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RECEIVED 06 January 2026

REVISED 09 February 2026

ACCEPTED 13 February 2026

PUBLISHED 25 February 2026

CITATION

Tenriawaru AN, Darma R, Nishanta B,
Mohd Nawawi N, Bakheet Ali HN, Syam SH,
Amandaria R and Azkar R (2026) From
tradition to sustainability: Toraja Arabica
coffee as heritage, conservation
practice, and source of livelihood.
Front. Hum. Dyn. 8:1781875.
doi: 10.3389/fhumd.2026.1781875

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From tradition to sustainability: Toraja Arabica coffee as heritage, conservation practice, and source of livelihood

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Toraja Arabica coffee is a globally renowned specialty product that is valued for its unique taste, cultural heritage, and ecological significance. Despite its premium reputation, the sector faces persistent challenges, such as low productivity, weak infrastructure, price volatility, and dependence on middlemen, which limit farmers' bargaining power and income. Additionally, heritage branding risks reducing rich cultural traditions to mere marketing, while ecological pressures threaten the fragile highland ecosystems. This study explores the transition of Toraja coffee "from tradition to sustainability," emphasizing its multifunctional role in highland communities. Using a qualitative case study approach, data were collected through interviews, focus group discussions, expert questionnaires, field observations, and secondary sources involving farmers, cooperatives, traders, SMEs, coffee shop owners, extension officers, and government representatives. The findings reveal that Toraja coffee is more than a commodity; it represents cultural identity through rituals and kinship, promotes conservation via shade-grown agroforestry, and serves as a vital livelihood source. However, structural imbalances and ecological and cultural vulnerabilities hinder long-term resilience. Strengthening cooperatives, improving infrastructure, adopting climate-smart practices, and developing balanced branding strategies are essential steps toward achieving sustainability. Toraja coffee demonstrates how cultural and ecological values can be integrated with global markets while highlighting the risks of commodification and inequality.

KEYWORDS

agroforestry, cultural heritage, livelihood resilience, sustainability pathways, value chain governance

1 Introduction

Coffee is one of the most important plantation commodities in Indonesia, valued not only for its economic contribution but also for its cultural and symbolic significance in the country. Arabica coffee, in particular, commands a premium in the global market, representing around 80% of world coffee trade (Nasution et al., 2024; Rico et al., 2024). In this context, Toraja Arabica coffee stands out as a globally recognized specialty coffee cultivated for centuries by highland communities in South Sulawesi. Beyond its economic role, Toraja coffee is embedded in rituals, hospitality, and communal traditions, serving as a marker of cultural identity and local heritage (Azkar et al., 2025; Salam et al., 2021). The dual character of Toraja Arabica—as both an economic commodity and a cultural asset—highlights the urgency of protecting it from unsustainable practices, structural inequalities, and market pressures that threaten its viability.

The potency of Toraja Arabica coffee lies in its unique agroecological conditions, distinctive cup profile, and strong branding as a single-origin product. Highland environments with fertile volcanic soils and favorable microclimates provide ideal conditions for cultivation, while global consumer demand increasingly favors traceable, sustainable, and heritage-linked products (Panggabean et al., 2022; Sia et al., 2025). Recent data show that production in Toraja contributes significantly to South Sulawesi's Arabica output, with an annual growth rate of nearly 38%, reinforcing its potential in domestic and international markets (Rico et al., 2024). Furthermore, Toraja coffee is increasingly leveraged as a cultural tourism icon, enhancing the region's visibility and generating complementary economic opportunities through heritage and gastronomy tourism. These dynamics position Toraja Arabica as a strategic commodity with the potential to deliver both livelihood improvements and cultural preservation.

However, alongside this promise, the sector faces persistent problems. Smallholder farmers encounter barriers such as limited access to capital, low adoption of modern technology, inadequate extension services, and poor infrastructure, which contribute to low productivity and uneven quality standards (Salam et al., 2021; Sia et al., 2025). Market systems remain dominated by middlemen, constraining farmers' bargaining power and exposing them to price volatility (Musa et al., 2020; Rico and Asrul, 2020). At the same time, certification and export market requirements pose challenges for smallholders with limited institutional support, while insufficient mechanisms for protecting intangible cultural heritage risk reducing "heritage" to a branding strategy detached from its local meanings (Caroline Rombe et al., 2021; Rico et al., 2024). Sustainability assessments underscore these vulnerabilities: despite strong economic and institutional performance, weaknesses in infrastructure and technology adoption persist, reflecting structural gaps that undermine resilience (Sia et al., 2025).

To address these complexities, this study adopts a conceptual framework based on three interlinked pillars: heritage, conservation, and livelihood. First, Toraja Arabica coffee is analyzed as a cultural symbol deeply woven into rituals, kinship institutions, and collective identity, offering a lens to view agrifood systems as carriers of intangible cultural heritage (Salam et al., 2021). Second, Toraja's shade-grown and agroforestry-based coffee systems are framed as conservation practices that sustain biodiversity, regulate ecosystems, and protect fragile highland landscapes (Panggabean et al., 2022). Third, coffee is examined as a livelihood resource that underpins rural economies but remains vulnerable to structural inequalities within value chains and global market volatility (Rico and Asrul, 2020; Sia et

al., 2025). By integrating these three dimensions, this study advances a sociological analysis of how Toraja Arabica coffee can transition "from tradition to sustainability," providing insights not only for Indonesia but also for broader debates on smallholder commodity systems, cultural heritage, and sustainable rural development.

Research on Toraja Arabica coffee reveals a complex interplay between heritage, conservation, and livelihood. Toraja coffee is recognized internationally as a specialty commodity while also functioning as a cultural symbol deeply embedded in local social identity (Neilson and Shonk, 2014). Its production is closely tied to Torajan culture and economy, where traditional vernacular architecture (Tongkonan) serves as the foundation of coffee culture and broader societal structures (Caroline Rombe et al., 2021). However, sustainability challenges still persist. A multidimensional assessment found North Toraja's coffee agribusiness to be only moderately sustainable at 73.78, with strong economic (87.53) and institutional (84.91) performance, but significant weaknesses in infrastructure and technology (55.77) (Sia et al., 2025). Moreover, the current coffee value chain remains linear, often failing to incorporate local wisdom and cultural embeddedness (Caroline Rombe et al., 2021). These findings suggest that value chain interventions alone are insufficient for rural development, as they often overlook diversified livelihoods and the cultural foundations of coffee production (Neilson and Shonk, 2014).

Several studies have explored Toraja coffee from different perspectives. Agribusiness and value chain studies emphasize the influence of institutional actors—such as cooperatives, companies, and government agencies—in shaping performance across farming, postharvest, and marketing subsystems (Rico et al., 2024). Value chain analyses highlight persistent challenges including farmers' low bargaining power, limited access to credit, and uneven margin distribution, where traders and processors capture greater value (Salam et al., 2021). Research on sustainability demonstrates that while Toraja coffee shows strong economic and institutional potential, it remains constrained by ecological vulnerabilities and poor infrastructure (Sia et al., 2025). Studies on market strategies underline the role of branding and certification—including organic, fair trade, and geographical indications—in enhancing competitiveness (Barham and Sylvander, 2011; Howard, 2016; Musa et al., 2020).

Beyond economic and market performance, the literature situates Toraja coffee within broader debates on heritage and cultural identity. Coffee in Toraja is not merely an export commodity but part of local traditions and rituals, symbolizing respect, unity, and social cohesion (Rico and Asrul, 2020). As global consumers increasingly value authenticity, traceability, and cultural distinctiveness in food commodities, Toraja coffee is positioned as a niche product with heritage appeal (Jaffee, 2007; Reynolds, 2009). At the same time, ecological sustainability in highland farming systems has gained attention, with scholars emphasizing shade-grown and agroforestry practices as critical for biodiversity conservation and soil resilience (Jha et al., 2014; Panggabean et al., 2022; Perfecto et al., 1996).

Despite these contributions, existing research often examines Toraja Arabica coffee through fragmented lenses—agribusiness performance (Rico et al., 2024), supply chain efficiency (Salam et al., 2021; Azkar et al., 2025), sustainability assessments (Sia et al., 2025), or market competitiveness (Musa et al., 2020). While each perspective offers valuable insights, limited attention has been paid to integrating these strands into a holistic framework. Specifically, little is known about how Toraja coffee simultaneously operates as a cultural heritage, ecological practice, and livelihood strategy, and how these dimensions

interact to shape sustainability pathways. Furthermore, prior research has tended to emphasize production and marketing while underexploring the roles of cultural identity and conservation in building resilience and market differentiation. This study addresses this gap by proposing and applying an integrated framework that highlights the multifunctional role of Toraja Arabica coffee as a bridge between tradition and sustainability in highland communities.

This study aimed to examine the multifunctional role of Toraja Arabica coffee by integrating the perspectives of cultural heritage, ecological conservation, and livelihood sustainability. Specifically, it seeks to analyze how coffee operates as a cultural heritage product embedded in rituals and community identity, evaluates its contribution to conservation practices that maintain highland ecosystems, and assesses its role in supporting rural livelihoods through income and resilience. This study also aims to develop an integrated framework that connects these dimensions to identify strategies for ensuring the long-term sustainability of Toraja Arabica coffee in both local and global contexts.

This study is significant because it provides a holistic understanding of Toraja Arabica coffee, not only as an economic commodity but also as a cultural heritage and conservation practice that sustains community livelihoods. The findings contribute to academic debates by bridging agribusiness performance, ecological sustainability, and cultural identity, which are often treated as separate entities. Practically, this study offers insights for policymakers, development agencies, and farmer organizations in designing strategies that enhance farmers' bargaining power, promote conservation-oriented practices, and strengthen value chain inclusivity. By framing Toraja coffee as a model of "from tradition to sustainability," this study also offers lessons for other smallholder coffee regions globally (Table 1).

2 Methods

2.1 Research design

This study adopted a qualitative case study design to explore the multifunctional role of Toraja Arabica coffee as a cultural heritage, conservation practice, and livelihood source. This design enabled an in-depth understanding of locally embedded systems, where cultural rituals, ecological practices, and livelihood strategies intersect. By focusing on Toraja's highland coffee system, this study captured not only how coffee production sustains household economies but also how it embodies social identity and ecological stewardship. The case study approach provided flexibility to integrate diverse stakeholder perspectives—including farmers, cooperatives, traders, SMEs, processors, and government actors—alongside secondary evidence from policy frameworks and historical records. This combination allowed the research to move beyond surface descriptions of value chains and illuminate the institutional gaps, ecological pressures, and cultural strengths that define sustainability pathways for Toraja Arabica coffee.

2.2 Sampling method

This study employed a purposive, theory-driven sampling strategy to capture actors with direct experiential, institutional, and decision-making knowledge of the Toraja Arabica coffee system as a heritage, conservation practice, and livelihood resource. Informants were selected for analytical relevance rather than statistical representativeness, prioritising depth of knowledge and institutional positioning, consistent with qualitative case study research.

TABLE 1 Stakeholder categories and their contributions to data in the Toraja Arabica coffee.

Stakeholder group (N = 23)	Main roles	Information contributed to study
Farmers (n = 5)	Cultivate coffee under traditional agroforestry, safeguard cultural rituals tied to coffee, and manage household livelihoods.	Provided insights on farming methods, challenges in production and marketing, cultural meanings of coffee, and perceptions of environmental sustainability.
Farmer associations (n = 2)	Coordinate collective action, represent member interests, and support local knowledge-sharing.	Shared experiences of group decision-making, challenges in institutional coordination, and strategies for improving collective bargaining.
Cooperative leaders (n = 2)	Organize aggregation, facilitate certifications, strengthen market linkages, and provide training.	Contributed data on organizational structures, certification processes, marketing strategies, and their role in improving farmer welfare.
Local traders/middlemen (n = 4)	Purchase beans, aggregate supply, influence farm-gate prices, and link farmers with processors.	Explained price-setting practices, aggregation methods, constraints in accessing premium markets, and their influence on quality control.
Processors (n = 1)	Convert raw beans into marketable products, grade quality, and prepare for local and export sales.	Provided details on post-harvest practices, quality assurance, and value-added activities.
SMEs (n = 4)	Innovate with roasting, packaging, and marketing of specialty products at local and regional levels.	Offered perspectives on branding, consumer demand, product development, and strategies for market expansion.
Coffee shop owners (n = 2)	Promote cultural narratives and serve Toraja coffee to consumers.	Shared consumer preferences, perceptions of authenticity, and the use of heritage in marketing strategies.
Extension agents (n = 1)	Deliver training and technical advice on sustainable farming and post-harvest management.	Provided accounts of farmer training programs, adoption of good practices, and challenges in knowledge transfer.
Government officials (n = 1)	Develop policies, oversee programs, and support certification and infrastructure development.	Shared policy priorities, institutional support mechanisms, and challenges in program implementation.
Input suppliers (n = 1)	Provide seeds, fertilizers, and pesticides, as well as advice on their use.	Contributed information on supply chain constraints, input accessibility, and farmer reliance on external inputs.

Clear inclusion criteria were applied to all stakeholder categories. Farmers were selected based on their long-term engagement in Arabica coffee cultivation (minimum 10 years), participation in traditional or agroforestry-based systems, and involvement in culturally embedded production practices. Cooperative leaders and farmer association representatives were included because of their roles in aggregation, certification, and collective decision-making.

Traders, processors, SMEs, and coffee shop owners were selected based on their sustained involvement in purchasing, processing, roasting, branding, and marketing Toraja Arabica coffee, as well as their influence on prices, quality standards, and heritage narratives. Extension officers, government representatives, and input suppliers were included based on their responsibilities regarding technical support, policy implementation, and input provision.

These criteria ensured that all informants possessed situated expertise relevant to the analytical framework, enabling triangulation across cultural, ecological, and livelihood dimensions and strengthening the credibility of the findings.

Table 2 shows that data were collected from 23 informants representing key stakeholder categories in the Toraja Arabica coffee system. Informants were recruited through a combination of direct field contact, institutional referrals, and snowball sampling, ensuring access to actors actively involved in production, processing, marketing, governance, and knowledge transfer. Selection was guided by attributes such as years of experience in the Toraja Arabica coffee sector, degree of involvement in supply chain activities, decision-making authority, and exposure to conservation- or heritage-related initiatives, ensuring that participants possessed the relevant expertise to address the research questions.

2.3 Data collection

Data were collected from 23 informants representing key stakeholder groups in the Toraja Arabica coffee system, selected to reflect the cultural, ecological, and livelihood dimensions of the analytical framework. Participants were recruited through direct field contact, institutional referrals, and snowball sampling, starting with farmer leaders and cooperative representatives. Selection was guided by attributes, including years of involvement in coffee production or trade, participation in decision-making, and engagement with conservation, heritage initiatives, or market governance.

The interviewed farmers were long-term cultivators (generally over 10 years) using traditional or agroforestry-based systems, while cooperative leaders and association representatives held formal roles in aggregation, certification, training, or market coordination. Traders, processors, SMEs, and coffee shop owners were selected based on their involvement in post-harvest handling, quality control, branding, and communication of Toraja coffee’s heritage identity. Extension officers, government representatives, and input suppliers were included because of their roles in technical support, policy implementation, and input provision.

Primary data were generated through semi-structured interviews and focus group discussions, complemented by expert questionnaires and field observations conducted on farms, cooperatives, processing facilities, and coffee shops. Observations documented agroforestry practices, post-harvest techniques, ritual events, and infrastructural conditions. Secondary sources, including policy documents, certification records, statistical reports, and prior studies, were used to contextualise local accounts.

Analytical credibility was strengthened through the selective use of verbatim interviews and FGD excerpts as critical evidence. Quotations were chosen to illuminate key mechanisms and meanings related to heritage, conservation, and livelihoods and were attributed to stakeholder categories to ensure transparency and traceability.

Table 2 strengthens the analytical credibility by summarizing the key themes supported by representative and analytically critical verbatim excerpts from the interviews and group discussions. These excerpts capture the central patterns, tensions, and meanings related to cultural heritage, ecological conservation, and livelihood dynamics, and are used selectively to substantiate interpretations and highlight contrasting stakeholder perspectives. This approach enhances transparency and reinforces the link between empirical evidence and the analytical claims advanced in the study.

2.4 Data analysis

The study analyzed the data using a qualitative thematic approach that systematically uncovered the interconnections between heritage, conservation, and livelihood. I transcribed and coded the interviews and focus group discussions, then grouped the codes into thematic categories to capture recurring patterns and contrasts in stakeholder perspectives. This process revealed how cultural meanings, ecological

TABLE 2 Data collection approaches and types of information gathered.

Data collection technique	Information captured
Semi-structured interviews	Individual accounts of farming practices, household livelihood strategies, cultural significance of coffee, market experiences, and sustainability perceptions.
Focus group discussions (FGDs)	Collective reflections on production challenges, opportunities for improvement, community-level coordination, cultural traditions, and shared strategies for adaptation.
Expert questionnaires	Stakeholder assessments of constraints and opportunities, relative importance of institutional actors, and priority areas for intervention.
Direct field observations	On-site evidence of cultivation and post-harvest methods, cooperative activities, ritual events linked to coffee, infrastructure conditions, and ecological practices.
Secondary data sources	Statistical reports, policy frameworks, previous academic studies, certification documents, and market trend information that provided context and validation of primary findings.

practices, and livelihood needs reinforce each other, but also create tensions within the Toraja Arabica coffee system.

The study validated the themes by incorporating observational notes and photographs from farms, cooperatives, processing sites and ritual events. These sources enriched the narratives by showing how rituals intersect with coffee practices and how agroforestry functions as both an ecological safeguard and livelihood strategy. I further triangulated the findings with secondary data—statistical reports, policy documents, and prior studies—to situate local experiences within broader historical and institutional contexts, which enhanced the credibility of the analysis.

Additionally, the study synthesized the results into table matrices that linked empirical realities with their sustainability implications. These matrices translated complex narratives into accessible visuals, clarifying the relationships between local practices and the observed dimensions. By mapping the findings in this way, the analysis highlighted the interdependence of heritage, conservation, and livelihood while clarifying how each domain contributes to or constrains sustainability pathways.

3 Results

3.1 Toraja Arabica coffee as cultural heritage

The findings affirm that Toraja Arabica coffee transcends its role as a crop, functioning as a cultural symbol embedded in rituals, hospitality, and kinship practices that sustain social cohesion across generations. This cultural anchoring has underpinned heritage branding efforts, most notably PT Toarco Jaya’s international trademark in 1977, which positioned Toraja coffee as a globally recognized single-origin specialty sought after in Japan, the United States, and Europe. Empirical evidence further highlights the economic–cultural nexus, with Arabica plantations covering 18,178 hectares and production nearly doubling between 2017 and 2019, reflecting an impressive 37.8% annual growth rate in the latter. Such growth reinforces Toraja coffee’s dual identity as a heritage emblem and economic driver. However, this distinctiveness faces vulnerabilities: weak legal

protection for intangible cultural heritage and global value chain pressures risk commodifying tradition, reducing heritage to a marketing label detached from community practice. Without stronger safeguards, commercial imperatives may erode the cultural integrity that gives Toraja coffee its unique identity and value.

Table 3 affirms that Toraja Arabica coffee functions as more than an agricultural commodity. It is deeply woven into Toraja’s cultural and social fabric, where coffee is central to rituals such as *Tongkonan* gatherings, *Rambu Solo’* funerary ceremonies, and *Rambu Tuka’* thanksgiving rituals. In these contexts, coffee signifies respect, solidarity, and continuity of kinship ties, while the daily act of serving coffee to guests embodies the values of hospitality and openness. Through these practices, coffee acts as a social medium that reinforces community identity and transmits cultural traditions across generations, sustaining Toraja heritage in both ceremonial and everyday life.

In Toraja culture in South Sulawesi, three key activities illustrate the deep ties between ritual, kinship, and community life. *Rambu Tuka’* is a thanksgiving ceremony held in the daytime to celebrate blessings such as weddings, house inaugurations, or harvests, marked by communal feasting, dancing, and the serving of coffee as a symbol of gratitude. The *Tongkonan*, or ancestral house, functions as a social and spiritual center where families gather for deliberations, rituals, and the preservation of heritage, reinforcing kinship unity across generations. Meanwhile, *Rambu Solo’* is an elaborate funerary ceremony conducted to honor the dead and ensure their passage to the afterlife, often involving animal sacrifices, mourning songs, and large communal gatherings that reaffirm social bonds and redistribute wealth. Together, these practices highlight how Toraja culture weaves rituals, identity, and hospitality into the fabric of everyday life.

Farmers and community leaders emphasised that coffee is inseparable from ritual life and social identity, rather than being merely a commercial crop. As one farmer explained:

“Coffee is always present in our ceremonies. When we gather at the Tongkonan or during Rambu Solo’, serving coffee is a sign of respect and unity. It is not just something we sell; it represents who we are.” (Farmer).

TABLE 3 Key findings and implications: Toraja Arabica coffee as cultural heritage.

Dimension	Key findings	Implications
Cultural practices and rituals	Coffee is central to <i>Tongkonan</i> rituals, <i>Rambu Solo’</i> (funerary ceremonies), and <i>Rambu Tuka’</i> (thanksgiving rituals); daily serving of coffee symbolizes hospitality, solidarity, and continuity of kinship ties.	Coffee acts as a social medium that reinforces community identity, cultural continuity, and intergenerational cohesion.
Heritage branding and market recognition	PT Toarco Jaya registered Toraja Arabica Coffee as an international trademark in 1977. The product is marketed globally not only for premium flavor but also for its association with authenticity and tradition. Strong demand exists in Japan, the US, and Europe, where cultural narratives increase its niche value.	The dual identity of quality and heritage enhances competitiveness, providing opportunities for farmers and cooperatives to capture premium market segments.
Economic–cultural nexus	North Toraja has 18,178 ha of Arabica plantations (5,174 ha immature). Production almost doubled between 2017 and 2019, from 2,596 to 4,873 tons, averaging 37.8% annual growth, far higher than Robusta’s 17.3%.	Rapid growth reflects the integration of economic expansion and cultural pride, showing coffee’s role as both a livelihood base and a cultural emblem.
Vulnerabilities and risks	Heritage branding risks commodification of cultural identity if reduced to marketing labels. Lack of legal protection for intangible heritage leaves traditions vulnerable to appropriation and erosion. Global value chain pressures may detach coffee from community practices.	Commercial imperatives could erode cultural integrity, weakening rituals and communal ethos unless safeguards (e.g., legal frameworks, community-led branding) are developed.

Simultaneously, several informants expressed concern that heritage branding increasingly simplifies these meanings for external markets. A cooperative leader noted:

“Buyers talk about Toraja coffee as heritage, but often they only want the story for marketing. If we are not careful, the culture becomes just a label, not something living.” (Cooperative leader).

This cultural foundation has been translated into market value through the use of heritage branding. Since PT Toarco Jaya registered Toraja Arabica as an international trademark in 1977, the coffee has gained global recognition as a premium single-origin product associated with authenticity and tradition in the coffee industry. Demand is particularly strong in Japan, the United States, and Europe, where consumers value not only the distinctive flavor but also the symbolic narratives that distinguish Toraja coffee from generic Arabica varieties. This dual identity—heritage and quality—has created opportunities for farmers and cooperatives to enter niche markets, positioning Toraja coffee as both an economic driver and a cultural symbol. Production trends further reinforce this economic–cultural nexus: with 18,178 hectares under Arabica cultivation, including 5,174 hectares of immature stands, production nearly doubled between 2017 and 2019, averaging 37.8% annual growth, far outpacing Robusta. This expansion reflects the mutual reinforcement of cultural pride and economic opportunity.

However, the results also underscore critical vulnerabilities. While heritage branding has elevated Toraja coffee in global markets, it risks commodifying cultural identity if it is reduced merely to a marketing label detached from lived community practices. Weak legal protection for intangible cultural heritage further exposes Toraja traditions to appropriation, while global value chain pressures threaten to erode the cultural integrity underpinning Toraja coffee’s distinctiveness. Unless stronger safeguards are introduced—such as legal frameworks, certification systems, and community-led branding initiatives—there is a danger that commercial imperatives may overshadow cultural values, weakening the rituals and communal ethos that sustain Toraja coffee’s

identity. Therefore, protecting the cultural dimension is essential not only for maintaining authenticity but also for ensuring the long-term competitiveness and resilience of Toraja Arabica coffee in global specialty markets.

3.2 Conservation practices in coffee cultivation

Toraja Arabica coffee is cultivated in uniquely favorable highland environments, where volcanic soils, steep terrains, and diverse microclimates shape its premium quality, making it the most suitable land use in North Toraja’s uplands. Traditional shade-grown and agroforestry systems enhance this ecological foundation by stabilizing fragile slopes, conserving biodiversity, and regulating microclimates, while also supplying households with fruit, timber, and fuelwood. These multifunctional systems not only secure rural incomes but also preserve the scenic landscapes that define Toraja’s cultural and ecological identities. However, the sustainability of these practices is increasingly challenged by limited access to training, finance, and infrastructure, which restricts farmers’ ability to adopt climate-smart innovations. The rising global demand further intensifies the pressure to prioritize yields over conservation, risking biodiversity loss, soil degradation, and erosion of traditional practices. The findings underscore that without stronger institutional and policy support, the long-term ecological and cultural distinctiveness of Toraja Arabica coffee may be undermined, threatening its role as an environmental anchor and cultural emblem.

Table 4 shows that Toraja Arabica coffee thrives under unique agroecological conditions. Grown above 1,000 meters in volcanic soils and diverse microclimates, coffee is the most suitable land use for North Toraja’s uplands, where steep terrain limits other crops. These natural endowments provide a strong comparative advantage, producing high-quality beans while anchoring both ecological and livelihood systems in the region.

Farmers widely understand traditional shade-grown and agroforestry practices as essential for maintaining the ecological balance in

TABLE 4 Key findings and implications: conservation practices in coffee cultivation.

Dimension	Key findings	Implications
Agroecological conditions	Coffee thrives at >1,000 meters above sea level in North Toraja’s volcanic soils and diverse microclimates. Steep upland terrains, unsuitable for many crops, are ideal for high-quality Arabica cultivation.	Agroecological endowments provide a natural comparative advantage for producing premium specialty coffee, anchoring both ecological and livelihood systems.
Conservation role of farming systems	Traditional shade-grown coffee and agroforestry systems (intercropped with lamtoro, calliandra, etc.) stabilize fragile slopes, reduce erosion, regulate microclimates, and maintain biodiversity. Shade trees also provide fuelwood, fruit, and timber for households.	Agroforestry creates a multifunctional farming system that enhances ecological resilience, sustains productivity, and supports household income while preserving the landscape.
Cultural–ecological linkages	Agroforestry landscapes preserve the scenic highlands that are integral to Toraja’s identity as a coffee region, reinforcing cultural symbolism alongside ecological functions.	Conservation farming sustains both ecological stability and cultural value, strengthening Toraja’s branding as a heritage-based and eco-friendly coffee origin.
Constraints and risks	Farmers face limited access to training, credit, and extension for adopting climate-smart practices. Poor infrastructure (roads, postharvest facilities) reduces efficiency and quality. Rising market demand risks pushing intensification that undermines ecological balance.	Without institutional and policy support, traditional conservation practices may erode, leading to soil degradation, biodiversity loss, and reduced resilience of highland farming systems.

Toraja’s fragile highland landscapes. Farmers emphasised that these practices are not external conservation interventions but locally embedded strategies developed through long-term experiences. As one farmer explained:

“The land here is steep and easily damaged. If we cut the shade trees, the soil is lost. Coffee grows better when we protect the land, not when we force it.” (Farmer).

At the same time, several informants highlighted growing tensions between conservation-oriented practices and market pressures to intensify production. An extension officer noted that the rising demand for Toraja Arabica has begun to influence farming decisions in ways that may undermine ecological sustainability:

“There is pressure to increase yields quickly, sometimes by reducing shade or using more inputs. In the short term it looks productive, but it threatens biodiversity and soil stability.” (Extension officer).

Conservation practices in Toraja are sustained through locally embedded ecological knowledge but are vulnerable to economic and institutional pressures. Traditional shade-grown and agroforestry systems, such as intercropping with lamtoro and calliandra, stabilise steep slopes, reduce soil erosion, and maintain biodiversity while also providing households with fuelwood, fruit, and timber. These multifunctional landscapes preserve the scenic highlands that are central to the Toraja cultural and ecological identity. However, without stronger support for climate-smart agroforestry and incentives aligned with conservation outcomes, the ecological foundations of Toraja Arabica coffee risk gradual erosion.

Despite these strengths, important constraints remain. Farmers often lack access to training, credit, and extension services to adopt climate-smart innovations, and weak infrastructure reduces efficiency and quality. Rising global demand also risks pushing intensification, which prioritizes yields over conservation. Without stronger institutional support and policy interventions, there is a danger that traditional agroforestry practices will erode, leading to biodiversity loss, soil degradation, and a weakening of both ecological and cultural resilience.

3.3 Coffee as a source of livelihood

The results confirm that coffee is a cornerstone of rural livelihoods in Toraja, serving as the primary or supplementary income source that finances essential household needs, such as education, healthcare, and ritual obligations, thereby sustaining both economic stability and cultural identity. However, farmers occupy a disadvantaged position in the value chain, as they often sell unprocessed cherries or parchment coffee and capture only a fraction of the added value, while traders, processors, and specialty buyers secure higher margins through their control over grading, storage, and market access. This structural imbalance leaves smallholders highly vulnerable to international price volatility and the dominance of middlemen, who suppress farm-gate prices and force many to sell quickly at low rates to meet urgent cash needs. Compounding these pressures are low productivity, aging trees, and limited access to finance and technical assistance, which hinder quality improvements and adaptation to meet market demands. Despite the growing global recognition of Toraja coffee, most smallholders remain excluded from its premium value, underscoring the gap between its international reputation and the economic realities of farming households.

Table 5 shows that for most highland households in Toraja, coffee represents either the primary or a crucial supplementary source of income, underpinning rural financial stability in an economy with few alternatives. Seasonal revenues from coffee sales are vital for financing education, healthcare, and ritual obligations, which are central to household welfare and community identity. In villages with limited formal employment, coffee serves as a cornerstone of livelihood resilience, allowing families to remain rooted in their ancestral lands while sustaining their cultural and social responsibilities.

Coffee plays a central role in sustaining household livelihoods in Toraja; however, farmers’ dependence on the crop is shaped by unequal power relations within the value chain. Many smallholders emphasised their limited bargaining power and reliance on middlemen, particularly when immediate cash needs constrain their ability to delay the sale of their produce. As one farmer explained,

TABLE 5 Key findings and implications: coffee as a source of livelihood.

Dimension	Key findings	Implications
Household dependence	Coffee is the primary or supplementary income source for most highland households. Earnings finance education, health, healthcare, and ritual obligations, anchoring both economic and social life.	Coffee provides financial stability and cultural continuity, allowing families to remain rooted in ancestral lands.
Value chain participation	Farmers typically sell unprocessed cherries or parchment, capturing limited value. Traders and processors dominate grading, storage, and export connections. Cooperatives exist but have limited reach.	Structural imbalance in the value chain restricts smallholders from accessing higher margins and specialty markets.
Vulnerabilities	Farm-gate prices are suppressed by middlemen and international price volatility. Immediate cash needs force quick sales. Productivity is low due to aging trees, limited inputs, and weak extension support.	Households face chronic income insecurity; opportunities in certification, branding, and processing remain underutilized.
Potential pathways	Certification schemes, cooperative strengthening, and local processing offer opportunities for value addition and improved incomes.	Leveraging value-added opportunities is key to bridging the gap between Toraja coffee’s global reputation and farmers’ lived realities.

“We often have to sell the coffee quickly to pay for daily needs or ceremonies. The price is decided by the trader, and we have little choice.” (Farmer).

Other actors also acknowledged these structural imbalances. A trader noted that control over grading and market access remains concentrated beyond the farm level, stating,

“Farmers usually sell cherries or parchment. Processing and access to buyers are not with them, so the price advantage is limited.” (Trader).

Despite these constraints, cooperatives were widely viewed as a potential pathway to improve livelihoods if adequately strengthened. As a cooperative leader observed,

“If farmers can process more through cooperatives and meet quality standards, incomes would improve. The challenge is capacity and support.” (Cooperative leader).

Despite this reliance, farmers occupy a structurally weak position in the coffee value chain. Most smallholders sell unprocessed cherries or parchment coffee, capturing only a small share of the final value-added. Traders and processors, who control grading, storage, and links to specialty buyers, can secure much higher margins. While cooperatives provide some access to certification schemes and collective bargaining, their reach remains limited, leaving many farmers dependent on middlemen for selling their produce. This uneven distribution of roles and benefits highlights a structural imbalance that constrains smallholders’ ability to capture the premium value of Toraja coffee in the global market.

This disadvantage exposes farming households to multiple vulnerabilities. International price fluctuations translate directly into unstable farm-gate earnings, and the dominance of intermediaries further suppresses prices, particularly when farmers are forced to sell quickly to meet immediate cash needs. Low productivity, aging coffee trees, and limited access to credit or extension services exacerbate these pressures,

restricting investment in quality improvements and adaptation to market demands. Consequently, many households remain locked into subsistence-oriented production models. Although opportunities exist in certification, branding, and local processing, most smallholders have yet to realize these benefits, underscoring the gap between Toraja coffee’s global reputation and the economic realities of farming families in the region.

3.4 Towards a transition “from tradition to sustainability”

Despite these structural constraints, the Toraja Arabica coffee system exhibits a strong local agency embedded in everyday political–ecological relations. Farmers maintain shade-grown agroforestry as a strategy of ecological stewardship and risk management, while cooperatives and farmer associations selectively engage with certification, aggregate production, and mediate market relations to negotiate value capture. Indigenous governance, rooted in *Tongkonan*-based kinship structures, embeds coffee production within norms of reciprocity, collective decision-making, and ritual obligation, shaping the local circulation of labour, resources, and value. However, these practices operate within unequal power relations: limited capital, uneven governance capacity, and certification barriers constrain inclusivity, particularly among smaller and remote farmers. Weak legal protections and externally controlled branding further enable the downstream accumulation of heritage value. As described in [Table 6](#), sustainability emerges through negotiated social practices under conditions of inequality rather than through normative or market-led interventions alone.

Stakeholders widely emphasised that achieving sustainability in Toraja Arabica coffee requires coordinated action that links cultural heritage, ecological conservation, and livelihood improvement, rather than treating them as separate objectives. A cooperative leader highlighted the importance of institutional integration, noting,

“Coffee here is not only about production. It is culture, land, and income together. If policies focus on only one aspect, the system becomes weak.” (Cooperative leader).

TABLE 6 Key findings and strategic implications for the transition from tradition to sustainability.

Dimension	Key findings	Strategic implications
Integration of heritage, conservation, and livelihood	Heritage enhances cultural value and niche market appeal; conservation practices sustain highland ecosystems; livelihoods support communities that maintain traditions and agroforestry landscapes.	Treat heritage, conservation, and livelihoods as interconnected pillars of sustainability rather than isolated domains.
Cooperative strengthening	Farmers remain dependent on middlemen, capturing limited value; cooperatives and producer groups have potential but remain underutilized.	Strengthen cooperatives to improve bargaining power, ensure fairer value distribution, and expand access to certification and specialty markets.
Infrastructure development	Poor rural roads, limited postharvest handling, and weak processing facilities reduce efficiency, lower quality, and raise costs.	Invest in rural infrastructure and processing systems to stabilize farm incomes and ensure consistency in quality for global markets.
Branding and market positioning	Toraja coffee’s dual identity as a cultural heritage product and conservation-friendly crop offers differentiation in global specialty markets.	Develop branding strategies that highlight heritage and ecological stewardship to secure premium positioning and consumer trust.
Policy and institutional support	Farmers lack adequate credit, training, and legal protection for intangible heritage; coordination among stakeholders is weak.	Establish enabling policy frameworks, legal safeguards, and stronger institutional coordination to embed sustainability within governance systems.

From a governance perspective, the participants stressed that sustainability transitions depend on enabling institutions and long-term support. A government representative explained,

“Toraja coffee has strong identity and environmental value, but without better coordination between farmers, cooperatives, and government programs, sustainability will remain fragmented.”
(Government official).

These perspectives underscore that the transition from tradition to sustainability is not a technical process alone but a socio-institutional transformation that requires aligning market incentives, conservation practices, and cultural protection within a coherent governance framework.

Advancing this transition requires coordinated interventions: strengthening cooperatives to improve farmers' bargaining power, investing in infrastructure to raise quality and reduce inefficiencies, and developing branding strategies that emphasize Toraja's dual identity as a heritage and conservation-friendly product. Equally important are supportive policies and institutional frameworks, including access to credit, extension services, legal protection of intangible heritage, certification, and climate-smart practices, underpinned by stronger stakeholder coordination. Together, these measures highlight that Toraja Arabica coffee should be seen not merely as a commodity but as a system of cultural resilience, ecological stewardship, and rural livelihood security, offering lessons for other smallholder-based commodities navigating the global value chains.

Table 6 confirms that coffee is a cornerstone of rural livelihoods in Toraja, serving as the main or supplementary source of household income. Earnings from coffee sales finance essential needs such as education, health care, and ritual obligations, anchoring economic stability and cultural identity. In areas with few formal employment opportunities, coffee allows families to remain rooted in their ancestral lands, while sustaining community life.

However, farmers occupy a disadvantaged position in the value chain. Most sell unprocessed cherries or parchment coffee, capturing only a small fraction of the final value of the product. Traders, processors, and specialty buyers dominate the grading, storage, and export channels, whereas cooperatives remain limited in their reach. This structural imbalance restricts smallholders' access to higher-margin and specialty markets.

These vulnerabilities are compounded by price volatility, middlemen dominance, and low farm productivity caused by aging trees, limited inputs, and weak extension service. As a result, households face chronic income insecurity and are often forced to sell quickly at low farm-gate prices to meet urgent cash needs. Opportunities such as certification, cooperative strengthening, and local processing remain underutilized, leaving a gap between Toraja coffee's global reputation and the lived economic realities of farming households.

3.5 Integrated sustainability dimensions

The findings indicate that the long-term sustainability of Toraja Arabica coffee rests on the interdependence of heritage, conservation, and livelihoods, which operate as mutually reinforcing rather than as discrete domains. Cultural heritage enhances symbolic value and market recognition in specialty coffee niches, whereas conservation-oriented practices maintain the ecological conditions necessary for

consistent quality and long-term production. Together, these dimensions underpin the viability of Toraja Arabica coffee as a cultural asset and livelihood resource.

Simultaneously, the results reveal that sustainability outcomes are shaped by uneven power relations within the coffee value chain. Pricing, credit arrangements, certification processes, and access to market information concentrate the influence among traders, middlemen, and downstream actors. Cash advances and informal credit tie farmers to specific buyers, limiting their bargaining capacity and encouraging sales driven by short-term liquidity needs, rather than quality differentiation. Certification and quality standards, while enabling entry into premium markets, often impose costs and technical demands that exceed farmers' capacities, shifting risk upstream while allowing downstream actors to capture the added value. Thus, power is exercised through routine economic and informational mechanisms that structure market participation and constrain smallholder agency.

Across stakeholder groups, sustainability was consistently understood as the outcome of interdependent cultural, ecological, and economic processes rather than as a single intervention. Farmers and institutional actors emphasized that weakening one dimension directly affects the others. As one farmer reflected,

“If the land is damaged, coffee quality drops, and if income falls, it becomes harder to maintain traditions. Everything is connected.”
(Farmer).

Institutional actors similarly highlighted the need for balanced strategies that recognize these linkages. A policy representative noted,

“Protecting heritage without improving livelihoods will not work, and increasing production without conservation will not last. Sustainability requires these dimensions to move together.”
(Government official).

These accounts demonstrate that integrated sustainability in Toraja Arabica coffee is grounded in lived experience and institutional awareness. They reinforce the need for strategies that simultaneously support agroforestry conservation, cultural heritage protection, and equitable livelihood outcomes within the coffee value chain.

Livelihoods, in turn, sustain communities that maintain both cultural and ecological dimensions. Treating these aspects as interconnected underscores the importance of building a holistic sustainability pathway that protects the rituals and traditions associated with coffee, maintains fragile highland ecosystems, and strengthens household economies. This integrated view positions Toraja coffee not only as a commodity but also as a system of cultural and ecological resilience that is worth preserving.

Table 7 shows the findings that the Toraja Arabica coffee possesses significant potential but also faces notable fragility when viewed through a sustainability lens. Its strengths lie in favorable agroecological conditions, rapid production growth, and growing institutional engagement that connects farmers to specialty markets, alongside its recognition as a cultural emblem with premium international value. Simultaneously, persistent weaknesses—including low productivity, uneven quality, weak infrastructure, and insufficient institutional support—limit smallholders' ability to fully benefit from this global reputation. Opportunities are emerging through the rising demand for traceable, heritage-based, and eco-friendly products, with certification,

TABLE 7 Summary of key findings across the four result dimensions.

Findings	Vulnerabilities/constraint	Implications for sustainability
Cultural heritage dimension		
Coffee central to Tongkonan rituals, Rambu Solo', Rambu Tuka'; daily serving symbolizes hospitality, solidarity, kinship ties. Heritage branding since 1977 (PT Toarco Jaya) has positioned Toraja coffee as a premium single-origin in Japan, US, Europe.	Risk of commodification if heritage reduced to a marketing label. Lack of legal protection for intangible heritage makes traditions vulnerable to erosion.	Coffee is both a cultural emblem and marketable identity, but safeguarding heritage is critical to prevent loss of meaning and authenticity.
Conservation practices dimension		
Grown at >1,000 m altitude, volcanic soils, diverse microclimates. Traditional shade-grown and agroforestry systems stabilize slopes, conserve biodiversity, and provide fuelwood/timber.	Farmers face limited training, credit, and extension for climate-smart practices. Weak infrastructure undermines efficiency. Market pressures risk intensification.	Agroforestry sustains both ecological resilience and cultural identity, but requires institutional support to resist market-driven ecological degradation.
Livelihood dimension		
Coffee is the main or supplementary income for most households, financing education, healthcare, and rituals. Enables families to remain rooted in ancestral lands.	Farmers sell mainly cherries or parchment; middlemen dominate. Farm-gate prices volatile; low productivity, aging trees, and limited finance/extension services.	Coffee anchors household resilience, but greater value capture through cooperatives, certification, and local processing is essential to reduce insecurity.
Integrated sustainability dimension		
Strengths: ecological endowments, cultural branding, rapid growth (37.8% annually 2017–2019), cooperative involvement. Opportunities: demand for traceable, eco-friendly, heritage products; certification, direct trade, eco-tourism.	Weaknesses: low productivity, uneven quality, weak infrastructure, poor institutional support. Threats: global price volatility, cultural erosion, ecological risks from intensification.	Sustainability depends on integrated strategies that link heritage, conservation, and livelihoods. Without balance, Toraja coffee risks fragility despite global recognition.

TABLE 8 Key findings and implications: integrated sustainability dimensions.

SWOT element	Key findings	Implications
Strengths	Favorable agroecological conditions. Strong heritage branding and global recognition. Rapid production growth (37.8% annually, 2017–2019). Emerging cooperative and private sector engagement.	Provide a solid foundation for economic and cultural resilience in specialty markets.
Weaknesses	Low productivity due to aging trees and limited inputs: Uneven quality of traditional processing. Weak infrastructure and post-harvest systems. Limited farmer access to credit, extension, and training.	Structural barriers reduce competitiveness and constrain smallholders' ability to capitalize on global demand.
Opportunities	Rising demand for traceable, heritage-based, and eco-friendly coffee. Certification, direct-trade, eco-tourism, and digital traceability are expanding niches.	Creates new avenues for value addition that integrate economic, ecological, and cultural dimensions.
Threats	International price volatility undermines income stability. Risk of cultural commodification through over-commercialization. Ecological risks from unsustainable intensification.	Highlights the fragility of Toraja's coffee system; growth without balance risks eroding cultural and ecological integrity.
Synthesis	Toraja coffee shows a strong but fragile sustainability profile: ecological and cultural strengths face persistent structural weaknesses and external risks.	Integrated strategies that link heritage, conservation, and livelihoods are necessary to secure long-term resilience.

direct trade, and digital traceability offering pathways for value addition and cultural preservation. However, external threats remain, ranging from volatile international prices and ecological risks linked to intensification to the danger of cultural commodification through aggressive branding. These dynamics highlight that Toraja coffee's sustainability depends on integrated approaches that reinforce synergies between heritage, conservation, and livelihoods, ensuring that economic growth does not come at the expense of cultural integrity and ecological resilience.

Table 8 highlights that SO strategies seek to maximize ecological and cultural strengths by capitalizing on the global demand for traceable, heritage-based, and eco-friendly coffee. Leveraging Toraja's strong agroecological endowments and heritage branding allows farmers and cooperatives to position their coffee in premium niche markets, reinforcing both cultural identity and economic resilience.

WO strategies aim to transform weaknesses into opportunities by directing external demand and investment toward structural improvement. This includes channeling resources into rural infrastructure,

rejuvenating aging coffee trees, and providing training to improve quality and consistency of the coffee. Such measures help smallholders overcome productivity gaps and enhance their competitiveness in the global value chain.

Simultaneously, ST strategies use existing strengths to guard against external threats. Strong branding and the conservation value of agroforestry can shield farmers from price volatility and ecological risks by differentiating Toraja coffee in the market and ensuring that its sustainability credentials remain credible.

Finally, WT strategies emphasize defensive measures to reduce the vulnerabilities. This involves protecting Toraja's intangible cultural heritage from over-commercialization and preventing ecological degradation through stronger institutional frameworks, legal safeguards, and policy interventions. These measures are critical to ensuring that growth does not come at the expense of cultural integrity or environmental sustainability.

Synthesis: Taken together, the strengths, weaknesses, opportunities, and threats highlight the multifaceted sustainability profile of the Toraja Arabica coffee. While the region benefits from favorable ecological and cultural endowments and growing global demand, persistent weaknesses and external risks threaten to erode these advantages in the future. The results emphasize the need for integrated approaches that reinforce synergies among the economic, cultural, and ecological dimensions, rather than treating them in isolation. By addressing weaknesses and safeguarding against threats, Toraja Arabica coffee can transition “from tradition to sustainability” and serve as a model for other smallholder-based commodities navigating the global value chains.

When viewed through the lens of sustainability, Toraja Arabica coffee reveals a mix of strengths and weaknesses. On the one hand, the region benefits from strong economic potential, favorable agroecological conditions, and a growing institutional presence through cooperatives and companies that link farmers to larger markets. However, structural challenges, such as weak infrastructure, low productivity, and inconsistent quality control, continue to undermine competitiveness. Opportunities for growth lie in global consumer trends favoring traceable, heritage-based, and environmentally sustainable products, which align with the cultural and ecological dimensions of Toraja coffee. However, threats are also present: volatile global prices, cultural erosion through commercialization, and environmental degradation from unsustainable farming practices could jeopardize the sector's resilience. This balance of strengths, weaknesses, opportunities, and threats underscores the need for integrated approaches that reinforce synergies between the economic, cultural, and ecological dimensions, rather than treating them as isolated factors.

4 Discussion

4.1 Framing the findings in sociological context

The findings of this study reaffirm that Toraja Arabica coffee must be understood not merely as an economic commodity but as a social and cultural artifact deeply embedded in the community's institutional life. Coffee production in North Toraja is intricately tied to kinship relations, ritual exchanges, and customary land tenure systems that define resource access and shape cooperation patterns among

farmers. As noted in previous research, coffee functions as both a household livelihood and a symbolic good that underpins social status and communal identity (Musa et al., 2020; Panggabean et al., 2022). This dual role illustrates how agribusiness activities in Toraja cannot be separated from the broader cultural and institutional frameworks that sustain them, echoing wider debates on agrarian livelihoods as simultaneously material and symbolic (Bebbington, 1999; Müller, 2018).

Placing the findings in a wider sociological framework highlights the intersection of cultural, environmental, and economic sociology. From the perspective of cultural sociology, Toraja coffee embodies heritage practices and ritual significance that reinforce identity while shaping the narratives marketed globally as “heritage coffee” (Rico and Asrul, 2020; Sia et al., 2025). Such processes align with studies of “heritage commodification” that show how cultural practices are selectively reinterpreted for markets while maintaining local meaning (Cohen and Cohen, 2012; Jolliffe, 2010). From the lens of environmental sociology, coffee farming in Toraja is sustained by agroforestry traditions that conserve biodiversity and mitigate climate risks, underscoring the role of local ecological knowledge in shaping adaptive livelihoods (Azkar et al., 2025; Panggabean et al., 2022; Sia et al., 2025; Mansilla and Soza, 2026). This resonates with broader scholarship on agroecology as both a cultural and ecological practice that supports resilience in smallholder farming systems (Altieri and Nicholls, 2017; Giménez and Shattuck, 2011). Meanwhile, economic sociology draws attention to how coffee is situated within value chains characterized by asymmetrical power relations, where farmers, cooperatives, traders, and global buyers contest value distribution and market access (Rico et al., 2024). These dynamics are consistent with global commodity chain perspectives that reveal how structural inequalities in agri-food markets constrain smallholder bargaining power (Ponte, 2019; Van Assche, 2019). Together, these interlinkages show that the agribusiness system is simultaneously cultural, ecological, and economic.

Finally, Toraja coffee illustrates the tension between tradition and globalization. On the one hand, local actors safeguard coffee as a cultural identity marker and ritual asset; on the other, these same cultural attributes are commodified in niche global markets where “authenticity” and “heritage” become branding strategies (Musa et al., 2020; Sia et al., 2025). This ambivalence underscores a paradox: while global demand provides new income opportunities, it also risks transforming social meaning into market value, potentially eroding communal control over the resource. Similar tensions have been observed in Latin American coffee regions, where heritage branding strengthens local visibility but can create new dependencies on external certification and consumer tastes (Curran and Eckhardt, 2017; Feinberg et al., 2006). This study positions Toraja Arabica coffee as a site where heritage, ecological stewardship, and market logic converge, producing both opportunities and vulnerabilities. Addressing these dynamics requires policy frameworks that recognize coffee not only as an agribusiness commodity but also as a cultural and ecological commons (Ostrom, 1990; Robbins, 2012).

4.2 Cultural heritage and identity

The findings of this study highlight that Toraja Arabica coffee plays a central role in sustaining cultural heritage and collective identity. Coffee is not only a livelihood resource but also a ritual

substance embedded in Rambu Tuka' (life-cycle ceremonies), Tongkonan (ancestral house institutions), and Rambu Solo' (funeral rituals). These practices reaffirm kinship solidarity, redistribute resources, and strengthen social cohesion through the symbolic use of coffee as a medium of exchange and hospitality in the region. In this way, coffee becomes both an economic crop and a cultural anchor that shapes identity and reinforces collective belonging in Toraja society (Musa et al., 2020; Panggabean et al., 2022). Similar patterns have been documented in other coffee-growing societies, where coffee functions as a cultural marker that connects households to broader histories of place, ancestry, and community (Feinberg et al., 2006; Lund, 2018). This confirms that agricultural commodities can embody intangible heritage, serving as vessels for memory, ritual, and symbolic capital (Bourdieu, 1986; Lund, 2018).

However, the integration of cultural practices into global value chains raises concerns about heritage commodification. The branding of Toraja coffee as "heritage" or "authentic" in international markets often reduces complex rituals and social meanings into simplified marketing narratives. While such commodification has created new opportunities for economic gain and global recognition, it also risks detaching cultural practices from their local context and undermining their authenticity (Rico et al., 2024; Sia et al., 2025). Scholars of cultural tourism and agrifood markets note that heritage commodification can generate symbolic visibility but also reshape practices to fit external consumer expectations, weakening their embeddedness in everyday social life (Cohen and Cohen, 2012; DiFruscia, 2012). The findings of this study suggest that the commercialization of heritage, if not managed carefully, can transform cultural identity into a consumable label, leaving local communities vulnerable to exploitation in value chains dominated by external actors (Curran and Eckhardt, 2017; Ponte, 2019).

To mitigate these risks, this study emphasizes the importance of legal protection and community-led heritage management in safeguarding the authenticity of Toraja coffee culture. Recognition of Geographical Indications (GI) and the development of cooperative-led governance structures are crucial steps to ensure that cultural heritage is not appropriated solely as a marketing tool but remains rooted in community control and benefit-sharing (Panggabean et al., 2022; Rico and Asrul, 2020). Evidence from other commodity systems shows that GI and similar frameworks can empower producers to link identity and place with equitable economic returns, but only when accompanied by strong collective action and transparent institutions (Barham and Sylvander, 2011; Mancha Cáceres, 2017). By positioning Toraja coffee as both a cultural asset and economic resource, this study underscores the need for policies that strengthen collective rights and institutional safeguards, allowing local actors to determine how their heritage is represented and valued in global markets.

4.3 Conservation practices and ecological sociology

The findings of this study indicate that traditional agroforestry and shade-grown practices in Toraja are not only agricultural techniques but also expressions of indigenous knowledge. By intercropping coffee with diverse tree species and preserving forest canopies, farmers sustain biodiversity while maintaining soil fertility and regulating water. These practices embody a long-standing adaptive strategy in which ecological stewardship and cultural traditions converge,

contributing to community resilience against environmental uncertainty. Previous research has shown that such systems enhance ecological sustainability while simultaneously protecting cultural landscapes and identities (Asante et al., 2025; Musa et al., 2020; Panggabean et al., 2022). Comparable evidence from other coffee-growing regions underscores how agroforestry systems integrate local knowledge and ecological functions, strengthening both biodiversity and livelihoods (Gliessman, 2014; Jha et al., 2014; Perfecto et al., 1996; Azkar et al., 2025). This study positions Toraja's agroforestry system as a vital example of how rural societies can integrate conservation into livelihood strategies without separating nature from culture (Altieri and Nicholls, 2017).

However, despite their ecological and cultural value, these conservation practices face growing vulnerabilities. Market pressures to increase yields and meet export standards have encouraged some farmers to shift toward monoculture or intensive practices, threatening biodiversity. Weak rural infrastructure, such as limited postharvest facilities and poor road access, further constrains farmers' ability to capture value from quality-differentiated products, reducing incentives to maintain traditional methods. Moreover, limited institutional support, particularly the lack of strong cooperatives and state-backed extension services, undermines the continuity of conservation-oriented farming (Rico et al., 2024; Sia et al., 2025). Similar challenges have been documented in smallholder contexts globally, where pressures from certification regimes, global buyers, and unequal market structures weaken the viability of traditional ecological knowledge (Bacon et al., 2008; Mutersbaugh, 2005). These findings suggest that without structural interventions, the ecological gains of Indigenous practices risk being eroded by economic marginalization and institutional fragility.

Connecting these insights to broader debates in sociology, this study underscores how sustainability in rural societies is contingent upon human–environment interactions shaped by power, institutions, and global markets. Ecological sociology highlights that conservation cannot be divorced from social structures, as the resilience of agroforestry systems depends on equitable value chains, institutional capacity, and climate adaptation strategies (Panggabean et al., 2022; Sia et al., 2025). This resonates with theoretical perspectives emphasizing socio-ecological systems, where environmental resilience is closely linked to governance and social justice (Berkes et al., 2000; Robbins, 2012).

4.4 Livelihoods and social inequalities

Livelihoods in the Toraja Arabica coffee system are shaped by political–economic relations that concentrate value downstream, while transferring risk to smallholder farmers (Neilson and Shonk, 2014). Traders and middlemen control prices, credit, and market access, reinforcing dependency and limiting bargaining power, particularly among poorer and more remote households. Although cooperatives, heritage protection, and conservation-oriented branding are promoted as sustainability solutions, their impacts remain uneven owing to capital constraints, governance weaknesses, and certification barriers that exclude less-resourced farmers (Ma et al., 2024; Nowfal et al., 2025; Zou and Wang, 2022). Weak legal frameworks and externally controlled branding further limit local control of heritage value. These findings highlight that reducing livelihood inequality requires interventions that address power relations and institutional capacity rather than normative market-based solutions alone.

This finding resonates with broader analyses of agribusiness systems, where value chains tend to be shaped by unequal relations between smallholders and market actors who control capital and distribution (Panggabean et al., 2022; Rico et al., 2024). Such dynamics are consistent with global evidence showing that smallholders often face exclusionary governance structures in commodity markets, where intermediaries wield disproportionate influence over pricing, credit, and access to markets (Gereffi, 2018; Ponte, 2019; Yeros, 2012). In Toraja, dependence on middlemen illustrates how agribusiness growth can deepen, rather than reduce, rural producers' vulnerabilities.

Smallholder households also have limited access to credit, training, and infrastructure, which reinforces their precariousness. Without affordable and timely financial services, many farmers are compelled to rely on informal lenders or advance payments from traders, which locks them into cycles of dependency. The absence of sufficient training in quality standards and post-harvest practices further limits their capacity to upgrade production. Moreover, weak rural infrastructure—including inadequate storage facilities, poor road connectivity, and limited access to processing technology—reduces farmers' ability to add value and increases postharvest losses (Musa et al., 2020; Sia et al., 2025). Similar findings from other coffee-producing regions show how financial exclusion, inadequate rural services, and lack of extension exacerbate social inequalities, constraining smallholders' capacity to benefit from global markets (Bacon, 2005; Feuerstein, 2007; Neilson, 2008). These constraints highlight how structural barriers exacerbate inequality, preventing coffee farming households from fully benefiting from the global demand for high-quality Arabica coffee.

By situating these findings within sociological debates, this study underscores how agrarian change and rural development are marked by enduring inequalities. The agrarian political economy highlights that rural livelihoods are shaped not only by land and labor but also by the institutions and power structures that govern market relations. The Toraja case demonstrates how dependency on intermediaries and unequal resource distribution reflect wider dynamics of development inequalities in rural societies (Rico et al., 2024; Sia et al., 2025). These observations align with research on the persistence of rural poverty and precarity in global commodity systems, where integration into markets can reproduce rather than alleviate inequality (Bebbington, 1999; Hofferberth, 2016; Yeros, 2012). Thus, this study positions Toraja Arabica coffee as both an opportunity and a paradox: while it provides livelihoods and global recognition, it simultaneously entrenches forms of exclusion and precarity that mirror broader patterns of inequality in rural development.

4.5 Pathways to sustainability: integration of heritage, conservation, and livelihood

The findings indicate that sustainability in Toraja Arabica coffee depends on integrating heritage, conservation, and livelihoods as mutually reinforcing, rather than competing, agendas. Coffee operates simultaneously as a cultural asset embedded in ritual and kinship, an ecological system sustained through shade-grown agroforestry, and as a source of rural livelihoods in global markets. Customary institutions rooted in Tongkonan-based kinship play a central role in this integration by shaping decisions on land use, labour, and harvest timing through the norms of reciprocity, obligation, and collective authority. These institutions also influence how value circulates locally and facilitates collective action, enabling sustainability transitions to emerge from socially embedded governance rather than external intervention.

Addressing these dimensions in isolation risks fragmenting their interdependence; sustainability emerges only when cultural heritage, ecological conservation, and social well-being are integrated within a single framework (Musa et al., 2020; Panggabean et al., 2022). This resonates with broader sustainability science arguments that emphasize linking social and ecological systems to strengthen adaptive capacity and resilience (Folke et al., 2010; Ostrom, 2009; Scoones, 1998). Therefore, this study positions Toraja coffee as a living system in which cultural, ecological, and economic logics intersect, making integration essential for long-term resilience.

Several strategies identified in this study highlight concrete pathways for integration. Cooperative strengthening offers a vehicle for collective bargaining, equitable value distribution, and protection against market volatility. Infrastructure development, such as improved road access and post-harvest facilities, enhances farmers' capacity to reduce losses and capture value. Branding and certification, including the use of Geographical Indications (GI), provide mechanisms to safeguard authenticity while enhancing market positioning. Finally, policy reforms that strengthen institutions, improve access to credit, and ensure inclusive participation function as forms of institutional innovation and collective action (Rico et al., 2024; Sia et al., 2025). Evidence from other commodity systems shows that institutional arrangements such as GI and collective action can empower smallholders to balance economic competitiveness with cultural and ecological sustainability (Barham and Sylvander, 2011; Curran and Eckhardt, 2017; Howard, 2016). These strategies underscore how institutional design and social organization are central to sustainability transitions, enabling local actors to mobilize resources and assert agency in global value chains (Bebbington, 1999; Gereffi, 2018; Ponte, 2019).

Placing these insights in a broader sociological context, the integration of heritage, conservation, and livelihood aligns with theories of social resilience, governance, and community-based development. From a resilience perspective, maintaining diverse functions—cultural, ecological, and economic—enhances communities' ability to adapt to shocks and uncertainties (Berkes et al., 2000; Folke et al., 2010; Townsend and Roth, 2023). Governance theories emphasize that sustainability depends on inclusive, accountable, and adaptive institutions capable of mediating between local knowledge and global markets (Ostrom, 1990; Robbins, 2012). Meanwhile, approaches to community-based development stress the importance of empowering rural actors to shape their own trajectories, ensuring that sustainability is not imposed externally but emerges from within social practices (Chambers, 1997; Hickey and Mohan, 2008; Panggabean et al., 2022; Sia et al., 2025). By framing sustainability as an integrated process, this study advances the position that Toraja Arabica coffee can become a model for how cultural heritage, ecological stewardship, and livelihoods can mutually reinforce the pursuit of just and resilient rural futures.

Customary institutions rooted in *Tongkonan*-based kinship systems play a central role in shaping sustainability pathways in the Toraja Arabica coffee system by embedding production and exchange within shared norms of reciprocity, obligation, and collective authority. Decisions regarding land use, labor allocation, and the timing of harvests are often negotiated through kinship-based deliberation rather than individual calculation, aligning coffee cultivation with long-term ecological stewardship. These institutions also influence how value circulates locally, as proceeds from coffee sales are redistributed through social obligations linked to ritual life, mutual

assistance, and community events, thereby moderating individual accumulation. Through these mechanisms, Tongkonan institutions facilitate collective action by coordinating labor, resolving disputes, and legitimizing shared rules, enabling sustainability transitions to emerge from socially embedded governance rather than externally imposed interventions.

4.6 Broader implications and comparative perspectives

The dynamics observed in Toraja Arabica coffee offer important lessons for other smallholder-based commodities in Africa and Latin America, which face similar tensions of heritage commodification, ecological fragility, and livelihood insecurity. As in Toraja, the coffee sectors in Ethiopia, Colombia, and Guatemala are deeply tied to cultural identity and traditional agroecological systems, yet are increasingly pressured by global certification standards, market concentration, and environmental degradation (Sharma et al., 2025). Studies of Ethiopian coffee ceremonies and Colombian specialty coffee likewise show that cultural heritage is central to producer identity but often reduced to marketing narratives in global value chains (Feinberg et al., 2006; Petit, 2007; Ponte, 2019). The Toraja case illustrates that without strong institutions and community-led governance, heritage risks being reduced to slogans, and ecological practices may erode under the weight of market pressures (Musa et al., 2020; Panggabean et al., 2022). This study therefore positions Toraja coffee not as an exception but as part of a broader global struggle in which smallholder farmers negotiate uneven value chains while seeking to protect their cultural and ecological foundations (Bacon, 2005; Feuerstein, 2007).

Simultaneously, the findings contribute to the global sociology of food systems by highlighting how local traditions and identities interact with global markets and sustainability agendas. Toraja coffee exemplifies how global consumers valorize “authenticity” and “heritage” while demanding ecological and ethical standards, producing both opportunities and contradictions in the process. These dynamics reveal that food systems are not only economic and ecological but also profoundly sociocultural, shaped by power relations between producers, intermediaries, and consumers (Rico et al., 2024; Sia et al., 2025). Comparative scholarship on fair trade and ethical consumption similarly shows how consumer-driven standards reshape producer practices, often reinforcing inequalities while generating new cultural value (Jaffee, 2007; Reynolds, 2009). By situating Toraja within this global framework, this study underscores the importance of examining how sustainability agendas intersect with cultural identity and the lived realities of smallholder households.

Finally, Toraja coffee provides a model of how intangible cultural heritage and ecological stewardship can be strategically leveraged in global value chains, yet with recognition of its fragility. The integration of rituals, kinship-based institutions, and agroforestry practices into value chain branding demonstrates the potential to align culture, ecology, and the market. However, the study also cautions that such leverage is vulnerable to exploitation, uneven benefit distribution, and erosion of authenticity if not supported by strong community institutions and enabling policies (Rico and Asrul, 2020; Sia et al., 2025). Lessons from Guatemala’s smallholder cooperatives and Mexico’s shade coffee systems highlight that success depends on collective governance, equitable certification schemes, and policies that recognize producers as custodians of both heritage and ecology (Milford, 2004;

Mutersbaugh, 2005). Thus, the Toraja case speaks beyond Indonesia: it advances a comparative perspective that sustainability pathways in smallholder commodity systems require a careful balance between valorizing heritage and safeguarding its integrity and between mobilizing ecological knowledge and protecting against commodification.

4.7 Limitations of the study

This study had several limitations that warrant consideration. First, the qualitative case study design and purposive sampling strategy, while appropriate for in-depth analysis, involved a relatively small number of informants and therefore did not aim for statistical representativeness. The findings reflect analytically rich but context-specific insights into the Toraja Arabica coffee system in Indonesia.

Second, reliance on interview narratives introduces the possibility of recall bias and strategic representation, as informants may emphasize particular experiences or interests. This risk was mitigated through triangulation across the stakeholder groups, field observations, and secondary sources. Nevertheless, narratives should be interpreted as situated accounts rather than as objective measures.

Third, while the findings offer transferable insights into heritage-based and agroforestry coffee systems, caution is required in generalizing them beyond comparable smallholder contexts. The analytical value of this study lies in its contribution to theory-building on the integration of heritage, conservation, and livelihoods rather than in producing universally generalisable claims.

5 Conclusion and policy implication

The study concludes that the long-term sustainability of Toraja Arabica coffee depends on integrating cultural heritage, ecological stewardship, and rural livelihoods as mutually reinforcing pillars of sustainability. Coffee is not merely a commodity but a cultural emblem tied to rituals and identity, an ecological practice that safeguards fragile upland ecosystems, and a livelihood resource that sustains highland communities. However, structural imbalances in value chains, weak infrastructure, and market pressures risk undermining these interconnections between the two sectors. To secure resilience, policies must move beyond narrow agribusiness interventions and adopt holistic approaches. Strengthening cooperatives and producer organizations can enhance farmers’ bargaining power and value capture. Strategic investments in infrastructure, post-harvest facilities, and climate-smart practices are required to maintain quality and reduce vulnerabilities. Equally, the legal protection of intangible cultural heritage and the promotion of Geographical Indications (GI) can preserve authenticity while enhancing market positioning. By embedding heritage and conservation within development strategies, Toraja Arabica coffee can serve as a model for sustainable smallholder commodities worldwide.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical approval was not required for the studies involving humans because. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

AT: Writing – review & editing, Methodology, Writing – original draft, Conceptualization. RD: Conceptualization, Methodology, Writing – review & editing, Writing – original draft. BN: Supervision, Writing – review & editing, Conceptualization. NM: Supervision, Conceptualization, Writing – original draft. HB: Writing – original draft, Software, Formal analysis, Validation, Investigation. SS: Visualization, Data curation, Resources, Writing – original draft, Funding acquisition. RAm: Software, Visualization, Validation, Data curation, Resources, Writing – original draft. RAz: Software, Writing – original draft, Visualization, Data curation, Project administration.

Funding

The author(s) declared that financial support was not received for this work and/or its publication.

Acknowledgments

The authors sincerely thank all farmers, cooperative representatives, traders, SMEs, extension officers, and local government officials in North Toraja who generously shared their time and insights. Their contributions were invaluable to this study. The authors are

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solely responsible for the interpretations and conclusions presented in this article.

Conflict of interest

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