

Breaking The Natural Resource Curse: How The Gig Economy Can Transform Indonesia's Mining Regions

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Abstract

Mining regions in Indonesia face a paradox: abundant natural resources do not automatically translate into improved local welfare. Although extractive and processing sectors contribute significantly to regional economies, a generous part of the local workforce stays in the informal sector, lacking social protection, fair wages, or clear career pathways. This situation exemplifies the natural resource curse, where economic growth does not necessarily improve the quality of life for communities. This study offers a novel perspective by exploring the gig economy as a strategy to overcome the resource curse. Flexible work, including transportation, catering, digital logistics, mining subcontracting, and local e-commerce, offers opportunities to expand employment and diversify income sources. However, significant barriers such as limited digital access, low skill levels, and geographic remoteness constrain labor-market connectivity.

With the available fiscal space, the Natural Resource Revenue Sharing Fund (DBH SDA) could be optimally used for community empowerment and social protection programs. Using a mixed-methods approach, combining quantitative analysis with qualitative literature review, the study identifies practical intervention pathways: developing digital platforms that connect mining companies with flexible workers, distributing DBH SDA for skills training, certification and digital infrastructure, and strengthening social protection through flexible contracts and policies prioritizing local vendors. Findings suggest that, with a supportive ecosystem, fiscal instruments, and social protection, the gig economy is more than a transient trend. It represents a concrete strategy for economic diversification and improving living standards in mining regions, turning labor flexibility into a driver of sustainable development and a promising pathway to break the resource curse.

Keywords: gig economy, resource curse, DBH SDA, mining regions, economic inclusion.

1. Introduction

Indonesia is among the world's most resource-rich nations. Abundant reserves of coal, oil, gas, nickel, cobalt, and bauxite have long supported national economic growth and constituted a major source of revenue for both central and regional governments. Ideally, such abundance should generate broad-based and sustainable prosperity. In practice, however, many resource-rich regions remain trapped in poverty, inequality, and low economic diversification—a paradox described by Gelb as the “resource curse” (Auty, 2001; Gelb, 1988; Sachs & Warner, 2001).

The resource curse emerges when dependence on extractive industries hampers structural transformation. Mining booms often displace other productive sectors such as agriculture and manufacturing, inducing the well-known Dutch Disease effect (Corden & Neary, 1982). Despite more than two decades of fiscal decentralization, this paradox persists in Indonesia. The mining and processing sectors contribute roughly one-third of national GDP (BPS, 2024), yet poverty and inequality remain pronounced, particularly in extractive-based provinces such as Riau Islands, Papua, West Papua, Central Sulawesi, North Maluku, Central Kalimantan, South Kalimantan, and East Kalimantan.

Empirical evidence reinforces the persistence of the resource curse across Indonesia's mining regions. Rahma et al. (2021) demonstrate that mineral-rich provinces exhibit stronger symptoms of the curse compared to non-mining regions, reflecting limited progress in broader economic development. In East Kalimantan, Hilmawan et al., (2016) found that coal mining profits are concentrated among urban elites and capital owners, while local workers gain minimal benefit. Similarly, Hajad et al., (2023) highlight how unequal resource revenue distribution intensifies spatial inequality and rural poverty, eroding the promise of resource-based prosperity.

To address these disparities, the Indonesian government introduced the Revenue Sharing Fund (Dana Bagi Hasil, DBH) to redistribute a portion of extractive income to producing regions. Over the past five years, DBH allocations have risen from IDR 103.98 trillion in 2019 to IDR 151.55 trillion in 2024 (Ministry of Finance, 2025). Yet, improvements in welfare indicators remain modest. Persistent unemployment and the weak development of non-mining sectors suggest that fiscal redistribution alone is insufficient. A new approach is required—one that transforms fiscal resources into drivers of inclusive, labor-intensive, and digitally enabled growth.

Digital transformation and demographic change have created such an opportunity. Indonesia's growing young population and increasing use of online platforms have given rise to flexible employment known as the gig economy (Permana et al., 2023; Pratomo et al., 2024). Gig workers, also called “on-demand” workers, are individuals who provide services only when required, rather than under fixed employment arrangements (Prestianawati et al., 2023). Emerging around 2015, the gig economy has become an integral feature of urban labor markets, particularly among Generation Z and Millennials (Nugroho et al., 2023). Studies show that the gig economy can alleviate poverty and provide alternative employment solutions (Burtch et al., 2018; Thompson, 2018; Tolba, 2021; Kayu et al., 2019, in Prestianawati et al., 2023), though its flexibility also entails risks of unstable income and limited social protection (Pratomo et al., 2024).

Globally, the gig economy has also been recognized for its potential to support sustainable development. Research highlights its role in green logistics in Chile (Ojeda-Pereira, 2025), labor market reform in Ukraine (Mykolaiets et al., 2025), and low-carbon mobility in Paris (Krier et al., 2022). Liu et al. (2023) further demonstrate that digital labor platforms can enhance energy efficiency and reduce carbon emissions. Nevertheless, the role of the gig economy in resource-dependent regions, particularly within developing countries, remains underexplored.

This study bridges two major strands of literature, the resource curse and the digital labor economy, by examining whether the gig economy can serve as an endogenous mechanism to reduce dependency in Indonesia's mining regions. This perspective aligns with Zalitzko et al., (2022), who emphasize the potential of digital labor to strengthen socio-economic resilience and create sustainable livelihoods in extractive contexts. By leveraging regional fiscal space to support digital infrastructure, vocational certification, and platform-based entrepreneurship, resource-rich provinces can diversify their economic base and reduce vulnerability to commodity price fluctuations.

Theoretically, this paper draws on Lewis (1954) model of structural transformation and Graham et al.'s (2017) digital labor framework. The Lewis model highlights the importance of shifting labor from low-productivity traditional sectors to more productive modern sectors as the foundation of inclusive growth. Graham et al. extend this logic to the digital era, showing how online labor platforms can generate new economic opportunities while simultaneously producing new forms of inequality if not accompanied by adequate social protections. In this context, the gig economy represents a contemporary form of structural transformation—where digitalization expands employment opportunities beyond formal sectors and serves as a potential instrument for economic diversification in resource-dependent economies.

This paper has three main objectives: (i) to evaluate fiscal performance and welfare outcomes in resource-rich provinces to identify empirical patterns of the resource curse; (ii) to explore the potential of the gig economy in creating employment and entrepreneurship opportunities in mining regions; and (iii) to propose a fiscal policy framework that links intergovernmental transfers, particularly DBH, with the development of local digital labor ecosystems. By combining panel data analysis with a systematic review of digital labor studies, this research contributes to the discourse on regional transformation and inclusive digitalization. The findings are expected to inform fiscal strategies that promote more inclusive and sustainable economic growth in Indonesia's resource-rich regions.

2. Research method

This study employs a mixed-methods approach, integrating quantitative and qualitative analyses to explore how fiscal policy can drive structural transformation through the development of gig-based economic activities in Indonesia's mining regions. This approach is adopted because the phenomenon of the resource curse is not solely a matter of fiscal allocation, but also involves institutional dynamics, rigid labor market structures, and unequal adoption of digital technologies. As emphasized by As Creswell & Clark (2018), complex socio-economic phenomena require a convergent framework that combines empirical measurement with contextual interpretation to achieve a holistic understanding.

The research applies a convergent parallel design, in which quantitative and qualitative analyses are conducted simultaneously, and their findings are integrated during the interpretation stage. The quantitative component empirically examines the extent to which regional fiscal capacity, measured through DBH SDA affects welfare outcomes in resource-rich provinces. It also investigates whether signs of a resource curse are evident in provinces heavily dependent on extractive industries.

All data used are secondary, obtained from the Ministry of Finance and Statistics Indonesia (BPS) for the period 2017–2024. The econometric analysis employs a panel data regression using EViews 13 software. After conducting several specification tests, the Fixed Effect Model (FEM) was selected as the most statistically consistent and theoretically appropriate specification, as it captures the unique structural heterogeneity across provinces, particularly variations in fiscal capacity and socio-economic dynamics among mining regions. The estimated model is expressed as follows:

$$Poverty_{it} = \alpha + \beta_1 \ln(DBH_{it}) + \beta_2 \ln(GRDP_{it}) + \beta_3 Gini_{it} + \beta_4 Unemploy_{it} + \beta_5 Informal_{it} + e_{it} \quad (1)$$

Where:

$Poverty_{it}$: poverty rate in province i at time t ;

$\ln(DBH_{it})$: natural logarithm of natural resource revenue sharing fund;

$\ln(GRDP_{it})$: natural logarithm of Gross Regional Domestic Product per capita;

$Gini_{it}$: income inequality index (Gini Coefficient);

$Unemploy_{it}$: open unemployment rate; and

$Informal_{it}$: share of informal employment

All continuous variables are expressed in logarithmic or ratio form to normalize distributions and facilitate elasticity interpretation. The analysis focuses on eight provinces, Riau Islands, East Kalimantan, South Kalimantan, Central Kalimantan, Central Sulawesi, North Maluku, Papua, and West Papua, whose economic growth is predominantly driven by mining and mineral processing sectors, as reflected in their 2024 GRDP structure.

To ensure model robustness, several diagnostic tests were conducted, including the Variance Inflation Factor (VIF) to detect multicollinearity, the F-statistic to test overall model significance, and the R^2 value to assess explanatory power. The log-linear specification mitigates heteroskedasticity and allows proportional interpretation between fiscal and welfare variables.

The qualitative analysis complements the regression results by unpacking the mechanisms underlying the fiscal–welfare relationship. It explores how the gig economy may function as a new channel for fiscal redistribution, expanding employment and digital entrepreneurship opportunities in mining regions. This inquiry draws upon literature reviews, policy document analysis, and empirical reports focusing on three key dimensions: (1) the direction and quality of fiscal redistribution, (2) the emergence of digital labor markets, and (3) institutional and corporate readiness to leverage resources for human capital and digital transformation.

Integration of quantitative and qualitative findings is achieved through a meta-inference process (Tashakkori & Teddlie, 2010), which synthesizes empirical patterns with institutional insights and local contextual understanding. The regression results identify the effectiveness of fiscal transfers in reducing poverty and inequality, while the qualitative component elucidates the structural transformation mechanisms enabled by gig work and digital entrepreneurship.

This methodological framework not only examines the persistence of the resource curse but also proposes a more inclusive fiscal policy design through digital-based economic diversification. The

logical sequence of the conceptual and empirical framework is presented visually in the following research framework diagram.

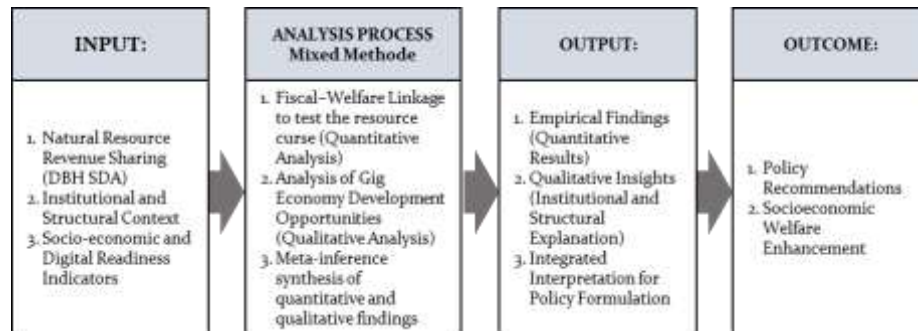


Figure 1. Conceptual Framework of the Study

Source: Author's elaboration, 2025

3. Results and Discussion

3.1. Fiscal Performance and Welfare Outcomes in Resource-Rich Regions

This section examines the relationship between fiscal performance and welfare outcomes in Indonesia's resource-rich provinces. It assesses how revenue sharing from natural resources (DBH SDA) contributes to poverty reduction, inequality alleviation, and labor formalization. By combining descriptive and regression analyses, this section highlights interprovincial disparities and evaluates whether fiscal abundance derived from extractive industries translates into tangible welfare improvements or instead reflects the persistence of the resource curse.

3.1.1. Descriptive Analysis of Fiscal and Welfare Indicators

The trajectory of DBH SDA over the period 2017–2024 demonstrates a highly volatile pattern, largely shaped by fluctuations in global commodity prices and domestic fiscal policy adjustments. Nationally, DBH SDA rose from IDR 34.6 trillion in 2017 to IDR 61.7 trillion in 2019, before declining temporarily in 2020–2021 due to the economic shock triggered by the COVID-19 pandemic. As global commodity prices surged during the post-pandemic recovery—an episode commonly referred to as a “commodity windfall”, DBH SDA rebounded sharply, reaching IDR 100.8 trillion in 2022 and peaking at IDR 132.4 trillion in 2023. Nevertheless, in 2024, the realization dropped again to IDR 94.5 trillion, reflecting budget consolidation measures and the fiscal prudence accompanying a political transition period.

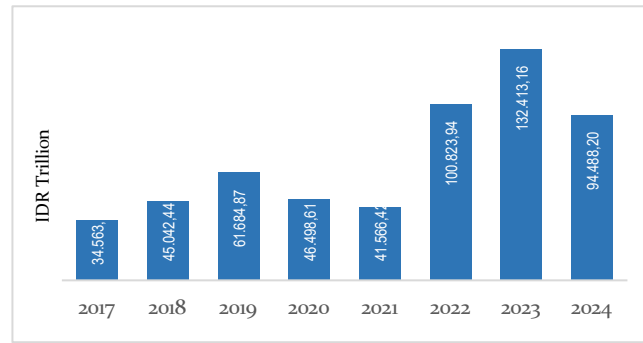


Figure 2. *Trend of National DBH SDA Realization, 2017–2024*

Source: Ministry of Finance (2025)

This national dynamic provides a crucial backdrop for understanding how fluctuations in natural resource revenues are transmitted to the regional level, particularly in provinces endowed with extractive industries. Based on 2024 GDP data, economic growth in the eight provinces examined in this study was predominantly driven by the mining sector and its associated downstream manufacturing industries. These two sectors contributed between 30% and over 50% of total provincial GDP, positioning them as the primary engines of regional economic growth and the largest sources of local fiscal capacity.

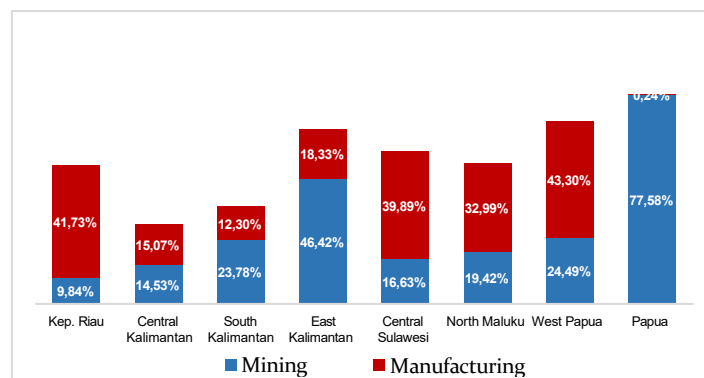


Figure 3. *Provincial Dependence on Mining and Manufacturing Sectors (%), 2024*

Source: Statistic Indonesia (2025)

As shown in Figure 2, there are notable variations in sectoral dependence across provinces. Papua and East Kalimantan rank the highest, with mining contributing 77.6% and 46.4% to their respective GDPs. When manufacturing is included, more than 64% of total output in both provinces originates from extractive activities. Central and South Kalimantan display moderate dependence at around 36–37%, while Riau Islands shows a more diversified structure, where mining and manufacturing together account for less than half of total GDP. These structural differences provide an empirical foundation for examining how the resource curse may manifest differently across subnational economies.

However, fiscal space alone has not translated into broader social welfare improvements in these resource-rich regions. Between 2019 and 2024, there was a persistent disconnect between the size of regional fiscal capacity and the improvement of socioeconomic outcomes. Despite receiving larger DBH SDA allocations than non-producing regions, most provinces recorded only marginal declines in

poverty and inequality, while the share of informal employment remained high. This indicates that broader fiscal space does not automatically resolve the structural disparities inherent in extractive-led growth.

A closer examination, as presented in Table 1, shows that East Kalimantan, receiving an average of over IDR 24 trillion in DBH SDA annually, experienced less than a half-percentage-point decline in poverty. In contrast, provinces with smaller DBH SDA allocations such as South Kalimantan and Riau Islands achieved more equitable outcomes through more diversified economic structures. This comparison raises a fundamental question: is it the magnitude of fiscal transfers or the quality of expenditure that determines progress in economic and social development across regions?

Table 1. DBH-SDA and Welfare Indicators Changes in Mining Provinces, 2019–2024

Province	Avg. DBH SDA (Billion IDR)	Δ Pove rty (%)	Δ Gini Rasio (%)	Δ Infor mal Empl oy (%)	Δ GRDP per Capita (%)
Riau Islands	2,025	-1.02	+0.02 0	-1.92	+5.7
Central Kalimantan	6,187	+0.4 5	-0.031	-1.7	+11.5
East Kalimantan	24,412	-0.40	-0.025	+0.56	+4.9
South Kalimantan	10,41	-0.45	-0.036	-3.26	+6.2
Central Sulawesi	2,847	-2.14	-0.021	+2.46	+10.4
North Maluku	2,446	-0.88	-0.014	+3.07	+8.8
Papua	5,326	-2.87	-0.008	+1.9	+20.9
West Papua	5,429	-2.49	-0.015	+7.67	+32.7

Source: Ministry of Finance, Statistic Indonesia, processed (2025)

What stands out from this trajectory is not merely the absolute increase in DBH SDA, but the fragility of its socio-economic impact. The surge in economic growth—particularly in Central Sulawesi and North Maluku amid the recent nickel boom—indeed drove per capita GDP to rise by more than 8%. Yet, this growth was not accompanied by sufficient formal job creation. On the contrary, the proportion of informal workers increased by two to three percentage points per year, underscoring the limited absorptive capacity of the extractive sector for skilled labor. Consequently, low-skilled workers remain at the periphery of the value chain, benefiting little from the economic expansion.

This pattern suggests that regional revenues derived from mining and downstream industries tend to circulate within narrow local economic linkages, generating limited multiplier effects on broader welfare outcomes. The paradox is even more pronounced in Papua and West Papua. Despite receiving substantial DBH SDA allocations for decades, poverty rates remain persistently high and inequality has barely improved. The Papua case demonstrates that dependence on extractive industries may sustain macroeconomic growth but fails to address the deep-rooted structural socio-economic challenges. This condition is further exacerbated by the poor quality of local public spending, much of which remains absorbed by bureaucratic programs with minimal multiplier effects on local economies.

These findings reaffirm that larger fiscal space in resource-producing regions does not automatically guarantee improved social welfare. The weak correlation between DBH SDA and key social indicators reflects institutional asymmetries, uneven governance capacity, and suboptimal public spending quality across regions. Consequently, this evidence strengthens the argument within the resource curse literature that rising natural resource revenues do not necessarily translate into social progress without effective fiscal governance and high-quality public expenditure.

3.1.2. Regression Analysis of the Resource Curse

Following the descriptive analysis that revealed a persistent mismatch between fiscal abundance and welfare improvement in resource-rich regions, the next step involves empirically examining this relationship through an econometric approach. A panel regression model covering the 2019–2024 period is employed to link natural resource revenue sharing (DBH SDA) with poverty levels, while controlling for GDP per capita, income inequality (Gini ratio), unemployment rate, and the share of informal workers. The objective is to determine whether increases in DBH SDA revenues genuinely contribute to poverty reduction or, conversely, reinforce the symptoms of a resource curse in Indonesia’s mining provinces.

Table 2. Panel Regression Results: Testing the Resource Curse Hypothesis

Variable	Coefficient	t-Statistic	p-Value
ln(DBH SDA)	+0,73	4.12	0.000
ln(GRDP per capita)	−4,46	−6.51	0.000
Gini Ratio	15,63	2.09	0.046
Unemployment Rate	+0,08	0.71	0.483
Share of Informal Employment	+0.03	0.77	0.444
R ²	0.997		

Source: Author’s processed (2025)

The regression results presented in Table 2 indicate that the Natural Resource Revenue Sharing Fund (Dana Bagi Hasil Sumber Daya Alam or DBH SDA) has not produced a significant impact on poverty reduction in resource-rich regions. In fact, the positive and significant coefficient of DBH SDA reveals a fiscal paradox, regions receiving larger natural resource revenues tend to experience higher poverty levels. This finding reinforces the classical resource curse hypothesis, in which natural

wealth does not automatically translate into social prosperity. In practice, much of the revenue from extractive sectors is absorbed by routine expenditures and short-term political interests, rather than being directed toward productive programs capable of expanding local economic opportunities.

This result aligns with Hajad et al. (2023), who found that the economic benefits of resource exploitation in Indonesia remain unevenly distributed, thereby widening inequality and weakening development effectiveness. It is also consistent with the arguments of Kolstad et al. in Rahma (2020) and Narh (2025), who emphasize that weak governance and regulatory capacity often foster rent-seeking behavior and corruption within the mining sector.

Meanwhile, economic growth, proxied by GDP per capita, shows a negative and significant relationship with poverty, suggesting that growth still plays a role in poverty reduction. However, the effect is limited because growth in resource-dependent regions is primarily driven by capital-intensive rather than labor-intensive industries, resulting in constrained formal job creation. This condition mirrors Lewis's (1954) dual-sector theory, which explains how modern sectors may expand rapidly without strong linkages to traditional sectors, ultimately leading to non-inclusive growth.

Furthermore, the positive and significant coefficient of the Gini ratio highlights that higher income inequality hampers poverty reduction. Fiscal space derived from natural resource revenues has not been optimally utilized to strengthen public services such as education and health or to enhance local economic capacities. This reflects a resource trap condition, as described by Sachs & Warner (2001), in which natural wealth becomes locked within weak institutional systems and unproductive government spending.

Taken together, these findings suggest that the persistence of the resource curse in Indonesia is largely rooted in structural weaknesses of fiscal governance and institutional capacity. First, many local governments still lack adequate planning and budgeting capabilities, leading to fragmented and result-insensitive allocations of DBH funds. Second, the limited quality of bureaucracy and weak integrity of local leadership undermine the effectiveness of extractive revenue utilization. As Rahma (2020) highlights, the integrity of regional leaders, transparency in mining licenses, and effective regulatory enforcement are critical factors determining regional vulnerability to the resource curse. Third, the enclave nature of the mining industry restricts local economic spillovers. Rahma et al. (2021) demonstrate that the resource curse is more evident at the provincial level than at the national level, particularly in regions heavily dependent on extractive industries. Similarly, Narh (2025) argues that overly centralized natural resource management and the absence of binding long-term development planning weaken government accountability and open avenues for corruption.

Therefore, increases in DBH transfers will only translate into welfare gains if accompanied by fiscal governance reforms, institutional strengthening, and more inclusive development strategies. Without these reforms, fiscal abundance from natural resources risks perpetuating inequality and deepening structural dependence on extractive economies.

3.2. The Gig Economy as a Bridge for Economic Transformation in Mining Regions

The rapid expansion of the digital economy over the past decade has become a new driver of more inclusive and sustainable growth, including within Indonesia's mining regions. The gig economy, defined as flexible, project-based, and digitally mediated work, has begun to reshape local labor markets traditionally dominated by formal employment in extractive industries.

Unlike the relatively mature urban gig economy, gig activities in mining areas possess distinct characteristics influenced by industrial cycles, worker consumption patterns, and geographically remote settings. The presence of thousands of mine workers with relatively high incomes, alongside supporting communities such as families and migrant laborers, has created strong local demand for digitally enabled services and products. This signals an evolving labor structure that is increasingly adaptive to digitalization, accompanied by a gradual decline in informality across several resource-rich provinces.

According to BPS, most mining provinces experienced a decline in informal employment between 2020 and 2024. For example, South Kalimantan from 60.8 to 41.2 percent, and North Maluku from 66.1 to 54.9 percent. These shifts indicate a transition toward more productive and digitally connected forms of work. Provinces with higher Information and Communication Technology Development Index (ICT-DI) scores, such as Riau Islands (6.80) and East Kalimantan (6.73), tend to record higher average informal incomes than those with lower ICT-DI scores, such as North Maluku (5.68) and Papua (3.56) (Table 3).

Table 3. Labor and Digitalization Indicators in Mining Provinces, 2024

Province	Informal Workers (%)	Informal Income (Rp)	ICT-DI
Riau Islands	28.63	2,878,351	6.80
East Kalimantan	35.89	2,840,815	6.73
Central Sulawesi	47.86	1,686,482	5.93
North Maluku	54.86	1,865,569	5.68
Papua	41.22	2,372,097	3.56

Source: Statistic Indonesia, processed (2025)

These findings align with the literature on economic diversification in resource-based regions (Auty 2001; Sachs & Warner, 2001), emphasizing the need to create alternative growth pathways that reduce dependency on raw commodities. Within this context, the gig economy represents a potential transition mechanism. According to the adaptive economy framework (Brynjolfsson & McAfee, 2016), digital platforms integrate market flexibility with productivity enhancement. The higher a region's digital capacity, the greater its potential for informal workers to transition into more productive and competitive gig occupations.

In general, the mining-region gig economy manifests in two complementary forms. The first is location-based gigs, involving on-site services such as local transport (motorbike taxis, logistics delivery), catering adapted to 24-hour shift patterns, cleaning and laundry services, and temporary accommodation for mine workers. In many mining areas, these activities remain informal and are often coordinated through social networks or messaging apps rather than large digital platforms like Gojek or Grab. The second is remote or online gigs, which are emerging despite limited digital infrastructure. These include professional services in mining consultancy, environmental management, occupational safety, and technical design, facilitated by platforms. Online education, training, and e-commerce are also expanding, providing additional income opportunities for miners' families without requiring migration. The digital creative sector, like photography, mine documentation, and local business promotion, has likewise shown promising potential.

Such opportunities thrive because mining zones constitute captive markets with high purchasing power. Based on BPS, mine workers earn average Rp 5,09 million per month, far exceeding most informal sectors (BPS, 2025). Assuming each mine worker generates demand for three to five gig workers in supporting services, a single site employing 5,000 miners could create 15,000–25,000 new local gig opportunities. Labor market interactions here are distinct, trust and relationship-based, with flexible hours aligning with 24-hour mining operations.

However, global evidence reveals a paradox. While digitalization expands income opportunities, it can also produce a low-skilled labor trap in which workers are absorbed into quick-pay, low-value-added tasks (Huda, 2024). This limits upward mobility and reinforces segmentation within digital labor markets. Unlike advanced economies such as the UK and the US, where the gig economy often engages highly skilled professionals (Wood et al., 2019). In Indonesia, particularly in mining regions, it largely functions as a survival mechanism rather than a source of innovation.

Several structural constraints reinforce this condition: limited access to training and certification, uneven digital literacy across regions, and inadequate social protection schemes for non-standard, fluctuating work arrangements. Income disparities are also evident: younger workers (aged 15–24) earn significantly less than the prime-age group (25–54), reflecting unequal access to higher-value gig opportunities. These patterns challenge the optimistic narrative that digitalization automatically enhances welfare. In resource-dependent regions, without targeted public policy interventions, the gig economy risks reproducing traditional characteristics of the informal sector flexible yet vulnerable.

Nevertheless, the gig economy remains strong potential as a bridge toward more diversified and sustainable local economies. With adaptive policy support, investment in digital infrastructure, human-capital development, and inclusive social protection, the gig economy could evolve beyond an income buffer to become a catalyst for innovation and economic self-reliance in Indonesia's mining regions.

3.3. From the Resource Curse to Inclusive Digital Transformation

Empirical evidence suggests that regions rich in natural resources often experience fiscal space without a corresponding improvement in social and economic well-being. Inequality, dependence on extractive sectors, and high rates of informal employment signal a limited multiplier effect from

resource-based revenues. In this context, the present section synthesizes these findings while exploring digital transformation within the gig economy as an alternative pathway toward inclusive development.

Digital transformation appears poised to bridge the gap between economic growth and equitable welfare in mining regions. Analyses reveal a strong interconnection between digital readiness, workforce structure, and socio-economic indicators. Provinces such as the Riau Islands and East Kalimantan, scoring above six on the ICT Development Index, demonstrate a stronger ability to curb informal employment than regions like Papua and North Maluku, which lag behind in digital capacity. This pattern underscores that digital readiness is not merely a facilitating condition, but a prerequisite for escaping extractive dependency traps and cultivating a more resilient, inclusive gig economy.

The digital divide also clarifies why economic growth in extractive regions does not automatically translate into quality employment. Extractive industries are capital-intensive, employing relatively few workers. When local economies remain heavily dependent on such sectors without adequate diversification, households are often pushed into unprotected informal work. Yet, mining regions hold untapped potential for gig-based employment. Freelancers can contribute across the mining value chain and surrounding areas, on-site or remotely, performing professional and technical roles previously reserved for permanent staff (Table 4).

Table 4. Potential Gig Work Roles in the Mining Sector

Job Category	Type and Role of Gig Work	On-site Basis	Digital/Online Basis
Mining & Quarrying	Geologists, surveyors, exploration technicians, contract heavy-equipment operators	Mining sites or exploration perimeters	Digital mapping, real-time monitoring, geospatial analysis
Construction & Engineering	Contract engineers, equipment maintenance technicians, inspection workers	Mining and production facilities	CAD-based technical design, digital reporting, remote supervision
Occupational Health & Safety	Safety consultants, OHS trainers, risk monitoring officers	Mining sites and operational areas	E-learning modules on OHS, online monitoring systems, incident reporting
Environmental & Energy Services	Environmental consultants, waste analysts, impact assessors	Mining sites and surrounding operational areas	Environmental data analysis, emission visualization, online monitoring dashboards
Transportation & Logistics	Drivers, mineral transport service providers, warehouse operators	Mining areas, ports, and	Inventory tracking, online coordination

Job Category	Type and Role of Gig Work	On-site Basis	Digital/Online Basis
		logistics warehouses	systems, digital route optimization
Information & Communication Technology	Data analysts, application developers, technical writers, IoT specialists	On-site or remote	Big data processing, systems programming, digital visualization
Support & Maintenance Services	Catering providers, cleaning services, equipment maintenance personnel	Mining sites or worker camps	Online scheduling, contract service request systems
Creative & Media Industry	Photographers, videographers, graphic designers, project documenters	On-site or remote	Digital content production, multimedia editing, online project documentation

Source: Compiled from contemporary studies on freelance mining industries and platform-based work, contextualized for mining regions, 2025

The table illustrates that gig opportunities now extend beyond supporting roles to include professional and specialized work requiring advanced skills. Khethisa et al., (2020) highlight that the gig economy offers flexibility, autonomy, and potentially higher income, making it an attractive alternative, particularly in resource-dependent regions.

However, Huda (2024) cautions that these opportunities carry structural risks. The gig economy can trap low-skilled workers in a cycle of temporary employment without career progression, the so-called “low-skilled labor trap”. Limited access to training and continuous learning impedes the transition to more productive work. Such risks may exacerbate digital and social inequalities, especially in mining regions characterized by educational and infrastructural disparities.

Consequently, human capital development emerges as central to leveraging the gig economy inclusively. Governments can reinforce fiscal instruments, particularly DBH SDA to finance vocational training and digital skills enhancement for communities near mining areas. This approach ensures that a portion of resource-based economic gains is converted into human capital. Collaborative program design between government, industry, and educational institutions is crucial to ensure practical, flexible, and labor-market-relevant training (Ode & Arafat, 2025).

Within this economic context, the gig economy serves a dual function. First, it buffers local communities against commodity price volatility by opening alternative income streams. Second, it promotes digital inclusion, allowing those without formal employment to access skill-based work. Local governments can amplify this effect by developing regional digital platforms linking freelancers

with mining companies, contractors, and local SMEs. Such platforms enhance labor market efficiency while extending the local economy into the digital ecosystem.

Yet, digital transformation introduces new challenges. Loow et al. (2019) emphasize that, without careful governance, digitization can generate work pressure, life imbalance, and privacy concerns. Therefore, developing the gig economy should coincide with adaptive social protection measures, such as light-contribution insurance schemes or digitally accessible project savings. These systems not only provide basic security but also sustain workers' participation in the digital economy.

Cross-sectoral synergy is indispensable in strengthening the gig ecosystem. Central governments provide digital infrastructure and connectivity, particularly in remote and underserved areas. Industry contributes through corporate social responsibility initiatives focused on training and local empowerment. Educational institutions offer applied research and curriculum development aligned with digital labor market needs. Collectively, these actors create a workforce adaptable to ongoing economic transformation.

Huda (2024) stresses that bridging the digital divide requires more than infrastructure; an ecosystem of inclusion is essential, encompassing capacity building, social protection, and fiscal incentives. Collaborative strategies must be reinforced with effective public communication (Ode & Arafat, 2025). Communities, especially youth and middle-income groups, need to understand the gig economy as a source of supplementary income and skill enhancement. Experiential training, through short-term internships, community projects, or industry-based assignments, can build confidence and digital readiness among workers.

From a fiscal perspective, DBH SDA can evolve beyond a mere revenue-sharing mechanism into a catalyst for inclusive and sustainable economic development. Provinces like East Kalimantan and the Riau Islands illustrate how digital readiness can amplify fiscal effectiveness in reducing inequality and boosting productivity. In contrast, Papua and North Maluku require an asymmetric approach based on digital capacity, such as a Digital Readiness Grant, linking digital transformation achievements to fiscal transfers. This ensures that regions with lower human capital and infrastructure capacities are not left behind.

The model emphasizes that digital transformation in mining areas is not solely an efficiency tool; it is an instrument for social justice and regional economic resilience. Ultimately, integrating fiscal policy, digital capacity building, and adaptive social protection forms the key to escaping the resource curse. When local workers gain access to digital platforms, relevant training, and social insurance, digital transformation in mining regions can deliver both economic growth and social equity. Coordinated fiscal policies aligned with digital empowerment thus form a bridge from natural resources toward sustainable regional prosperity.

As a synthesis of the analysis on natural resource dependence, digital divides, and the potential of the gig economy, the proposed policy model outlines strategic measures for fostering inclusive development. The model illustrates how the integration of fiscal policy, digital capacity building, and adaptive social protection can function synergistically across government, industry, educational institutions, and society. This approach emphasizes that digital transformation is not merely a tool for

enhancing economic efficiency, but also a means to expand social inclusion, create employment opportunities, and promote economic diversification in resource-dependent regions (see Figure 2).

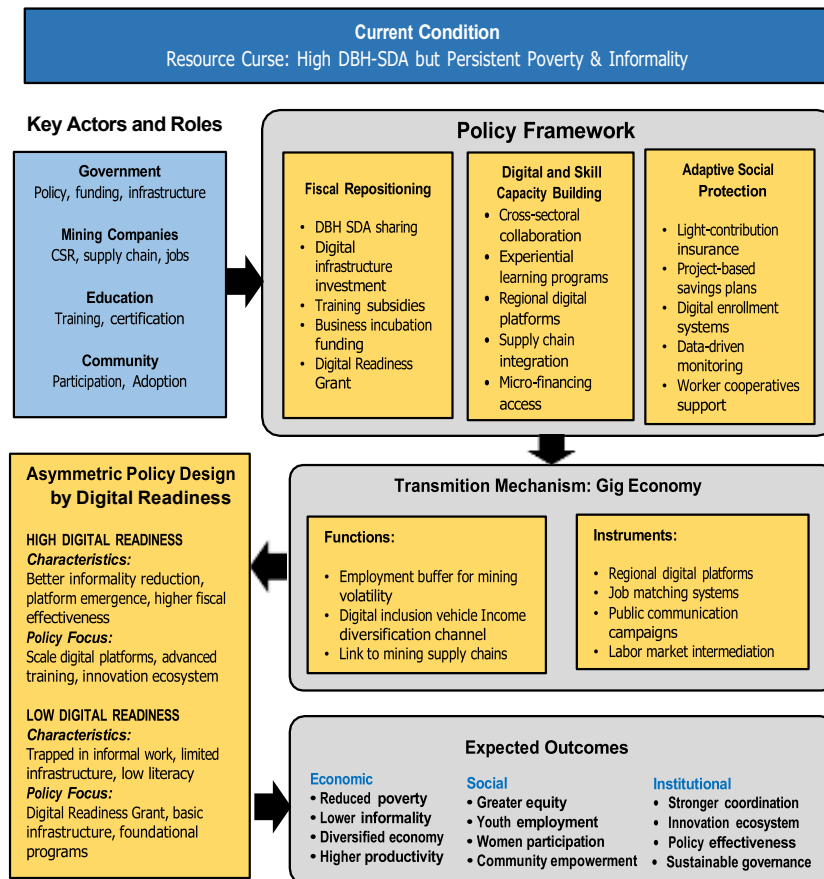


Figure 2. Proposed Policy Model: From Resource Curse to Inclusive Digital Transformation

Source: Author's own elaboration, 2025

The proposed model demonstrates that the success of inclusive digital transformation depends on regional digital readiness, fiscal policy adjustments, and coordinated adaptive social support across sectors. Through the mechanisms of the gig economy, resource-rich regions can convert resource-based revenues into productive employment, economic diversification, and enhanced social welfare. Thus, when strategically integrated with fiscal policy and human capital development, digitalization can transform the resource curse into a pathway toward inclusive and sustainable growth.

4. Conclusion and Recommendations

This study investigates the relationship between natural resource wealth, fiscal performance, and welfare outcomes in mining-based regions, emphasizing how the gig economy, driven by digital transformation, can serve as a bridge toward more inclusive development in resource-rich areas. Both quantitative and qualitative analyses reveal that higher revenue-sharing transfers from natural resources (DBH SDA) do not automatically reduce poverty or improve equity. On the contrary, the

positive and significant correlation between DBH SDA and poverty levels indicates the persistence of a resource curse in provinces whose economies depend on extractive and processing industries. Substantial fiscal space is often directed toward routine expenditures and short-term political priorities rather than productive and social capacity building.

The findings also demonstrate that digital readiness plays a crucial role in shaping the quality of post-extractive growth. Provinces with higher ICT Development Index (ICTDI) scores, such as Riau Islands and East Kalimantan, tend to have lower levels of informal employment compared to Papua and North Maluku. This pattern supports the argument that digital transformation, through infrastructure development, literacy improvement, and gig economy participation, can expand access to more productive and adaptive employment opportunities. Digital readiness thus functions not only as a technological factor but also as an economic and social instrument to address structural failures in converting resource rents into welfare gains.

The study further finds that the gig economy in mining regions holds potential as a mechanism for economic transition. It serves as an employment buffer during commodity price volatility and as a vehicle for digital inclusion among populations previously excluded from formal labor markets. However, realizing this potential requires strategic fiscal policies, stronger human capital development, and adaptive social protection systems that can accommodate nonstandard and informal forms of work.

4.1. Policy Implication and Recommendation

The policy implications of these findings are multidimensional. *First*, fiscal reforms should reposition DBH SDA as a catalyst for development rather than merely a revenue-sharing mechanism. Local governments should earmark part of their resource revenues for investments in digital skills training, platform-based entrepreneurship incubation, and broadband infrastructure in productive areas. The dual use of DBH SDA, as both a fiscal equalizer and a driver of digital transformation, can enhance economic resilience and inclusivity.

Second, both central and regional governments should introduce incentive models linked to digital readiness, such as a Digital Readiness Grant, which ties fiscal incentive allocations to progress in ICTDI indicators. Such a scheme would motivate regions to strengthen their digital infrastructure and literacy as part of a long-term poverty alleviation strategy. *Third*, social protection frameworks for gig workers must be reinforced through flexible, platform-based designs. Policies such as low-cost employment insurance contributions or project-based savings schemes can enhance financial security without undermining work flexibility. Digital systems can also be leveraged to expand coverage and monitor implementation efficiently with minimal administrative cost.

Fourth, cross-sector collaboration is essential. Governments, private sectors, and educational institutions should jointly build an experiential learning ecosystem aligned with the needs of digital labor markets in resource-based regions. This approach links training, work experience, and income opportunities within a single, integrated, and inclusive digital economy framework.

4.2. Limitations and Directions for Future Research

This study faces several limitations related to data coverage and time span, particularly concerning the empirical measurement of the gig economy's contribution to household welfare. Access to micro-level data on gig workers' income in mining areas remains limited. Future research should combine micro-surveys, spatial analysis, and mixed-method approaches to capture the dynamics of the gig economy more comprehensively within local contexts.

Furthermore, the environmental dimension of digital transformation has yet to be thoroughly explored. Future studies should examine how digitalization and the gig economy interact with decarbonization policies and green development agendas in mining regions, ensuring that the digital transition is not only inclusive but also environmentally sustainable.

This study deepens the understanding of how fiscal policy, digital capacity, and social protection can operate synergistically to overcome the resource curse and drive a more equitable economic transformation. By positioning the gig economy as a bridge between digital and fiscal inclusion, this analysis underscores that natural resource wealth becomes meaningful only when translated into sustained human well-being. The findings highlight a new policy direction where fiscal and digital capabilities converge as the foundation for a resilient, innovative, and inclusive future economy.

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