power Control
6	Decision environment	What conditions of success are/ought to be outside the control of the system decision maker?	Power Control
7	Expert	Who are/ought to be experts i.e. who provides relevant knowledge and skills for the system?	Knowledge
8	Expertise	What is/ought to be relevant knowledge and skills that should flow into the design of the system?	Knowledge
9	Guarantor	What or who is/ought to be the regarded as guarantor, providing assurance of successful implementation?	Knowledge
10	Witness	Who are/ought to be the witnesses, representing the interest of those negatively affected but not involved with the system?	Legitimacy
11	Emancipation	What are/ought to be the opportunities for the interests of those negatively affected to have expression and freedom from the worldview of the system?	Legitimacy
12	Worldview	What space is/ought to be available for reconciling differing underlying worldviews about design of the system among those involved and affected?	Legitimacy

Source: Ulrich & Reynolds (2020)

Picturize the Cooperative's Operational Landscape

Soft Systems Methodology (SSM) is highly sensitive to diverse stakeholder interests (Hardman & Paucar-Caceres, 2011). A core tool within this framework is the Rich Picture, a diagrammatic visualization used to structure and simplify the cooperative's operational complexities (Setianto et al., 2014). In this study, the Rich Picture was constructed based on document analysis and semi-structured interviews with purposively sampled stakeholders, mapping three essential elements: key actors,

activities, and their systemic relationships. Data validation was ensured through member checking, guaranteeing that the visualization accurately represents the problem scope and encourages active stakeholder engagement in the problem-structuring process (Checkland & Poulter, 2006, as cited in Setianto et al., 2014).

Systemic Diagnosis of the Problem Context

Because SSM is frequently criticized for overlooking structural power (Mingers, 2000; Flood, 2000), this research integrates it with Critical Systems Heuristics (CSH) (Ulrich & Reynolds, 2020). CSH addresses power dynamics and boundary judgments through twelve evaluative questions posed in both 'ought' (ideal) and 'is' (actual) modes. Operationally, respondents were first asked the 'ought' questions using the Rich Picture as a visual guide. In a subsequent interview stage, respondents critiqued the gaps between these ideal expectations and the actual conditions. Finally, these critiques were synthesized to structure the problematic situation at KPBM across four core dimensions: motivation, control, knowledge, and legitimacy (Ulrich & Reynolds, 2020).

RESULT AND DISCUSSION

The Existing Operational Landscape

The observational activities and semi-structured interviews generated a Rich Picture diagram that delineates the actors, activities, and systemic interrelationships within the operational framework of KPBM. As illustrated in the translation of the developed Rich Picture (Figure 1), a diverse array of stakeholders is involved, categorized into internal and external actors. Identified internal actors include tea farmers, tea leaf pickers, collectors, as well as cooperative administrators and members. Conversely, the external actors comprise cattle breeders, tea nurseries, Bank Indonesia, the Ministry of Cooperatives and SMEs, the Ministry of National Development Planning (Bappenas), the Ministry of Industry, non-member farmers, the non-governmental organization (NGO) Business World Indonesia, the KOMPAK program, local and inter-local tea factories, local tea traders, the surrounding community, as well as the hospitality sector and exporters. Identifying these actors through this analysis serves as a fundamental step within the Agricultural Innovation Systems (AIS) framework to ascertain the involved stakeholders and illustrate how an enabling environment is constructed around the KPBM cooperative ecosystem. As articulated by Suchiradipta & Raj (2015), the core elements of an AIS comprise the stakeholders, their respective roles and actions, and the enabling environment that fosters innovation. Consequently, achieving a comprehensive understanding of this system relies heavily on mapping the strength of linkages and interactions among these key actors.

The multiplicity of these actors highlights the complexity of an inclusive governance system, a characteristic increasingly essential for agribusinesses to transcend traditional governance boundaries. As argued by Cao & Tao (2025), such an ecosystem is ideally driven by four principal actors: agricultural enterprises (represented in this context by KPBM), the government, NGOs, and consumers. The active multi-stakeholder participation ensures product quality and sustainability through shared responsibilities among these actors. Furthermore, Ahmad et al. (2025) assert that aligning various stakeholders requires the cultivation of three vital operational constructs: joint action, shared motivation, and principled engagement. Implementing this inclusive collaborative governance has proven essential in accelerating resource sharing, fostering trust building, and generating agricultural solutions that are highly adaptive to local needs.

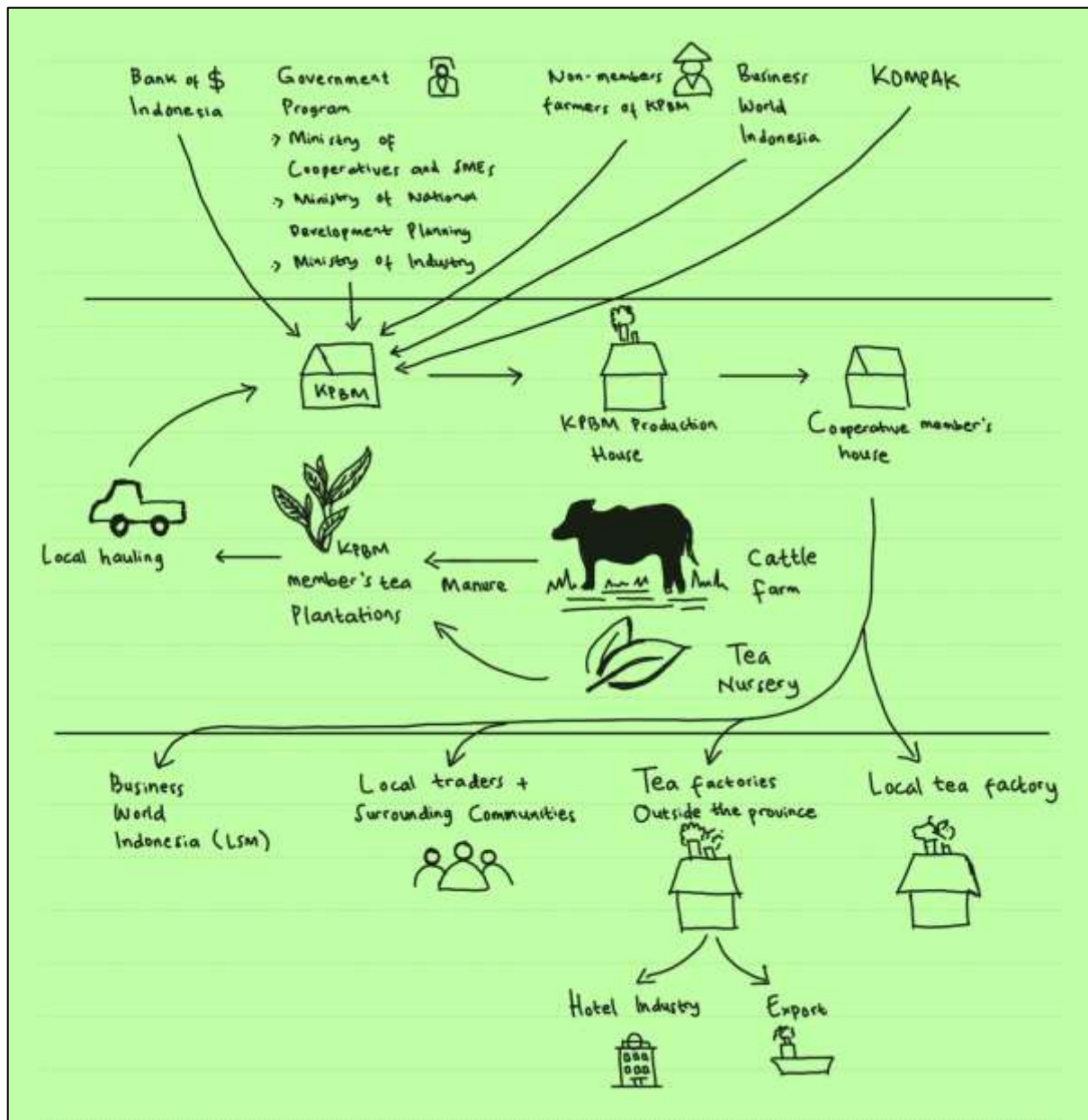


Figure 1. Rich picture of KPBM

Source: Authors' analysis results

Based in Figure 1, the system encompasses three distinct loci of activity: production, marketing, and external intervention. The production activity commences with tea nurseries and plantation fertilization, followed by routine maintenance until the shoots are ready for harvesting by the pickers. Subsequent to the harvesting process, the tea leaves undergo weighing, transport, and delivery to the KPBM production facility. The resulting output—dried premium tea shoots—is packaged and stored at the residences of administrators or cooperative members. The marketing activity has successfully penetrated various channels, including local tea factories, inter-local tea factories located in West Java, local traders, the surrounding community, and the NGO Business World Indonesia. Notably, the inter-local factories facilitate further distribution by supplying various hotels and engaging in product exportation.

Furthermore, various intervention activities targeting KPBM have been implemented. These include assistance and coaching programs initiated by Bank Indonesia, alongside government-led programs providing production equipment aid, cooperative guidance, human resource (HR) capacity

building, and market expansion support. Additionally, the system exhibits intervention linkages from non-member farmers who sell their harvest to the cooperative, marketing guidance provided by the NGO Business World Indonesia, and HR capacity enhancement coupled with market expansion facilitated through the KOMPAK program. These external dynamics align with the findings of Cao & Tao (2025), demonstrating that NGOs and external agencies play a crucial role in providing training and bridging the knowledge gaps for smallholder agribusinesses. These analytical findings also resonate with the application of the Innovation Systems Approach by Pound & Conroy (2017), revealing that KPBM no longer operates within a closed, linear agricultural delivery system. Instead, the diverse assistance and mentoring programs identified within this model essentially represent systemic efforts to transform KPBM into a fully integrated Innovation Platform.

The Structure of the Problem Context

The following analysis utilizes CSH to identify and structure the underlying issues within the operational system of KPBM. This process as it shown in Table 2, elucidates the significant divergence between the actual conditions (is-mode) and the ideal conditions (ought-mode) required for optimal system performance. The analysis categorizes these disparities across twelve distinct boundary elements, as detailed below.

- **Beneficiaries:** Ideally, the primary beneficiaries should be all cooperative members and administrators, realized through the distribution of Residual Business Results (*Sisa Hasil Usaha*). However, the actual system fails to distribute these dividends due to suboptimal activity and performance, which restricts revenue generation. Currently, the practical beneficiaries are farmers and collectors who bypass the cooperative to sell harvests directly to local factories for immediate profit. Consequently, the cooperative—which should be the primary profit center for equitable distribution—receives only a fraction of the potential revenue, thereby exacerbating the organization's financial instability.
- **Purpose:** The system's foundational purpose was to recover tea leaf prices from historical lows. While KPBM has successfully increased prices by focusing on premium quality tea leaves, it has not yet achieved the ideal goal of improving farmer welfare in terms of income. This stagnation is attributed to the unresolved operational issues hindering the cooperative's overall performance.
- **Measure of success:** There is a perceptual divergence regarding success metrics. Cooperative administrators and the village government view improvement through the lens of product value, land preservation, and general welfare. Conversely, farmers and tea pickers prioritize practical inputs, such as the availability of harvesting tools and technical assistance. The consensus on the ideal measure is a well-functioning cooperative that tangibly improves farmer welfare.
- **Decision maker:** Ideally, the Member Meeting (Rapat Anggota) should function as the supreme decision-making body. In reality, decision-making power is dominated by the cooperative administrators and the supervisory board.
- **Resources:** Views on necessary resources differ significantly. Tea pickers perceive agricultural tool support as the ideal resource condition. In contrast, farmers and administrators prioritize the consistency of premium leaf harvesting, the utilization of dormant land, and the optimization of existing machinery. Currently, the system's actual resources are limited to the financial capital for purchasing leaves, production equipment, and member-owned plantations.
- **Decision Environment:** The cooperative currently views market prices, weather patterns, climate change, and government policy as external factors beyond its control. The analysis suggests that the *ideal* internal environment should foster member spirit and consistency in harvesting premium leaves to mitigate these external pressures.

Table 2. Results of Critical System Heuristics (CSH)

Element	Dimension	Ideal Condition	Actual Condition
Beneficiaries	Motivation	All cooperative members and administrators	The cooperative has not yet been able to increase member income through Residual Business Results (<i>Sisa Hasil Usaha</i> / SHU). Farmers and collectors derive the greatest profit by selling harvests directly to local factories.
Purposes	Motivation	To increase tea-shoot prices and farmer welfare	The cooperative is not yet functioning optimally; consequently, it has not been able to directly improve farmer welfare.
Measure of success	Motivation	A cooperative that functions effectively and is capable of improving farmer welfare	Cooperative administrators and the village government view product value enhancement, tea plantation land preservation, and welfare improvement as measures of improvement. Conversely, farmers and pickers focus more on the increased availability of harvesting tools as well as assistance and garden maintenance.
Decision maker	Power Control	The Cooperative Members' Meeting (<i>Rapat Anggota</i>)	Cooperative administrators and the Supervisory Board
Resources	Power Control	Pickers: the provision of agricultural tool support for tea harvesting; Farmers and administrators: consistency in premium shoot harvesting, utilization of uncultivated land, and optimization of existing production machinery	Financial capital to purchase tea shoots, production equipment, and member-owned tea plantation land
Decision environment	Power Control	The spirit and consistency of premium shoot harvesting by cooperative members	Prices, weather, climate change, and government policy
Expert	Knowledge	The Department of Agriculture, for intervention regarding tea tree disease management	<i>Paguyuban Tani Lestari</i> , The People's Coalition for Food Sovereignty (KRKP), cooperative product buyers (Havila & Icigo), Gambung Plantation Research Center, APTEHINDO, District & Provincial Cooperative Agencies, Collectors, Foremen, and the Cooperative Supervisory Board
Expertise	Knowledge	Institutional strengthening, SOP standardization, and the processing of tea shoot products other than green tea (product diversification)	Garden maintenance, the tea shoot harvesting and processing workflow, management, and environmental conservation
Guarantor	Knowledge	All cooperative members	Cooperative administrators and the Supervisory Board
Witness	Legitimacy	Ideal already	No parties are disadvantaged
Emancipation	Legitimacy	Routine meetings between members and administrators	Direct conveyance to cooperative administrators and the village government
Worldview	Legitimacy	Routine meetings between members and administrators, provision of motivation, and the opportunity to struggle collectively regardless of background	Speaking directly and seeking a shared perception of "needs"

Source: Authors' analysis results

- **Experts:** The system acknowledges a wide range of sources for knowledge and expertise, including the *Paguyuban Tani Lestari*, the People's Coalition for Food Sovereignty (KRKP), buyers (Havila & Icigo), the Gambung Plantation Research Center, APTEHINDO, and local government cooperatives agencies. Ideally, the Department of Agriculture should also intervene to enhance members' capacity in tea tree disease management.
- **Expertise:** Current expertise is limited to garden maintenance, harvesting, processing, management, and environmental conservation. Ideally, this should be expanded to include institutional strengthening, the standardization of Standard Operating Procedures (SOPs), and product diversification beyond green tea processing.
- **Guarantor:** Currently, the administrators and supervisors act as the guarantors of the system. In an ideal framework, this responsibility should be shared collectively by all cooperative members.
- **Witnesses:** The analysis indicates that the current state is relatively ideal regarding witnesses, as no parties are currently perceived as being harmed by the system.
- **Emancipation:** While the cooperative allows for direct communication of grievances to administrators and the village government, the *ideal* mechanism for emancipation and conflict resolution should be structured through routine meetings between members and administrators.
- **Worldview:** The prevailing worldview relies on direct communication to align perceptions. The *ideal* worldview should foster a sense of collective struggle, providing motivation and equal opportunity for all members regardless of background, facilitated through regular dialogue.

Following the identification of these gaps, the issues were structured into four dimensions of the problematic situation: motivation, control, knowledge, and legitimacy. Each identified issue was critiqued using research questions to synthesize the root causes. The structural analysis yields a comprehensive map of the systemic challenges at KPBM (Figure 2), which identifying twelve distinct problematic situations and twenty-seven variable drivers contributing to these situations. This structured breakdown provides a rigorous foundation for designing targeted interventions to transition KPBM from its current state toward the identified ideal system.

The integration of SSM and CSH has effectively deconstructed the systemic complexities facing KPBM. The findings underscore a critical dichotomy between the cooperative's expansive external network and its internal structural fragility. While the *Rich Picture* analysis reveals that KPBM has successfully established production and marketing channels involving diverse external actors—ranging from government ministries to inter-local factories and exporters—the internal dynamics remain hindered by fundamental misalignments in motivation and control.

A primary systemic tension identified is the divergence in the Beneficiaries and Purpose elements. Ideally, the cooperative aims to function as a collective profit center distributing welfare to all members. However, the analysis reveals a hostage situation where the cooperative's purpose is undermined by the members' short-term material motivations. As noted in the results, members often bypass the cooperative to sell directly to local factories for immediate profit, leaving the cooperative with insufficient revenue to distribute dividends. This validates the challenges identified by Dalimunte (2011) regarding member motivation and lack of collective goals, suggesting that without restoring the economic Legitimacy of the cooperative as the primary beneficiary, the cycle of low participation and financial instability will persist. Furthermore, these constraints within the motivation dimension can also engender cross-level poverty traps, driven by social-ecological interactions that trigger persistent feedbacks (Sanga et al., 2026). Although ministries and NGOs actively provide equipment assistance—which constitutes "strong innovation interventions" as defined by Sanga et al. (2026)—such assistance risks failure if grassroots motivation is eroded by the absence of Residual Business Results (SHU) and member passivity. This demonstrates that without internal readiness, external interventions may

paradoxically perpetuate these poverty traps. This low motivation, compounded by a leadership crisis characterized by an over-reliance on a few individuals, can dismantle the organization's "shared motivation," which Ahmad et al. (2025) identify as one of the most vital constructs for aligning diverse stakeholders.

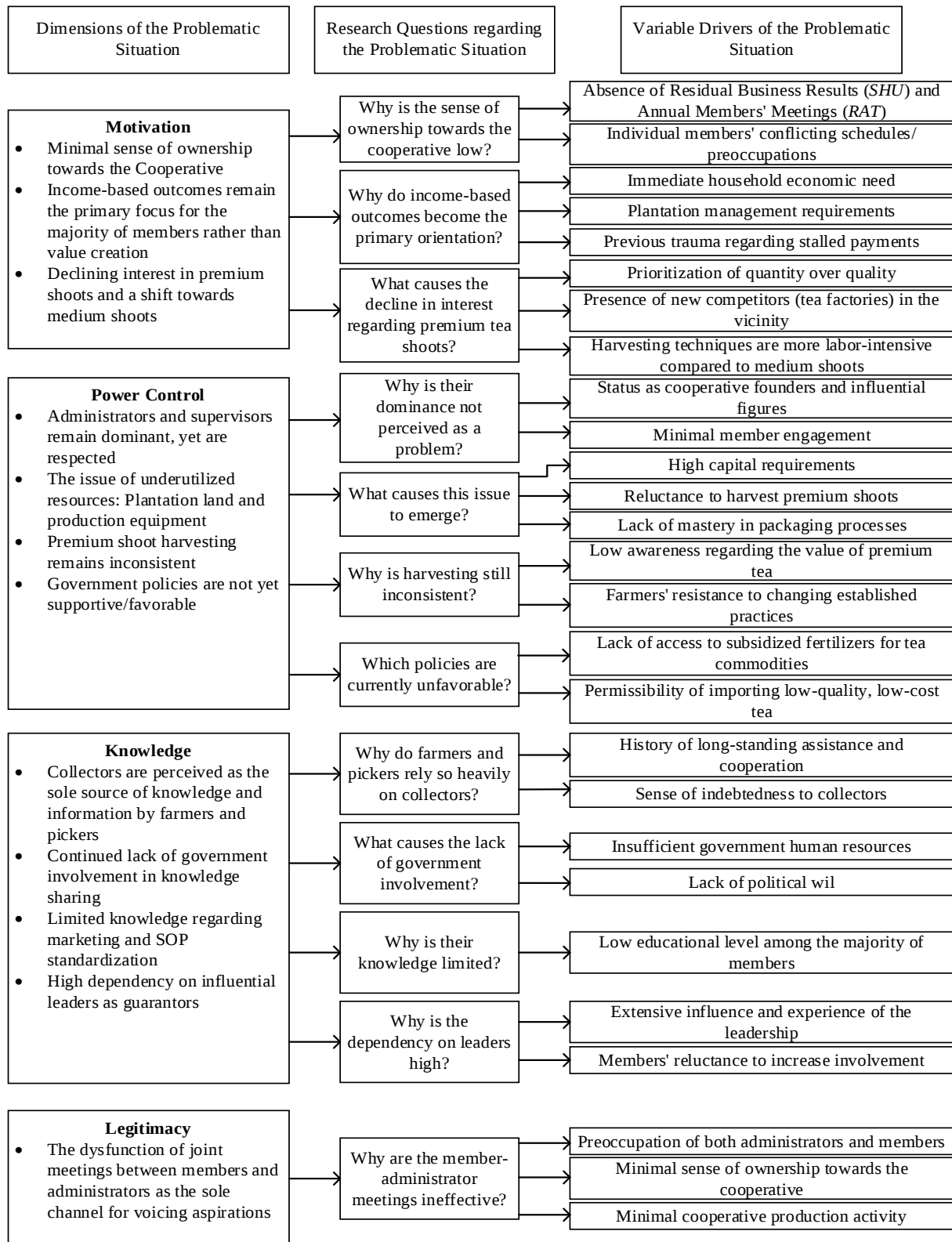


Figure 2. Results of structuring the problematic situations

Source: Authors' analysis results

Based on Figure 2, the CSH analysis exposes a significant power asymmetry within the Decision Maker and Control dimensions. While the democratic ideal posits the Member Meeting as the supreme authority, in reality, the control resides with administrators and supervisors. This centralization of power, while arguably necessary due to the low education level of the majority of members, alienated the grassroots members (tea pickers and farmers) and inadvertently fostered member passivity, creating a gap in the Measure of Success. This disconnect is further worsened by the Knowledge dimension, where farmers remain dependent on collectors not just for sales but as a primary information source. The structural analysis identifies the debt of gratitude to collectors as a powerful variable driver that weakens the cooperative's influence, preventing it from becoming the ideal Guarantor of the system. In their study on farmers' behavior, (Mustapit et al., 2025) demonstrate that environmental factors—encompassing the roles of farmer groups, extension workers, input traders, research institutions, and the government—have a significant impact on shaping farmers' behavior in their efforts to increase innovation capacity. Conversely, personal factors such as attitudes toward innovation, self-efficacy, and personal motivation do not exhibit a significant effect. These findings clarify that the farmers' reluctance to adopt premium picking methods is not rooted in personal indolence, but is rather a product of environmental governance factors. In the context of this study, these factors include the cooperative's failure to provide incentives, the dominance of local collectors who provide debt, and the absence of fertilizer subsidies. Consequently, this reinforces the assertion that the challenges faced by KPBM are purely a matter of systemic failure rather than the behavioral flaws of individual tea farmers.

Finally, the gap in Legitimacy indicates that the current support system is insufficient for the ideal state. The breakdown of the Annual Member Meeting as the sole aspiration channel prevents the alignment of worldviews between the administrators and the grassroots members. Ideally, the worldview should foster a collective struggle, but this is currently obstructed by the busy schedules of members and a low sense of ownership.

CONCLUSION

This study employed a multi-methodological systems approach to diagnose the performance challenges within the smallholder tea agroindustry at KPBM. By synthesizing the visual mapping capabilities of Rich Pictures with the critical interview of CSH, the research successfully structured the complex reality of the cooperative into twelve distinct problematic situations driven by twenty-seven variable drivers.

The empirical evidence demonstrates that KPBM's stagnation is not merely a result of technical or infrastructural deficiencies, but is deeply rooted in the misalignment between the actual (is) and ideal (ought) states of the system. The core conclusion is that the cooperative suffers from a legitimacy and motivation crisis. Although the cooperative has succeeded in stabilizing prices and connecting with high-value markets, it has failed to translate these macro-successes into tangible welfare improvements for individual farmers, primarily due to an uneven distribution of power and benefits. The dominance of administrators in decision-making and the transactional nature of member participation have eroded the collective ownership essential for a cooperative entity.

Therefore, this study concludes that future interventions must transcend physical aid and focus on institutional rearranging. Ideally, the focus should shift towards democratization of decision-making to align the worldview of administrators with the needs of tea pickers and farmers. Strengthening the Guarantor aspect by involving all members in quality assurance and conflict resolution is imperative. By addressing the four identified dimensions of the problematic situation—motivation, power control, knowledge, and legitimacy—stakeholders can formulate policies that not only improve technical performance but also restore the social capital that binds the cooperative together.

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