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WHEN CERTIFICATION MATTERS MORE THAN PRODUCTIVITY: GEOGRAPHICAL INDICATIONS AND THE SOCIAL CONSTRUCTION OF COFFEE PRICES AMONG SMALLHOLDER FARMERS IN RURAL INDONESIA

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ABSTRACT

This article examines how Geographical Indication (GI) certification reshapes coffee price formation and smallholder farmers' income beyond conventional productivity-based explanations. Challenging dominant agricultural development perspectives that associate income growth primarily with yield improvement, the study addresses a paradox among Arabica coffee farmers in Sipirok, rural Indonesia: certified farmers exhibit lower productivity and higher production costs, yet achieve significantly higher incomes. Using a comparative quantitative design with sociological interpretation, data were collected from 61 GI-certified and 29 non-certified farmers. Annual cash flow analysis and independent sample t-tests were applied to compare production levels, costs, prices, and income. The results indicate that GI-certified farmers incur substantially higher costs, mainly due to organic inputs and strict harvesting standards, and obtain lower yields, but receive coffee prices approximately 2.5 times higher than those of non-certified farmers, leading to statistically higher incomes. These findings demonstrate that price, rather than productivity, constitutes the primary mechanism of income differentiation. Drawing on economic and rural sociology, the study conceptualizes GI certification as a market institution that socially constructs prices through legitimacy, symbolic value, and consumer trust linked to origin and quality. The article contributes empirical evidence from Indonesia on how symbolic valuation reshapes agrarian livelihoods and generates new forms of market dependence.

Keywords: *Agrarian Livelihoods, Market Institutions, Price Formation, Rural Sociology, Smallholder Farmers*

INTRODUCTION

Coffee has emerged as one of the most dynamic global commodities over the past two decades, not merely as an agricultural product but also as a symbol of lifestyle, identity, and ethical consumption. The growing trend of coffee consumption across different regions of the world has driven a steady increase in global coffee demand (Peluso, 2023; Utrilla-Catalan et al., 2022). The International Coffee Organization reports that global coffee demand has grown at an average annual rate of 2–2.5%, with total consumption in the 2022–2023 period reaching 173.1 million bags, or approximately 10.39 million tons, an increase of 2.6% compared to three years earlier (Kath et al., 2022). This expansion has had direct implications for producing countries, including Indonesia, which currently ranks as the world's fifth-largest coffee producer (Maspul,

2023). At the national level, coffee constitutes one of Indonesia's strategic plantation commodities, following palm oil, coconut, and rubber, covering approximately 1.28 million hectares and producing around 794.8 thousand tons, the majority of which is generated by smallholder farmers (Pulungan et al., 2025; Simanjuntak & Chalil, 2025). These figures indicate that the sustainability of Indonesia's coffee sector is highly dependent on the economic and social position of small-scale farmers.

However, rising global demand does not automatically translate into improved farmer welfare. Traditional agricultural development literature has tended to position productivity as the primary determinant of farmers' income growth, assuming that higher yields per unit area enhance efficiency and competitiveness (Grzelak & Staniszewski, 2025; Ogunleye et al., 2025). This approach emphasizes technological innovation, production intensification, and cost efficiency as the main pathways toward agricultural modernization. Nevertheless, contemporary dynamics in the coffee market reveal a more complex reality. Farm-gate coffee prices are increasingly shaped by quality standards, certification schemes, geographical origin, and symbolic reputation rather than by production volume alone (Mdoda et al., 2025). In this context, coffee is no longer traded as a homogeneous commodity but as a differentiated product embedded with social and cultural meanings.

The diversity of coffee flavors, influenced by environmental conditions, cultivation practices, and local knowledge, has stimulated the development of Geographical Indications (GI) as instruments for product protection and differentiation. In Indonesia, a Geographical Indication is defined as a sign identifying a product's origin whose quality, reputation, and characteristics are determined by geographical factors, including both natural and human elements (Harding et al., 2025; Sulistianingsih et al., 2022). This approach aligns with the perspective that quality is not merely a technical attribute but the outcome of social processes involving tradition, local knowledge, and institutional legitimacy (Asri et al., 2022; Saputro et al., 2024; Simatupang et al., 2024). Through GI certification, products such as coffee receive formal recognition of their distinctive origin, which is subsequently translated into higher market value.

A growing body of empirical research suggests that certification schemes, including Geographical Indications, organic certification, and fair trade, can increase farm-gate prices and farmers' incomes (Jena & Grote, 2022; Li, C. et al., 2024; Li, X. & Ouyang, 2025; Zhang et al., 2024). Certification is commonly viewed as a mechanism for addressing information asymmetries between producers and consumers, while simultaneously fostering market trust in product quality (Li, X. & Ouyang, 2025; Schulte & Abdulai, 2025). Beyond market outcomes, state institutions and international organizations also emphasize the role of Geographical Indications in rural development, strengthening farmer organizations, and conserving natural resources and traditional knowledge (Bellassen et al., 2022; Wang, 2026). Within this framework, Geographical Indications are positioned not only as economic instruments but also as place-based development strategies rooted in local identity.

Despite these advances, agricultural economics literature often remains confined to measuring economic outcomes, such as price premiums and income increases, without sufficiently examining the social mechanisms through which prices are constructed. In contrast, perspectives from economic sociology and institutional economics emphasize that prices are the product of social processes involving legitimacy, trust, and quality conventions (Beckert, 2021; Granovetter, 2018). Convention theory, for instance, posits that product value is shaped through shared social agreements regarding what is considered high-quality, authentic, and worthy of compensation (Panza et al., 2023). In specialty coffee markets, geographical origin and narratives of ethical production play a central role in establishing these value conventions (Sahebi & Formosa, 2022).

Research in rural sociology and agrarian change further indicates that smallholder farmers are increasingly integrated into global value chains that demand compliance with standards, certifications, and consumer preferences (Akiri et al., 2024; Wollni et al., 2025). This transformation shifts farmers' roles from mere producers of raw materials to actors engaged in the production of symbolic value, while simultaneously creating new forms of dependency on global markets (Bennett, 2022; KC et al., 2023). Several studies caution that although certification may raise incomes, it can also increase production costs, labor burdens, and the risk of exclusion for smallholders unable to meet certification requirements (Ababouch et al., 2023; Akenroye et al., 2022; Kilima et al., 2024).

In the Indonesian context, research on coffee Geographical Indications remains relatively limited and largely normative, focusing primarily on legal aspects, economic potential, or regional development (Saragih et al., 2024; Waspiah et al., 2024). Empirical studies that combine quantitative analyses of farmer income with sociological explanations of how prices are socially constructed through certification are still scarce, particularly at the local rural level. This gap is notable given Indonesia's significant social, institutional, and market heterogeneity, which strongly shapes how Geographical Indications operate in practice.

Sipirok Subdistrict in South Tapanuli Regency offers a compelling empirical context to explore these dynamics. As an officially recognized Geographical Indication area for Sipirok Arabica Coffee since 2018, the region exhibits an apparently paradoxical phenomenon. Some farmers participating in GI certification have experienced declining productivity and rising production costs due to the adoption of organic practices and stringent harvesting standards. At the same time, they receive substantially higher selling prices than non-certified farmers, resulting in significantly increased incomes. This situation challenges the dominant assumption that productivity is the primary source of farmer welfare and opens analytical space to view price formation as a socially constructed arena involving institutions, symbols, and consumer preferences.

Against this backdrop, the present study aims to develop a deeper understanding of how Geographical Indication certification reshapes coffee price formation mechanisms and the income structure of smallholder farmers. By combining comparative quantitative analysis with

sociological interpretation, this research not only measures differences in production, costs, prices, and incomes between certified and non-certified farmers, but also traces how coffee value shifts from a material basis toward a symbolic one. This approach enables a more critical reading of certification as a market institution that promises income enhancement while simultaneously generating new dependencies on consumers' willingness to pay. Ultimately, this study seeks to contribute to debates in economic sociology, rural sociology, and development studies, particularly concerning the future sustainability of smallholder farmers within an increasingly institutionalized global agrarian market architecture.

RESEARCH METHOD

This study employs a comparative quantitative approach combined with sociological interpretation to examine the effects of Geographical Indication (GI) certification on price formation and income among smallholder coffee farmers. The choice of a quantitative approach is grounded in the need to empirically test differences in economic conditions between farmers participating in the certification scheme and those who are not, particularly with respect to farm-gate prices, production costs, and income levels. This approach enables systematic and comparable measurement across groups while providing a robust empirical foundation for interpreting the social dynamics underlying the observed numerical patterns (Bloomfield & Fisher, 2019; Taherdoost, 2022). In this study, quantification is not treated as an end in itself but rather as an entry point for interpreting how market institutions operate within farmers' everyday economic lives.

The research was conducted in Sampean Village, Sipirok Subdistrict, South Tapanuli Regency, North Sumatra Province, Indonesia. The site was selected purposively because Sipirok is a major production center of Mandailing coffee with a strong reputation in the national market and has held Geographical Indication certification for Sipirok Arabica coffee since 2018. The coexistence of GI-certified and non-certified farmers within the same locality creates an ideal socio-economic setting for comparative analysis. This configuration allows for a more precise examination of how certification functions as a market differentiation institution within a rural social space that is relatively homogeneous in agroecological terms but institutionally fragmented (Taherdoost, 2022).

Sampling was conducted purposively based on farmers' certification status. The study population consisted of actively producing smallholder coffee farmers in Sampean Village. Sample size was determined using Slovin's formula to ensure an adequate level of precision, resulting in a total of 61 GI-certified farmers (hereafter referred to as SIG) and 29 non-certified farmers (non-SIG). This purposive sampling strategy was adopted because the study does not aim to achieve statistical generalization to a broader population, but rather to generate an in-depth understanding of economic differences arising from participation in a specific certification scheme (Kawar et al., 2024).

Data were collected through a structured survey using a questionnaire designed to capture farmers' production and economic data over a single annual production cycle. The main variables measured included coffee selling price (IDR/kg), production costs (IDR/ha/year), and farmer income (IDR/ha/year). Cost and income data were calculated using annual cash flow analysis, which allows for a more accurate identification of cost structures and income sources under real production conditions (Barroga et al., 2023). This approach was chosen because it provides a comprehensive representation of farmers' economic dynamics, capturing not only a single point in time but the entire production process.

Information obtained from the questionnaires was verified through informal discussions with farmers and farmer group leaders, as well as through consistency checks across variables, such as alignment between reported production volumes, selling prices, and income levels (Ghanad, 2023). All quantitative data were subsequently analyzed using an Independent Samples t-test to assess the statistical significance of differences between SIG and non-SIG groups. This method was selected because it is appropriate for comparing two independent groups with relatively comparable characteristics (Nassaji, 2021). The statistical results were then interpreted sociologically to elucidate how Geographical Indication certification reshapes market relations, constructs the symbolic value of coffee, and generates new forms of farmer dependence on consumer preferences.

RESULTS AND DISCUSSION

Declining Productivity and Rising Production Costs: Consequences of Certified Production Practices

Sipirok coffee has been officially granted Geographical Indication (GI) certification since February 2018 through the Association for the Protection of Geographical Indications of South Tapanuli Coffee (Masyarakat Perlindungan Indikasi Geografis Kopi Tapanuli Selatan, MPIG-KTS). The GI registration process was initiated by the South Tapanuli Regency Agricultural Office, with technical support from the Medan Center for Seed Certification and Plantation Crop Protection (Balai Besar Perbenihan dan Proteksi Tanaman Perkebunan, BBPPTP). The specific characteristics of Sipirok coffee registered under the GI scheme include: (1) a fresh aroma with milky notes; (2) the absence of musty, rotten, or foreign odors; (3) freedom from mold contamination; (4) distinctive aroma and flavor resulting from the interaction between Arabica coffee plants, local climatic and soil conditions, and the cultural practices of highland communities in South Tapanuli Regency; and (5) cultivation at elevations above 900 meters above sea level. This coffee is an Arabica variety that turns bright red and fresh when fully ripe and is cultivated across six subdistricts that are members of the MPIG. The GI-designated area encompasses Angkola Timur, Sipirok, Saipar Dolok Hole, Marancar, Aek Bilah, and Arse subdistricts. The Sigararutang variety is the most widely cultivated. Sipirok Arabica coffee exhibits high physical quality, with an average cupping score of 83.55 (ranging from 81.375 to 84.75), classifying it as specialty coffee in the

"excellent" category.

A key distinction between GI-certified and non-certified coffee lies in cultivation practices. GI-certified coffee is produced without the use of chemical fertilizers, making it healthier and safer for consumption. Instead, farmers apply organic manure twice a year and use Trichoderma-based organic herbicides twice annually. Pest and disease control among GI-certified farmers relies on botanical pesticides derived from locally available materials such as rice-washing water, banana stems, coconut water, and Mimosa pudica, allowing farmers to minimize cash expenditures for agrochemicals.

Beyond cultivation practices, significant differences also occur at the post-harvest stage. For GI-certified coffee, only fully ripe, healthy, and fresh red cherries are harvested. Green and yellow cherries are deliberately left on the trees to reach optimal ripeness in subsequent harvests. After harvesting, cherries undergo a sequence of quality-control processes, including sorting of fully developed cherries, removal of the outer skin to produce wet parchment beans, soaking for approximately 12–18 hours, washing, sun-drying to a maximum moisture content of 12%, and final removal of the parchment layer. These stringent post-harvest procedures are designed to preserve quality and ensure consistency with GI specifications.

Differences in cultivation and post-harvest techniques between GI-certified and non-certified coffee inevitably lead to variations in production levels, prices, and ultimately farmer incomes. Comparative data on production, selling prices, production costs, and income for GI-certified (SIG) and non-certified (non-SIG) farmers are presented in Table 1.

Table 1 demonstrates that coffee production among SIG farmers is significantly lower than that of non-SIG farmers. With a harvesting frequency of twice per month, SIG farmers produce an average of 349.92 tons/ha/year, whereas non-SIG farmers reach 589.79 tons/ha/year. The lower productivity among SIG farmers is primarily attributable to the exclusive use of organic fertilizers. While organic fertilizers enhance the physical and biological properties of soil in the long term, their nutrient content is relatively low. In contrast, inorganic fertilizers provide readily available essential nutrients that can rapidly increase yields in the short term (Brito et al., 2022; Roba, 2018). In addition, SIG harvesting standards restrict collection to fully ripe cherries, further limiting harvest volume.

Table 1 Comparison of Production, Selling Prices, Production Costs, and Income between SIG and Non-SIG Farmers

Variable	Mean		Significance	Significance
	SIG	Non-SIG		
Production (tons/ha/year)	349.92	589.79	0.000	Significant difference
Selling price (IDR/kg)	200,000	80,000	n.a.	n.a.
Production costs (IDR/ha/year)	20,999,373	7,621,526	0.000	Significant difference
Income (IDR/ha/year)	48,983,578	39,561,922	0.000	Significant difference

Source: Authors' analysis, 2025

Despite lower production levels, SIG coffee commands a substantially higher price than non-SIG coffee, averaging IDR 200,000/kg compared to IDR 80,000/kg. This price premium reflects the distinctive sensory profile of SIG coffee and its recognized organic quality. Although certification entails considerable effort and compliance costs, it enables farmers to access higher prices in differentiated markets (Zhang et al., 2024).

The findings further indicate that average production costs for SIG coffee amount to IDR 20,999,373/ha/year, significantly higher than the IDR 7,621,526/ha/year incurred by non-SIG farmers. The largest cost component is organic fertilization. Farmers apply approximately 6,479 kg of organic manure per hectare per year, at an average price of IDR 3,000/kg. Consequently, fertilization costs reach IDR 16,773,115/ha/year, accounting for approximately 79.87% of total production costs.

Although SIG coffee production entails higher costs, the substantial price premium, approximately 2.5 times that of non-SIG coffee, results in higher total revenue and income. The independent samples t-test confirms that the income difference is statistically significant (t-calculated > t-table; 5.938 > 1.986). Average annual income among SIG farmers reaches IDR 48,983,578/ha, compared to IDR 39,561,922/ha for non-SIG farmers. These results support prior studies across various commodities demonstrating that certification can enhance farmer income through price premiums (Astuti et al., 2015; Ibnu et al., 2015; Poetschki et al., 2021; Zhang et al., 2024).

Overall, the findings suggest that GI certification leads to increased production costs and reduced productivity due to the exclusive reliance on organic inputs. Under these conditions, higher selling prices constitute the sole mechanism through which farmer income can increase. This indicates that the sustainability of GI certification is highly dependent on consumers' willingness to pay premium prices, reaching up to IDR 200,000/kg, for GI-certified coffee. If the market fails to absorb SIG coffee at such prices, income gains from certification may not materialize, potentially reducing farmers' long-term incentives to remain certified. Although farmers value environmental conservation as part of certification, their primary motivation for participation remains economic (Ibnu et al., 2015).

Therefore, sustained support from multiple stakeholders, including government agencies, exporters, non-governmental organizations (NGOs), and consumers, is essential to ensure the viability of GI certification. Government institutions and exporters can play a critical role in promoting Sipirok coffee as a high-quality product with distinctive sensory attributes and GI certification. Previous research indicates that consumer knowledge about GI-certified products significantly influences willingness to pay (Poetschki et al., 2021). Government-led promotion can further strengthen consumer confidence in certified products (Zhang et al., 2024). NGOs can contribute by providing continuous farmer assistance, enabling consistent adherence to cultivation practices and maintaining stable coffee quality and flavor profiles.

Price as the Primary Determinant of Income: From a Logic of Productivity to a Logic of Symbolic Value

The central finding of this study indicates that coffee prices constitute the most decisive factor shaping farmers' income, surpassing productivity, which has long been regarded in agricultural development literature as the primary explanation of farmer welfare. Results from the independent samples t-test reveal a highly significant difference in selling prices between Geographical Indication–certified (SIG) coffee farmers and non-SIG farmers. On average, SIG farmers receive prices approximately 2.5 times higher than those obtained by non-SIG farmers, despite the former exhibiting lower production levels and higher production costs. This empirical evidence demonstrates that income gains among SIG farmers do not stem from technical efficiency or increased output volumes, but rather from a distinct price formation mechanism.

These differences are summarized in Table 1, which compares selling prices, production levels, and incomes across the two farmer groups. The data show that although non-SIG farmers enjoy an advantage in terms of production volume, this advantage is insufficient to offset the low prices they receive. Conversely, the price premium earned by SIG farmers serves as the primary pillar of their income, enabling them to compensate for, and even exceed, the losses associated with declining productivity and rising production costs.

The dominant role of price in shaping income reflects a shift in economic logic at the farm level. Under the classical productivity-based logic, income is understood as a direct function of production volume and cost efficiency. However, the findings of this study suggest that price is no longer merely a reflection of production costs or commodity scarcity; instead, it represents the symbolic value attached to the product. Geographical Indication certification allows Sipirok coffee to be positioned in the market as a "distinct" and "higher-value" product, not because of the quantity produced, but due to its geographical origin, reputation, and narratives of ethical and sustainable production practices.

From the perspective of economic sociology, this condition can be interpreted as a social process of price formation in which value is not automatically determined by supply and demand, but is mediated through institutions that generate legitimacy and trust (Beckert, 2021). GI certification functions as a price-making institution that structures how coffee is valued, classified, and exchanged. Through the GI label, coffee quality no longer needs to be directly verified by consumers; rather, it is assumed through the institutional authority embedded in the certification. As a result, price premiums become feasible because market uncertainty is reduced through collectively recognized symbols and signs.

Narratives of geographical origin and organic production practices play a central role in this process. Consumers do not merely purchase coffee as a beverage, but also buy stories about place, tradition, and production ethics. Recent studies in valuation research demonstrate that the economic value of products is increasingly shaped through symbolic and narrative processes, in which reputation and meaning become key elements in the justification of prices (Kath et al., 2022). In the case of Sipirok coffee, GI certification institutionalizes these narratives and

translates them into measurable market value in the form of price.

One important implication of these findings is a shift in farmers' economic rationality. SIG farmers are no longer oriented solely toward maximizing yields, but rather toward meeting standards, maintaining quality consistency, and preserving collective reputation. More costly and risk-intensive production practices are accepted as part of a rational economic strategy, because value is no longer anchored in quantity, but in the product's ability to meet the symbolic expectations of the market. This observation aligns with Beckert's (2021) argument that in modern markets, economic gains are increasingly determined by actors' positions within institutional market structures, rather than by production efficiency alone.

Nevertheless, the dominance of price also entails important social consequences. Farmers' income dependence on price premiums implies that the economic sustainability of SIG farmers is highly contingent upon consumers' willingness to pay for the symbolic value of certified coffee. As long as the reputation and legitimacy of the GI are maintained, high prices can be sustained. However, if consumer preferences shift or symbolic legitimacy weakens, farmers' incomes may become vulnerable to sudden shocks. Thus, while GI certification successfully reshapes price formation mechanisms and enhances farmer incomes, it simultaneously creates new forms of structural dependence rooted in symbolic and market-based valuation systems.

Geographical Indication Certification as a Market Institution: Legitimacy, Trust, and Quality Conventions

In this study, Geographical Indication (GI) certification should be understood not merely as a technical instrument of quality assurance, but as a market institution that actively shapes how economic value is produced and perceived. The empirical findings indicate that the price premium received by GI-certified (SIG) farmers cannot be fully explained by improvements in the material quality of coffee, such as bean size or production volume, but rather by institutional recognition of product authenticity and reputation. In other words, certification operates at a symbolic and social level, creating conditions in which quality is not only measured but also legitimized. Within this context, Sipirok coffee is no longer treated as a homogeneous commodity, but as a product endowed with identity, history, and formally recognized origin-based authority.

Legitimacy plays a central role in explaining how GI certification functions as a market institution. Certification provides an official framework that links products to a specific geographical area, production practices, and producer communities. This framework acts as a form of "symbolic guarantee" that reduces uncertainty for consumers who are geographically and socially distant from the production process. In specialty coffee markets, where consumers cannot directly assess intrinsic product quality prior to consumption, institutional legitimacy substitutes for direct evaluation (Beckert, 2021). The findings of this study suggest that consumers are willing to pay higher prices not solely because of measurable differences in taste,

but because of trust in a system that declares the coffee to be authentic, ethically produced, and worthy of premium valuation.

This trust does not emerge spontaneously; rather, it is constructed through the institutionalization of quality. GI certification establishes a set of production standards, harvesting practices, and post-harvest management requirements that farmers must follow. Importantly, these standards function not only to regulate material quality, but also to produce a shared understanding of what constitutes "high-quality coffee." From the perspective of valuation studies, economic value is viewed as the outcome of social processes of evaluation, classification, and justification involving multiple actors, including producers, certification bodies, traders, and consumers (Zhang et al., 2024). In this sense, GI certification serves as a device that stabilizes these processes, enabling the symbolic value of coffee to be translated consistently into market prices.

The stabilization of quality conventions becomes particularly important under conditions of market complexity and uncertainty. The findings show that although SIG farmers face higher production costs and lower productivity, they continue to earn higher incomes due to relatively stable price premiums. This stability is closely linked to the success of GI certification in establishing widely recognized quality conventions. These conventions allow Sipirok coffee to be classified within a specific market category associated with particular price expectations, largely independent of annual production fluctuations. Thus, GI certification does not merely add value, but also governs how that value is maintained through market interactions.

This process is conceptually summarized in Table 2, which illustrates how GI certification transforms production attributes into sources of price legitimacy. The table links the empirical findings of the study to the underlying institutional mechanisms at work.

Table 2 Institutional Mechanisms of GI Certification in Coffee Price Formation

Dimension	Non-GI Condition	GI-Certified Condition
Quality assessment	Based on physical characteristics and local market prices	Based on GI standards and origin-based reputation
Source of trust	Personal relationships and local markets	Institutional legitimacy and certification
Pricing mechanism	Volume-based competition	Symbolic value–based differentiation
Price stability	Relatively volatile	More stable and premium

Source: Authors' analysis, 2025

By positioning GI certification as a market institution, this study demonstrates that price premiums are not merely economic "bonuses," but the result of sustained institutional work. SIG farmers become embedded within a system that demands compliance with standards, consistency of practices, and maintenance of collective reputation. Within this framework, quality is socially negotiated rather than solely produced through technical means. This argument aligns with the view that modern markets increasingly rely on institutional devices to coordinate

expectations and justify price differentials (Beckert, 2021).

Nevertheless, institutional recognition also entails significant social consequences. When the economic value of a product becomes heavily dependent on the legitimacy of certification, farmers' positions become increasingly tied to the durability of that institution. The consumer trust that underpins price premiums must be continuously maintained through compliance and consistency, which in turn may constrain farmers' autonomy in making production decisions. In this sense, while GI certification enhances value and income, it also embeds farmers more deeply within institutionalized market structures that shape both opportunities and constraints.

Higher Income amid Lower Productivity: Paradoxes and the Transformation of Farmers' Rationality

One of the most striking findings of this study is the emergence of an economic paradox at the level of farmers producing coffee under Geographical Indication (GI) certification. Quantitative analysis demonstrates that although GI-certified farmers exhibit significantly lower productivity levels and incur higher production costs than non-GI farmers, they nonetheless achieve statistically higher annual incomes. This paradox challenges classical assumptions in agricultural economics that treat productivity as the primary foundation of farmers' welfare. In the case of Sipirok coffee, the linear relationship between production volume and income no longer holds, as income is increasingly determined by institutionally legitimized pricing mechanisms.

These findings indicate a fundamental shift in the economic rationality of GI-certified farmers. Under productivist logic, farmers are encouraged to maximize output through input intensification and production expansion. In contrast, within the context of GI certification, farmers consciously accept production constraints. The lower productivity observed among GI farmers is not merely the result of technical limitations but rather a consequence of compliance with organic standards, stringent harvesting selection, and quality-oriented farm management practices. These practices reflect rational economic decisions within a new framework, where the primary objective is no longer quantity but the ability to maintain a position within high-value market segments.

From a theoretical perspective, this shift can be understood as a transition from productivist logic to valorization logic. Productivist logic is rooted in the agricultural modernization paradigm, emphasizing technical efficiency, output growth, and cost reduction as key indicators of economic success. By contrast, valorization logic positions symbolic value, reputation, and institutional legitimacy as the primary sources of economic returns (Beckert, 2021). The findings of this study show that GI-certified farmers actively adopt the latter logic by investing in standards, certification, and collective reputation, even though such investments increase costs and reduce physical yields.

This transformation in rationality is also reflected in how farmers perceive risk and profit. Within productivity-oriented logic, the main risks stem from yield fluctuations and input price

volatility. For GI farmers, however, risk shifts toward the domain of reputation and legitimacy. Failure to comply with certification standards or a decline in the symbolic quality of the product may result in the loss of access to premium prices, which constitute the principal source of income. Higher income, therefore, reflects not only economic success but also farmers' increasing embeddedness within institutional systems that demand consistency and market discipline (Beckert, 2021).

The paradox of lower productivity and higher income can be summarized in Table 3, which illustrates the fundamental differences in economic orientation between GI and non-GI farmers. The table captures not only quantitative differences but also the underlying shift in economic logic.

Table 3 Comparison of Economic Orientation between GI and Non-GI Farmers

Dimension	Non-GI Farmers	GI Farmers
Production orientation	Volume maximization	Quality consistency
Main strategy	Input intensification	Compliance with standards and reputation
Source of income	Volume and local market prices	Institutionally legitimized premium prices
Type of risk	Crop failure and input costs	Loss of reputation and certification

Source: Authors' analysis, 2025

More broadly, this transformation of farmers' rationality demonstrates that GI certification not only reshapes economic incentives but also redefines how farmers evaluate success and sustainability. Success is no longer measured by the quantity of coffee produced, but by the capacity to sustain recognized quality and secure access to high-value markets. In this context, higher income emerges from farmers' positions within the institutional architecture of the market rather than from productive capacity alone. This finding reinforces the argument that contemporary agrarian markets are increasingly hierarchical and stratified, with access to certification institutions serving as a key axis of differentiation among farmers.

Nevertheless, the shift toward valorization logic also entails ambivalent social implications. On the one hand, GI farmers benefit from higher and more stable incomes. On the other hand, they become increasingly dependent on the continued reproduction of symbolic value generated through certification and consumer preferences. Such dependence may constrain farmers' autonomy in production decision-making and heighten their vulnerability to shifts in market tastes and valuation regimes.

New Dependencies and Structural Vulnerabilities: Willingness to Pay as the Basis of Sustainability

This section situates the study's empirical findings within a broader horizon of long-term socio-economic implications by highlighting a key consequence of the success of Geographical Indication (GI) certification: the emergence of a new form of structural dependence of farmers on consumers' willingness to pay. The data indicate that the income advantage enjoyed by GI-certified farmers does not stem from superior productivity or cost efficiency, but rather from the

persistence of premium prices sustained by the market. In other words, the economic stability of GI farmers is largely determined by the extent to which consumers, particularly in upper-middle market segments and export markets, continue to recognize and value the symbolic attributes attached to certified coffee. This condition marks a fundamental shift in the basis of smallholder livelihood sustainability, from production resilience toward market legitimacy resilience.

Within this framework, GI certification operates as a mechanism through which smallholders are integrated into global regimes of symbolic value. Coffee prices are no longer merely reflections of localized relations among inputs, labor, and harvest outcomes, but expressions of valuation dynamics that unfold far beyond rural social spaces. Consumers' willingness to pay is shaped by origin narratives, territorial reputation, claims of ethical production, and imaginaries of sustainability that are produced and circulated through global market networks. When premium prices become the primary determinant of income, the economic sustainability of GI farmers becomes contingent upon the stability of the narratives and trust that underpin these value conventions. At this point, certification functions not only as a tool of economic empowerment but also as a new conduit linking farmers to consumer preferences and tastes that remain structurally beyond their control.

Contemporary rural sociology emphasizes that the integration of smallholders into high-value markets is often asymmetric and fragile. Kilima et al. (2024) argue that standard- and certification-based commodification processes tend to generate forms of "conditional inclusion," whereby farmers gain access to global markets only through continuous compliance with external norms, tastes, and expectations. The findings of this study reinforce this argument: GI-certified farmers derive tangible economic benefits, yet these benefits are contingent upon the ongoing symbolic recognition of the market. When consumer preferences shift, when new certifications emerge that are perceived as more "ethical" or "sustainable," or when trust in the GI label erodes, the economic position of GI farmers may weaken rapidly.

This vulnerability becomes even more apparent when considered in relation to the relatively higher production cost structure of GI farmers. Investments in organic inputs, strict harvesting standards, and compliance with collective rules reduce farmers' flexibility in responding to price declines. Unlike non-GI farmers, who may still adjust production strategies by increasing volume or cutting costs, GI farmers are bound by the institutional architecture of certification, which constrains their adaptive options. In contexts of demand shocks or declining willingness to pay, this structure may transform price advantages into sources of economic vulnerability.

From Beckert's (2021) perspective, this condition can be understood as a shift in the form of dependence, from conventional commodity markets to symbolic markets that are no less volatile. Whereas productivity-based markets expose farmers primarily to risks associated with crop failure and commodity price volatility, certification-based markets relocate risk to the domains of legitimacy, reputation, and trust. Economic value does not collapse solely because of technical failure, but because of crises of meaning and valuation. In this sense, willingness to pay

functions as both the foundation and the fragility of farmers' livelihood sustainability.

Nevertheless, it is important to emphasize that this vulnerability should not be interpreted as an argument against GI certification, but rather as a call for a more realistic reading of its implications. Certification has demonstrably increased farmers' incomes and opened new economic opportunities for smallholders, yet it also requires adequate strategies for managing social and institutional risks. Kilima et al. (2024) highlight the importance of strengthening local institutions, diversifying livelihood sources, and enhancing collective bargaining capacity as buffers against excessive dependence on a single value regime. In the context of GI coffee farmers, such strategies may include reinforcing farmer organizations, diversifying market outlets (local and domestic), and developing value narratives that are not entirely dependent on global markets.

CONCLUSION

This study concludes that Geographical Indication (GI) certification fundamentally reshapes the way smallholder coffee farmers' incomes are generated by positioning price, rather than productivity, as the primary determinant of economic welfare. Based on comparative cash-flow analysis and mean difference tests, the findings demonstrate that GI-certified coffee farmers in Sipirok achieve statistically higher incomes despite facing lower productivity levels and higher production costs. These results address the research objectives by showing that GI certification operates as a market institution that socially constructs prices through legitimacy, origin-based reputation, and consumer trust, such that the economic value of coffee is no longer determined solely by quantity and production efficiency. By integrating farm income analysis with perspectives from economic sociology, this article offers empirical novelty from the context of rural Indonesia, challenging productivist logic in the agricultural development literature while illustrating how symbolic valorization can transform agrarian livelihoods. At the same time, the study underscores that certification-based economic success carries structural consequences in the form of new dependencies on consumers' willingness to pay. Accordingly, the policy implications extend beyond the expansion of certification schemes to include the strengthening of rural institutions and sustainability strategies, ensuring that the resulting economic benefits do not remain structurally fragile in the long run.

ETHICAL STATEMENT AND DISCLOSURE

This study was conducted in accordance with established ethical principles, including informed consent, protection of informants' confidentiality, and respect for local cultural values. Special consideration was given to participants from vulnerable groups to ensure their safety, comfort, and equal rights to participate. No external funding was received, and the authors declare no conflict of interest. All data and information presented were collected through valid research methods and have been verified to ensure their accuracy and reliability. The use of

artificial intelligence (AI) was limited to technical assistance for writing and language editing, without influencing the scientific substance of the work. The authors express their gratitude to the informants for their valuable insights, and to the anonymous reviewers for their constructive feedback on an earlier version of this manuscript. The authors take full responsibility for the content and conclusions of this article.

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