Urwatul Wutsqo: Jurnal Studi Kependidikan dan Keislaman
Vol. 15 No. 2, July 2026
P-ISSN: **2252-6099**; E-ISSN: **2721-2483**
DOI: https://doi.org/10.54437/juw
Journal Page: https://pondokjurnal.uwj.ac.id/index.php/UrwatulWutsqo

Livelihood Transformation of Rice Farmers Amid Gold Mining Expansion: Labor Reallocation and Agricultural Sustainability in Kayuboko Village, Indonesia

Nur Avia[1], Lukman[2], Charles Kapile[3], Nuraedah[4]
Universitas Tadulako Indonesia[1,2,3,4]
nuravia023@gmail.com[1], lukmannadjamuddin@yahoo.com[2], kapilecharles@gmail.com[3], nuraedahnuraedah76@gmail.com[4]

Abstract: Gold mining activities often generate significant socio-economic transformations within agrarian communities. This study aims to analyze changes in community livelihoods, the impact of gold mining productivity on the sustainability of rice farming, changes in farmers' income before and after entering the mining sector, and the broader social impacts of mining activities in Kayuboko Village, West Parigi District, Parigi Moutong Regency, Central Sulawesi. A descriptive qualitative approach was employed using observation, semi-structured interviews, and documentation as data collection techniques. Research informants consisted of village officials, rice farmers, and mine workers selected purposively. Data were analyzed using the Miles and Huberman interactive model, including data reduction, data display, and conclusion drawing. The findings reveal that the livelihood transformation of rice farmers did not occur through a complete occupational shift but rather through an adaptive strategy involving the allocation of household time and labor between farming and mining activities. The decline in rice-field management was driven more by labor reallocation and shifting household priorities than by direct physical land degradation. Mining activities increased household income and created new economic opportunities; however, these gains were highly fluctuating and posed long-term sustainability risks. Furthermore, younger generations demonstrated a declining interest in agriculture, indicating a potential farmer succession crisis in the future. The study highlights that mining can undermine agricultural sustainability not only through ecological degradation but also through socio-economic mechanisms, including competition for household labor allocation and the erosion of social capital based on mutual cooperation.

Keywords: gold mining; rice farmers; livelihood transformation; agricultural sustainability; socio-economic change.

Abstrak: Aktivitas pertambangan emas sering menimbulkan perubahan sosial-ekonomi yang signifikan pada masyarakat agraris. Penelitian ini bertujuan untuk menganalisis perubahan mata pencaharian masyarakat, dampak produktivitas tambang emas terhadap keberlanjutan usaha tani sawah, perubahan pendapatan petani sebelum dan sesudah bekerja di sektor pertambangan, serta dampak sosial pertambangan emas di Desa Kayuboko, Kecamatan Parigi Barat, Kabupaten Parigi Moutong, Sulawesi Tengah. Penelitian menggunakan pendekatan kualitatif deskriptif dengan teknik pengumpulan data melalui observasi, wawancara semi-terstruktur, dan dokumentasi. Informan penelitian terdiri atas aparat desa, petani sawah, dan pekerja tambang yang dipilih secara purposive. Analisis data dilakukan menggunakan model interaktif Miles dan Huberman

yang meliputi reduksi data, penyajian data, dan penarikan kesimpulan. Hasil penelitian menunjukkan bahwa transformasi mata pencaharian petani tidak berlangsung secara total, melainkan melalui strategi adaptasi berupa pembagian waktu dan tenaga kerja rumah tangga antara sektor pertanian dan pertambangan. Penurunan intensitas pengelolaan sawah lebih banyak disebabkan oleh realokasi tenaga kerja dan prioritas ekonomi rumah tangga dibandingkan dengan kerusakan fisik lahan. Aktivitas tambang meningkatkan pendapatan masyarakat dan membuka peluang ekonomi baru, namun pendapatan tersebut bersifat fluktuatif dan menimbulkan risiko keberlanjutan ekonomi jangka panjang. Selain itu, terjadi penurunan minat generasi muda terhadap sektor pertanian yang berpotensi memunculkan krisis regenerasi petani di masa depan. Temuan ini menunjukkan bahwa dampak pertambangan terhadap pertanian tidak hanya terjadi melalui jalur ekologis, tetapi juga melalui mekanisme sosial-ekonomi berupa kompetisi alokasi tenaga kerja dan melemahnya modal sosial gotong royong.

Kata Kunci: pertambangan emas; petani sawah; transformasi mata pencaharian; keberlanjutan pertanian; perubahan sosial ekonomi..

Corresponding Author:
Nur Avia
Universitas Tadulako Indonesia; nuravia023@gmail.com

Introduction

Mining is an integrated activity encompassing technical, technological, and economic dimensions in the management of mineral resources, spanning exploration, extraction, processing, and marketing (Ayuk et al., 2020; Litvinenko, 2020). As a sector oriented toward the maximal utilization of natural resources (Feng et al., 2023), Mining frequently generates ecological problems due to waste from extraction, which contributes to pollution and environmental degradation (Reilly, 2012). The mechanization of mining equipment over recent decades has expanded both production capacity and the geographical scope of mining operations, making groundwater and surface water contamination an increasingly evident consequence of large-scale mining (Schwartz et al., 2021).

This phenomenon is clearly observable in Kayuboko Village, West Parigi District, Parigi Moutong Regency, Central Sulawesi, where gold mining activity has expanded rapidly since 2017. The village, historically agrarian in character with approximately 142 hectares of paddy fields and 1,500 hectares of plantation land has undergone a significant shift in its livelihood structure following the emergence of gold mining. New employment opportunities in the mining sector have attracted residents, particularly working-age men, to shift their occupation from paddy farmers to mine workers, as mining income is perceived as faster and larger than agricultural income, which remains dependent on harvest seasons.

On one hand, this occupational shift has brought positive outcomes, including increased purchasing power, improved housing conditions, and greater capacity for families to meet educational and healthcare needs. This pattern aligns with the findings of Gumanti (2024) in Nagari Padang Sibusuk, which demonstrated that the

conversion of paddy fields into gold mines improved settlement conditions and raised income across various occupations, from motorcycle taxi drivers to cooks and housewives. Similarly, Ramlah et al. (2019) in Rau-Rau Village, Bombana, recorded that gold mining opened employment opportunities and generated new business prospects for local farming communities.

On the other hand, mining expansion poses a threat to the sustainability of agriculture. The conversion of paddy fields into mining sites reduces productive agricultural land, leading to declining crop production (Basir-Cyio et al., 2020), consistent with Ma'mun's (2016) findings in Bombana, which revealed decreased agricultural output due to land loss and drought-induced degradation, with the most severely affected village experiencing the greatest loss of livelihood assets. Dependence on the mining sector also carries substantial risk: when mining activity contracts or ceases, communities that have abandoned farming face difficulty returning to their former occupation (Widana, 2019), compounded by occupational safety hazards inherent to mining work. The influx of migrant workers seeking employment in the mining sector further risks triggering social conflict and shifts in local values and norms (Labonne, 1999).

Prior studies have generally examined only one side of these impacts, either economic improvement (Dedrick et al., 2003; Dimitropoulos, 2007) or agricultural land degradation (Hossain et al., 2020) Yet few have specifically traced how the gradual transition of paddy farmers' livelihoods unfolds, including the adaptive pattern in which communities divide their time between farming and mining rather than abandoning agriculture entirely (Eswaran et al., 2001). Within the context of Kayuboko Village, this dynamic merits particular attention, given that the village was historically established upon a foundation of rice cultivation dating to the colonial era, such that its shifting economic orientation reflects a broader transformation of village identity.

Based on the foregoing, this study aims to analyze: (1) changes in community livelihoods since the emergence of gold mining in Kayuboko Village; (2) the impact of gold mining productivity on the sustainability of paddy farming enterprises; (3) changes in paddy farmers' income ownership before and after working as miners; and (4) the overall impact of gold mining activity on the social life of the Kayuboko Village community. This study contributes by presenting a narrative and contextual account of paddy farmers' economic adaptation process, complementing previous studies that have tended to emphasize aggregate, village-level impacts.

Methods

This study employed a descriptive qualitative approach to examine in depth how gold mining activity affects the socio-economic conditions of paddy farmers in Kayuboko Village, West Parigi District, Parigi Moutong Regency. The qualitative approach was chosen because the study positions the researcher as the primary

instrument in examining the object under natural conditions, with data analysis conducted inductively and oriented toward factual findings in the field rather than theory testing (Yin, 2018). This approach enabled the researcher to understand meaning, experience, and social change as contextually perceived by the community, beyond mere numerical data collection.

The research was conducted in Kayuboko Village, West Parigi District, Parigi Moutong Regency, Central Sulawesi, beginning in February 2026. This location was selected because it represents an area that has undergone significant socio-economic change due to the development of gold mining activity since 2017, particularly affecting communities previously engaged in paddy farming. The research subjects consisted of three groups of informants: Kayuboko Village government officials, gold mine workers, and paddy farmers. These three groups were selected purposively because they have direct or indirect involvement in mining activity, enabling them to provide relevant information regarding the socio-economic changes that have occurred. Village officials offered an institutional perspective on policy and governmental response, while mine workers and farmers provided direct accounts of livelihood dynamics, income changes, and perceived social impacts.

Primary data were obtained through direct interviews with informants, including the Village Head, Hamlet Heads, the Head of Village Governance Affairs, as well as farmers and mine workers (Sugiyono, 2017). Secondary data were gathered from documents, archives, and relevant literature, including the village profile and prior research findings (Sugiyono, 2021). Data collection employed three techniques: (1) field observation to directly examine the situations, activities, and changes resulting from mining activity (Umamah, 2025); (2) semi-structured interviews with relevant parties to elicit information on the social, economic, and environmental changes experienced by the community (Didin Fatihudin, 2015); and (3) documentation in the form of photographs and supporting records to complement the data obtained from interviews and observation (Creswell, 2014).

Data analysis followed the interactive model of Miles et al., (2014), comprising three stages that occur simultaneously and continuously: data reduction, namely the process of selecting, simplifying, and focusing field data on themes and patterns relevant to the research objectives; data display, namely the presentation of interview results in narrative form reinforced by visual documentation; and conclusion drawing, namely an ongoing verification process to formulate the patterns and themes emerging from observation and interviews into coherent research findings.

Results And Discussion

Result

The findings of this study were derived from three data collection techniques: indepth interviews with Kayuboko Village government officials, gold mine workers, and paddy

farmers; field observation of the physical condition of the village and mining activity; and documentation in the form of village profile data and field photographs. These three sources of data were combined to illustrate the changing socio-economic conditions of paddy farmers in Kayuboko Village since the development of gold mining activity in 2017.

Field observation revealed that the gold mining area in Kayuboko Village is situated directly adjacent to residents' paddy fields and plantations, connected by a dirt road leading from the settlement to the mining site. At several points, the researcher observed heavy equipment such as excavators operating on land that had previously been agricultural area, along with mounds of excavated soil located close to paddy plots still actively cultivated. This contrast between expanses of green paddy fields on one side and hills of excavated mining soil on the other was a common sight throughout the course of the research. Village profile documentation (2026) recorded that of the village's total area of 17,120 km², 142 hectares consist of paddy fields and 1,500 hectares of plantations, confirming that agriculture has historically served as the village's economic foundation since the land was first opened by Raja Tagunu in collaboration with the Dutch colonial government, long before gold mining emerged. This finding was reinforced by an interview with the Village Head of Kayuboko, who explained that the occupational shift occurred because mining was perceived as a faster source of income than farming:

> "*In the past, most people focused on the paddy fields, but now many have chosen to work in the mines, especially working age men. This change has indeed helped the economy of some residents, but on the other hand, agriculture has begun to receive less attention. Some land has even started to become neglected because its owners are more focused on working in the mines. The village government continues to remind residents to maintain their farms, because it remains important for the village's future.*" *(Samrun Latjari, interview, May 8, 2026)*

Consistent with this statement, the Head of Hamlet II, Naphan, who is also a farmer, explained that this transition is generally not absolute but rather involves dividing time between the two sectors:

> "*Before the mine existed, the majority of residents farmed paddy fields and tended plantations. After the mine developed, many residents became interested because of the faster income, so many now divide their time between the paddy fields and the mine, and some have abandoned farming altogether. Mining indeed provides greater income in a short time, but there is concern that agriculture is increasingly being neglected. Some land has also become poorly maintained.*" *(interview, May 8, 2026)*

Direct observation of several paddy plots across the three hamlets of Kayuboko Village revealed variation in the level of land upkeep; some paddy fields appeared to be cultivated normally, with healthy rice crops and functioning irrigation channels, while others showed signs of neglect, such as uncleared weeds and small irrigation channels beginning to clog with sediment. This condition aligns with the account of farmer Mahmud, who observed changes in land management practices among fellow farmers:

> "*In the past, people here focused mainly on paddy farming because that was indeed the main source of livelihood. But since the mine developed, many farmers have started shifting or dividing their time toward mining because the results come faster. Some paddy fields have also begun to receive less attention because their owners more often work in the mine. Some farmers*

have even changed their farming pattern from rice to corn or other work considered more suited to current conditions." (interview, May 13, 2026)

Kisan, also a local resident, added that farming now occupies a secondary position within the community's occupational structure:

"*Many farmers now go to the mine because of economic needs. Farming still exists, but not like before. If the mining results are good, people usually focus more on the mine than the paddy field. So farming now feels like a second job for some people." (interview, May 13, 2026)*

The village government, through the Head of Village Governance Affairs, Fadli, acknowledged the long term risks of this condition and emphasized the need for balance between the two sectors:

"*Gold mining has brought quite significant change. The income of those directly involved has indeed increased, but this shift in livelihood also raises new challenges, such as the shifting function of agricultural land and changes in people's way of life... Mining does help the community's economy in the short term, but if too many people abandon their paddy fields, this could affect the sustainability of the village's agriculture. The paddy fields are a source of food and long term economic security." (interview, May 8–13, 2026)*

Regarding income, photographic documentation of the conversion from agricultural land to mining activity showed areas that had previously been active farmland now repurposed as mining work corridors, complete with simple installations such as washing tarpaulins set up along waterways. This physical transformation correlates with the changes in income patterns reported by informants. Before working in the mine, farmers' income was seasonal and often insufficient to meet household needs, as described by Afrianto, a mine worker who was previously a farmer:

"*Back when I only farmed, there was income, but I had to wait for the harvest, and sometimes it wasn't enough to cover all the family's needs. If the harvest wasn't good, the income decreased as well. After I started working in the mine, income came faster, although it wasn't always the same every time. But compared to farming alone, household needs are now easier to meet because of the additional income from the mine." (interview, May 14, 2026)*

Mardan reinforced this finding through a similar experience regarding the instability of harvest yields as the primary driver of his occupational shift:

"*In the past, when I only farmed, sometimes the harvest was sufficient, sometimes not, depending on the season. So the income was uncertain. After working in the mine, I feel the income is greater, even though the work is harder. Now I can more quickly meet household needs, my children's school costs, and other necessities." (interview, May 14, 2026)*

Zulkifli further confirmed this income increase, while acknowledging the uncertainty that accompanies it as a consequence of working in the mining sector:

"*After working in the mine, my income feels more substantial for daily needs compared to when I only farmed... Now the results from the mine can come faster, even though they are not always stable. There is indeed a risk from harder work, but family needs can be met more quickly." (interview, May 14, 2026)*

Field observation further noted that the homes of several mine workers visited generally showed improved physical conditions, such as renovated walls and more adequate roofing, compared to several farmers' homes that relied entirely on paddy farming for their livelihood, although this observation is indicative rather than measured through

standardized instruments. Wirnawati, a resident who also observed these changes in her surrounding environment, expressed a similar impression:

> *"Since many people started working in the mine, there has indeed been economic change. Many families who used to be just getting by are now better off because of the additional income. But it also depends on the mining results." (interview, May 14, 2026)*

This shift in work orientation was also strongly felt among the younger generation of Kayuboko Village. Khusnul Khatima observed that young people's attitudes toward work had changed significantly:

> *"Nowadays most young people are more interested in the mine because it's seen as a way to earn money quickly. In the past, many followed their parents to farm or help in the plantation, but now most prefer to work in the mine... The mine has now become the main option for young people in this village. Farming is becoming less attractive because it's seen as slow to yield results." (interview, May 10, 2026)*

Dayat, who is part of this younger generation, reinforced this observation from his own perspective and that of his peers:

> *"Young people these days mostly choose the mine because it generates money faster. Farming is seen as taking too long to show results and is sometimes less appealing to young people. Many of my friends prefer the mine because they can get income directly." (interview, May 11, 2026)*

At the level of broader impact, observation of residents' activities showed that patterns of social interaction had shifted; communal gathering activities that previously occurred largely in the paddy fields during the morning and evening were now more frequently observed around the village's kiosks and market, in line with the increasing local economic turnover. Kayuboko Village itself was recorded as having one market unit and twelve kiosks supporting residents' daily trading activities. Vegetable trader Atika confirmed this economic impact based on her observation of residents' shopping patterns:

> *"Since the mine developed, there are sometimes more buyers because money circulation in the village has increased. Goods also sell better. But if agriculture keeps declining, we are also worried because the plantation yields could be affected." (interview, May 15, 2026)*

The Village Head of Kayuboko affirmed that the mine's impact is twofold for the village, encompassing both economic improvement and new social challenges:

> *"Since the mine developed, the community's economy has indeed changed. Many residents who previously depended only on farming now have the opportunity for faster income from the mine. Some community members have experienced economic improvement, such as being able to renovate their homes or better meet their family's needs. But on the other hand, we also see social change, such as people being busier with work and agriculture receiving less attention." (Samrun Latjari, interview, May 15, 2026)*

This observation was further corroborated by Mahmud from the perspective of a farmer who directly experiences the pressure on his agricultural sector:

> *"Mining does help the community's economy, but many farmers now focus more on the mine. The paddy fields are becoming neglected. If this continues, farming could decline even further." (interview, May 15, 2026)*

As a closing remark on this set of findings, one informant, Muhammad Ma'arif, noted the need for comprehensive management of mining impacts rather than a short term orientation alone:

> "*Mining does improve the economy and open up job opportunities, but its impact on the environment, agriculture, and community social life must still be taken into account. If not managed properly, it could create new problems.*" *(interview, May 15, 2026)*

Overall, the combination of interview, observation, and documentation data illustrates the process of socio-economic transformation in Kayuboko Village, shifting from an agrarian-based community toward a community with more diverse economic orientations, as summarized in Table 1.

Table 1
Summary of Changes in the Socio-Economic Conditions of Paddy Farmers in Kayuboko Village

Aspect	**Before Mining (pre-2017)**	**After Mining (2017–present)**
Primary livelihood	Paddy farmers and plantation cultivators	Partly shifted to / divided time with mining
Nature of income	Seasonal, tied to harvest periods	Faster to obtain, but fluctuating
Paddy field management	Intensive, the main focus	Reduced intensity for some
Social patterns	Strong mutual cooperation (gotong royong) in farming activities	Reduced intensity of mutual cooperation
Younger generation's interest in farming	High, following parents into farming	Declining, more attracted to mining work

Source: Interview, observation, and documentation data, 2026

Discussion

The findings of this study indicate that the presence of gold mining in Kayuboko Village produces impacts consistent with the concept of impact as proposed by Retnoningsih (2011) and Armita (2023), namely consequences that can be simultaneously positive and negative, depending on how an action is carried out and the context in which it occurs. Increased income, improved housing conditions, and the emergence of new economic opportunities in Kayuboko Village represent positive impacts, while the reduced intensity of paddy field management, the weakening of cooperation (gotong royong), and the shifting orientation of the younger generation away from agriculture constitute the accompanying negative impacts. This duality reinforces Kuyek, (2019) view that mining is never truly environmentally benign or socially neutral it inevitably affects the economic order, lifestyle, and cultural continuity of local communities, regardless of the scale of its operation (Githiria & Onifade, 2020). Such duality of impact is not, in itself, a novel phenomenon in studies of artisanal and small scale mining in Indonesia; however,

the manner in which this duality concretely manifests at the household level as reflected in the time division strategy between paddy farming and mining constitutes an empirical contribution that enriches the understanding of the concept of impact itself.

The pattern of livelihood shift identified in Kayuboko Village in which residents divide their time between farming and mining rather than abandoning agriculture entirely shows similarity with the findings of Ramlah et al. (2019) in Rau-Rau Village, Bombana, which likewise recorded that gold mining increased income and opened business opportunities without immediately eliminating the existence of the agricultural sector. However, this study also reveals a different nuance: the shift in Kayuboko is strongly driven by age related demographic factors, with the younger generation considerably more attracted to mining than older generations. This condition demonstrates that livelihood transformation due to mining is not homogeneous across all community groups, but rather stratified by age and life stage a dimension that has not been extensively articulated in the studies of (Brain, 2017; Huntington & Marple-Cantrell, 2022; Maconachie, 2017)

Viewed through the lens of sustainable livelihood theory, the pattern observed in Kayuboko can be understood as a livelihood diversification strategy, in which households do not fully replace one source of livelihood with another but instead combine both to minimize risk. Such a strategy is commonly found among agrarian communities facing new but uncertain economic opportunities; households tend to retain their existing livelihood asset (paddy fields) as a form of informal insurance, while simultaneously utilizing the new livelihood asset (mining) to accelerate short term income. This pattern differs from the findings of Ma'mun (2016) in Bombana, which instead showed significant loss of livelihood assets without a successful diversification strategy, possibly because the scale of land degradation in that location had already exceeded households' adaptive capacity.

Regarding the sustainability of farming enterprises, the finding of declining intensity in paddy field management in Kayuboko Village is relevant to the research results of Dondo and Palar (2021) and Ma'mun (2016), both of which identified that mining expansion leads to a decline in the area and productivity of agricultural land. However, an important difference exists in the underlying mechanism. In Ma'mun's (2016) study in Bombana, the decline in agricultural production resulted from physical land damage reduced paddy field area and drought caused by mining activity itself. In contrast, in Kayuboko Village, the decline in field upkeep was caused more by the reallocation of labor and farmers' attention rather than by direct land damage; the paddy fields observed as poorly maintained in this study were generally still physically cultivable but were neglected because their owners chose to prioritize their time and energy for mine work.

This difference in mechanism is theoretically significant, as it demonstrates that the "sustainability of paddy farming enterprises" can be disrupted through two distinct pathways: an ecological physical pathway (land damage, as in Bombana) and a socio-economic pathway (labor reallocation and shifting priorities, as in Kayuboko). This finding contributes a new perspective, suggesting that mining's impact on agriculture need not always occur through direct environmental damage, but can also occur through a subtler mechanism involving competition for household labor allocation. The implication is that policy interventions focused solely on controlling physical environmental damage such as land reclamation or restrictions on mining areas would be insufficient to safeguard agricultural sustainability in areas like Kayuboko. Policies addressing labor allocation are also needed, for instance through economic incentives that keep farming competitive in terms of time and yield relative to mining, so that farmers are not driven to abandon their paddy fields purely out of short-term labor-efficiency considerations.

The change in paddy farmers' income structure before and after working as miners, as found in this study, reinforces the concept of socio-economic conditions proposed by Soekanto (2012) and Bintarto (1977), who position occupation type and income level as two primary indicators of an individual's socio-economic status. The shift from seasonal income dependent on harvest yields toward faster but more fluctuating mining income illustrates a simultaneous change in both indicators. This finding aligns with the results of Gumanti's (2024) study in Nagari Padang Sibusuk, which also recorded significant income increases following the conversion of paddy fields into gold mines, including for supporting occupations such as motorcycle taxi drivers and cooks.

Nevertheless, this study offers a critical observation not extensively emphasized in Gumanti's (2024) research: income gains from mining are unstable and vulnerable to fluctuations in mining output itself, meaning that the welfare improvements observed may be temporary in nature unless accompanied by sound household financial management strategies. This reinforces the warning of Saptawartono et al. (2024) that communities who have abandoned the agricultural sector will face difficulty returning to their former occupation should mining activity cease or decline a structural risk that remains undetected if research focuses solely on income gains without considering their sustainability dimension. From the perspective of household economic resilience, the dual income pattern (farming and mining) found among the majority of informants in this study effectively functions as a risk-mitigation mechanism against the volatility of mining income itself; households that maintain their paddy fields, even at reduced intensity, possess an economic buffer that households fully shifted to mining do not have.

The overall impact of gold mining on the social life of the Kayuboko Village community particularly the reduced intensity of mutual cooperation and the

shifting pattern of social interaction from the paddy fields to the village's trading center shows a pattern that partly resonates with the findings of Siregar et al. (2021) in Muara Soma, Batang Natal, who identified the potential for social conflict and shifts in values and norms resulting from the influx of migrants into mining areas. In the case of Kayuboko, this dynamic appears more moderate; the observed social changes tend to involve a shift in the rhythm and space of residents' interaction itself (from the paddy fields to kiosks and the market), rather than open conflict between local residents and migrants. This difference in intensity may be interpreted as contextual variation possibly influenced by the scale of the mine, its relatively recent presence (since 2017), or an ownership structure in which residents themselves are employed as workers, rather than the workforce being dominated purely by outside migrants.

The reduced intensity of cooperation found in this study can also be read through the lens of social capital. Gotong royong has long functioned as a social capital mechanism sustaining collective farming activity, ranging from shared irrigation management to labor assistance during planting and harvest seasons. As a substantial portion of the village's productive labor force shifts toward mining activity, which is individualistic and oriented toward daily wages, this collective social capital risks gradual erosion. The implications are not merely social but also economic: farmers who remain in the paddy fields also lose access to the communal labor they could previously rely upon, such that agricultural production costs may indirectly rise due to the necessity of hiring wage labor as a substitute.

By connecting these overall findings to the study's conceptual framework (input-process-output), it can be inferred that gold mining activity, as an input, has triggered a process of change across two interwoven dimensions social conditions and economic conditions which ultimately produces an output in the form of a comprehensive transformation among Kayuboko Village's paddy farmers: from a group entirely dependent on agrarian output to a group that is economically more diversified yet also more vulnerable to the fluctuations of a non-renewable natural resource. This transformation carries important implications for the village's long-term food security. Paddy fields in Kayuboko Village function not only as a source of individual farmers' income but also as part of a local food system sustaining rice availability for the broader village community. Should the declining trend in paddy field management intensity continue without intervention, the village risks shifting from a position of local food surplus toward greater dependence on rice supplies from outside the village a consequence that may not be immediately apparent in the short term but carries significant potential implications in the long run.

The originality of this study lies in revealing that this transformation process does not occur in binary fashion (complete shift or complete retention of farming), but rather through a gradual adaptive strategy involving the division of household

time and labor allocation between the two sectors a pattern that offers a richer nuance than the generalized notion of "livelihood shift" commonly found in the literature on gold mining's impact on farming communities. This study further underscores that mining's impact on agriculture can occur through a non-physical pathway (competition over labor allocation and social capital), which has thus far received less attention compared to the physical pathway (land damage and pollution) in studies of gold mining's impact on paddy farmers in Indonesia.

Nonetheless, this study has limitations in terms of measurement; observations of housing and land conditions are descriptive and indicative in nature and are not yet supported by standardized quantitative data on the precise extent of neglected land or exact income figures, such that generalization of these findings should be made with caution and ideally verified through follow-up research that combines qualitative approaches with more systematic quantitative measurement.

Conclusion

The transformation of rice farmers' livelihoods in Kayuboko Village due to gold mining activities did not occur in a binary manner but rather through a gradual adaptation strategy involving the division of time and the allocation of household labor between the agricultural and mining sectors. A relatively surprising finding that emerged only after the research was conducted is that the declining maintenance of rice fields in Kayuboko is not primarily caused by physical land degradation resulting from mining activities. Instead, it is largely driven by the reallocation of household priorities and labor, as farmers increasingly focus their attention on mining because it is perceived to provide faster financial returns, while the abandoned rice fields remain physically suitable for cultivation. Furthermore, this livelihood shift is strongly stratified by age, with younger generations being far more inclined to abandon agrarian orientations than older generations. This situation indicates a potential farmer succession crisis in the future if the current trend continues without intervention.

This study contributes to academic discourse by challenging a common generalization in research on the impacts of gold mining on farming communities, which often positions environmental degradation as the sole primary pathway through which agriculture is weakened. The findings offer a new perspective, demonstrating that the sustainability of rice farming can also be undermined through more subtle socio-economic mechanisms, namely competition for household labor allocation and the erosion of social capital based on mutual cooperation, even in the absence of direct ecological damage. At the same time, the study confirms the existence of increased income and new economic opportunities generated by gold mining activities. However, it also provides a critical insight that these economic gains are highly fluctuating and may pose structural risks to the long term sustainability of household livelihoods.

Several limitations should be considered when interpreting and utilizing the findings of this study. First, the research was limited to a single case study location, namely Kayuboko Village; therefore, the generalization of the findings to other artisanal gold mining communities in Indonesia should be approached with caution, given variations in local contexts, mining scales, and ownership structures that may influence impact patterns. Second, observational data concerning land conditions and housing were descriptive and indicative in nature and were not supported by systematic quantitative measurements, such as the precise extent of abandoned farmland or accurately measured household income levels. Third, the study did not capture long-term perspectives through a longitudinal approach, considering that mining activities in Kayuboko only began in 2017. Future studies are therefore recommended to integrate qualitative approaches with more systematic quantitative measurements, expand research coverage to several artisanal gold-mining villages with different characteristics, and examine longitudinally how the dual adaptation pattern between farming and mining evolves over time, particularly under scenarios in which mining activities decline or cease. Such research would contribute to the formulation of more effective resource management policies aimed at ensuring the economic and food-security sustainability of similar rural communities.

REFERENCES

Ayuk, E., Pedro, A., Ekins, P., Gatune, J., Milligan, B., Oberle, B., Christmann, P., Ali, S., Kumar, S. V., & Bringezu, S. (2020). *Mineral Resource Governance in the 21st Century: Gearing extractive industries towards sustainable development*. International Resource Panel, United Nations Envio, Nairobi, Kenya.

Basir-Cyio, M., Isrun-Baso, M., Nakazawa, K., Mahfudz-Muchtar, T., Napitupulu, M., Anshary, A., Rauf, R. A., & Laude, S. (2020). The effect of traditional gold mining to land degradation, mercury contamination and decreasing of agricultural productivity. *Bulgarian Journal of Agricultural Science*, *26*(3), 612–621.

Bintarto, R. (1977). Pengantar geografi sosial. Yogyakarta: UP Spring

Brain, K. A. (2017). The impacts of mining on livelihoods in the Andes: A critical overview. *The Extractive Industries and Society*, *4*(2), 410–418. https://doi.org/10.1016/j.exis.2017.03.001

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches*. SAGE Publications.

Darna, N., & Herlina, E. (2018). Memilih metode penelitian yang tepat: Bagi penelitian bidang ilmu manajemen. Jurnal Ekonologi Ilmu Manajemen, 5(1), 1–6.

Dedrick, J., Gurbaxani, V., & Kraemer, K. L. (2003). Information technology and economic performance: A critical review of the empirical evidence. *ACM Computing Surveys (CSUR)*, *35*(1), 1–28. https://doi.org/10.1145/641865.641866

Dimitropoulos, J. (2007). Energy productivity improvements and the rebound effect: An overview of the state of knowledge. *Energy Policy*, *35*(12), 6354–6363. https://doi.org/10.1016/j.enpol.2007.07.028

Eswaran, H., Lal, R., & Reich, P. F. (2001). Land degradation: An overview. In *Response to Land Degradation*. CRC Press.

Fatihudin, D. (2015). Metode penelitian untuk ilmu ekonomi, manajemen dan akuntansi. Sidoarjo: Zifatama Publisher.

Feng, T., Xiong, R., & Huan, P. (2023). Productive use of natural resources in agriculture: The main policy lessons. *Resources Policy*, *85*, 103793. https://doi.org/10.1016/j.resourpol.2023.103793

Githiria, J. M., & Onifade, M. (2020). The impact of mining on sustainable practices and the traditional culture of developing countries. *Journal of Environmental Studies and Sciences*, *10*(4), 394–410. https://doi.org/10.1007/s13412-020-00613-w

Hossain, A., Krupnik, T. J., Timsina, J., Mahboob, M. G., Chaki, A. K., Farooq, M., Bhatt, R., Fahad, S., & Hasanuzzaman, M. (2020). Agricultural Land Degradation: Processes and Problems Undermining Future Food Security. In S. Fahad, M. Hasanuzzaman, M. Alam, H. Ullah, M. Saeed, I. Ali Khan, & M. Adnan (Eds), *Environment, Climate, Plant and Vegetation Growth* (pp. 17–61). Springer International Publishing. https://doi.org/10.1007/978-3-030-49732-3_2

Huntington, H., & Marple-Cantrell, K. (2022). The importance of artisanal and small-scale mining for rural economies: Livelihood diversification, dependence, and heterogeneity in rural Guinea. *Journal of Rural Studies*, *94*, 177–191. https://doi.org/10.1016/j.jrurstud.2022.06.004

Kuyek, J. (2019). *Unearthing justice: How to protect your community from the mining industry*. Between the Lines.

Labonne, B. (1999). The mining industry and the community: Joining forces for sustainable social development. *Natural Resources Forum*, *23*(4), 315–322. https://doi.org/10.1111/j.1477-8947.1999.tb00919.x

Litvinenko, V. S. (2020). Digital economy as a factor in the technological development of the mineral sector. *Natural Resources Research*, *29*(3), 1521–1541.

Maconachie, R. (2017). Navigating the intergenerational divide? Youth, artisanal diamond mining, and social transformation in Sierra Leone. *The Extractive Industries and Society*, *4*(4), 744–750. https://doi.org/10.1016/j.exis.2017.05.006

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook. 3rd*. Thousand Oaks, CA: Sage.

Ma'mun, S. R. (2016). Pertambangan emas dan sistem penghidupan petani: Studi dampak penambangan emas di Bombana Sulawesi Tenggara. Sodality: Jurnal Sosiologi Pedesaan, 4(1).

Novendra, M. D., Lesawengen, L., & Kandowangko, N. (2021). Aktivitas pertambangan dan perubahan sosial masyarakat. Jurnal Ilmiah Society, 1(1).

Ramlah, Bahtiar, & Yusuf. (2019). Dampak keberadaan tambang emas terhadap kondisi sosial ekonomi masyarakat petani (Studi di Desa Rau-Rau Kecamatan Rarowatu Kabupaten Bombana). Neo Societal: Jurnal Ilmu Sosial, 4(4), 954–961.

Reilly, J. M. (2012). Green growth and the efficient use of natural resources. *Energy Economics, Green Perspectives*, *34*, S85–S93. https://doi.org/10.1016/j.eneco.2012.08.033

Salim, H. S. (2013). Hukum pertambangan di Indonesia. Jakarta: RajaGrafindo Persada.

Silalahi, U. (2006). Metode penelitian sosial. Bandung: Unpar Press.

Soekanto, S. (2012). Sosiologi suatu pengantar. Jakarta: RajaGrafindo Persada.

Sugiyono. (2013). Metode penelitian kuantitatif, kualitatif, dan R&D. Bandung: Alfabeta.

Schwartz, F. W., Lee, S., & Darrah, T. H. (2021). A Review of the Scope of Artisanal and Small-Scale Mining Worldwide, Poverty, and the Associated Health Impacts. *GeoHealth*, *5*(1), e2020GH000325. https://doi.org/10.1029/2020GH000325

Sugiyono. (2017). *Metode penelitian pendidikan: (Pendekatan Kuantitatif, Kualitatif dan R & D).* Alfabeta.

Sugiyono. (2021). *Metode penelitian kualitatif, kuantitatif, dan R&D*. Alfabeta.

Widana, A. (2019). *The Impacts of Mining Industry: Socio-Economics and Political Impacts* (SSRN Scholarly Paper No. 3423562). Social Science Research Network. https://doi.org/10.2139/ssrn.3423562

Yin, R. K. (2018). *Case study research and applications* (Vol. 6). Sage Thousand Oaks, CA.