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Resource Linkages, Structural Constraints, and MSME Performance in Mining-Intensive Regional Economies: Evidence from Jharkhand, India.

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ABSTRACT

This paper examines how resource-based structural environments shape the performance of Micro, Small, and Medium Enterprises (MSMEs) in Jharkhand, a mineral-rich Indian state characterized by industrial concentration in mining and metallurgy. Drawing on primary enterprise survey data and district-level secondary indicators, the study employs OLS, Tobit, Difference-in-Differences (DiD), and Propensity Score Matching (PSM) models to analyze turnover growth, employment generation, labour productivity, and enterprise survival across mining and non-mining districts. A novel Resource Linkage Index (RLI) is constructed to quantify firm-level integration into mining supply chains. The results reveal significant regional heterogeneity: while mining proximity confers certain infrastructure and demand advantages, these benefits are conditional on enabling factors including formal credit access, infrastructure quality, and cluster membership. Post-2020 MSME policy reforms have improved formalization and finance access, yet peripheral and informal enterprises remain partially excluded. The study extends Resource-Based View (RBV) and Linkage Theory to sub-national resource economies and offers actionable policy recommendations for inclusive industrial development.

Keywords: *MSMEs, Resource-Based Economy, Jharkhand, Mining Linkages, Enterprise Performance, Regional Disparities, Structural Determinants, Econometric Analysis, India.*

JEL Classification: L25, O18, R11, Q32, O14

1. INTRODUCTION

The relationship between natural resource abundance and industrial development remains one of the most contested questions in development economics. While the 'resource curse' thesis warns that mineral-rich economies often exhibit structural concentration and limited diversification (Sachs and Warner, 1995), Linkage Theory suggests that, under appropriate institutional conditions, extractive

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industries can stimulate upstream and downstream enterprise development (Hirschman, 1958). This tension is acutely visible at the sub-national level in India, where resource-intensive states such as Jharkhand present coexisting patterns of high-output extractive sectors and uneven MSME ecosystem development.

Jharkhand provides approximately 26 percent of India's coal output and is home to major steel and power plants. Despite this mineral wealth, the state displays significant district-level disparities in MSME density, productivity, and survival rates. Mining-dominated districts such as Dhanbad and Bokaro command higher infrastructure investment and industrial output, yet MSME growth in these areas is neither uniform nor reliably superior to that in non-mining districts. This paradox underscores the need for firm-level empirical investigation that moves beyond aggregate industrial output to examine the quality and distribution of enterprise performance.

India's post-2020 MSME policy environment has introduced structural reforms—revised classification thresholds, Udyam digital registration, Emergency Credit Line Guarantee Scheme (ECLGS) expansion, and interest subvention schemes—aimed at promoting formalization, easing credit access, and reducing the disincentive to grow. Yet the effectiveness of these reforms is contingent on the local structural context, which varies sharply across India's states and districts.

This paper addresses four interrelated research objectives: (i) to measure MSME performance across Jharkhand districts using multidimensional indicators; (ii) to construct and estimate a Resource Linkage Index (RLI) capturing firm-level integration with mining supply chains; (iii) to identify structural and institutional determinants of enterprise growth and sustainability; and (iv) to evaluate the effectiveness of post-2020 MSME policy interventions in Jharkhand.

The study makes three contributions. Theoretically, it extends the Resource-Based View and Linkage Theory to a sub-national resource economy context, demonstrating that external resource endowments—not merely internal firm capabilities—constitute meaningful sources of competitive (dis)advantage. Empirically, it provides the first systematic, district-level, firm-level quantitative assessment of MSME performance in Jharkhand. From a policy standpoint, it offers granular, evidence-based recommendations calibrated to structural constraints rather than uniform national prescriptions (Mittal et al., 2022; Kaur and Kumar, 2026).

2. LITERATURE REVIEW AND THEORETICAL FOUNDATIONS

2.1 Resource-Based View and Firm Performance

The Resource-Based View (RBV) posits that sustainable competitive advantage derives from the possession and deployment of resources that are valuable, rare, inimitable, and non-substitutable (Barney, 1991; Wernerfelt, 1984). In the MSME context, the RBV has been applied to explain performance differences across firms in terms of managerial competencies, technological capabilities, and organizational routines (Agyapong et al., 2021; Arbelo et al., 2021; Civelek, 2024). However, the traditional RBV treats resources as primarily internal firm attributes, limiting its applicability to contexts where external structural endowments—proximity to mining operations, availability of raw materials, infrastructure density—constitute critical performance determinants.

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This study extends the RBV by conceptualizing mining-related external resources as potential competitive enablers, mediated by institutional and infrastructural conditions. Consistent with Abid et al. (2023) and Widnyani et al. (2025), we argue that resource bricolage and dynamic capabilities allow firms to leverage contextual resource availability when enabling conditions are present.

2.2 Linkage Theory and Mining-Led Industrialization

Hirschman's (1958) Linkage Theory distinguishes backward linkages (demand for inputs by extractive industries), forward linkages (value-adding processing of raw materials), and fiscal linkages (revenue redistribution through public spending). These mechanisms suggest that extractive activities can catalyze local enterprise development if procurement is localized, raw materials are processed domestically, and fiscal revenues are reinvested in public goods (Crespi et al., 2020).

Empirical evidence on mining spillovers in developing economies is mixed. While Zulu-Chisanga et al. (2020) find that government support and inter-firm collaboration enhance SME performance in resource contexts, Abdullahi et al. (2025) demonstrate that the business environment moderates the translation of resource proximity into performance gains. The key insight is that linkages are not automatic: they depend on the technical capacity of local firms, availability of financing, and procurement policies that incentivize local sourcing (Antara et al., 2025).

2.3 Financial Inclusion and MSME Growth

Access to formal credit is consistently identified as a critical determinant of MSME performance in emerging economies (Frimpong et al., 2022; Ahinful et al., 2023). Informal credit markets, characterized by high interest rates and asymmetric information, constrain investment in technology and capacity expansion. Digital financial inclusion—leveraging mobile payments, GST transaction records, and digital lending—has the potential to reduce information asymmetry and lower transaction costs for small enterprises (Yuwono et al., 2025; Nugroho et al., 2024).

Yet access remains uneven, particularly in resource-intensive peripheral districts where banking infrastructure is limited. The findings of Mittal et al. (2022) suggest that Indian SMEs face a distinctive ecosystem in which structural and regulatory barriers compound financial exclusion, necessitating context-specific interventions rather than uniform credit policy.

2.4 Cluster Development and Agglomeration

Industrial clusters reduce transaction costs, facilitate knowledge spillovers, and provide access to shared infrastructure, collectively enhancing firm-level productivity and survival probabilities (Asamoah et al., 2020; Kustiningsih et al., 2022). In resource-based economies, clusters tend to form around extraction activities, creating both opportunities for MSMEs through supplier networks and risks through dependency on single-sector demand cycles (Dionysus and Arifin, 2020).

The performance benefits of cluster membership are conditioned on internal cohesiveness and institutional intermediation. Clusters with active industry associations, technology support services, and market linkage programs generate stronger productivity and survival outcomes than spatially co-located but organizationally fragmented enterprise groupings.

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2.5 Research Gaps

Despite a growing body of literature on MSME performance in emerging economies, systematic firm-level evidence from resource-intensive sub-national contexts in India remains limited. Existing studies either analyze aggregate state-level industrial performance or focus on MSMEs in non-resource-dependent settings. Critically, no prior study has constructed a quantified resource linkage index at the firm level or evaluated post-2020 MSME reforms in the specific structural context of Jharkhand. This study addresses these gaps.

3. RESEARCH METHODOLOGY

3.1 Research Design

The study adopts a cross-sectional quantitative design with quasi-experimental elements, combining primary enterprise survey data with secondary district-level indicators. A comparative analytical framework distinguishes mining-dominated districts (Dhanbad, Bokaro, East Singhbhum, West Singhbhum) from non-mining districts (Ranchi, Hazaribagh, Giridih, Dumka, Palamu, Gumla). This dichotomization permits examination of structural resource-dependence effects on MSME performance while controlling for district-level covariates.

3.2 Data Sources

Primary data were collected through a structured questionnaire survey administered to 420 registered MSMEs across ten Jharkhand districts, selected via stratified random sampling proportional to district-level MSME density under the Udyam framework. The sample included manufacturing enterprises (fabrication, food processing, light engineering) and service enterprises (logistics, repair services, business support), with purposive exclusion of purely agricultural activities and unregistered informal enterprises.

Secondary data comprised district-level infrastructure indices (road density, electricity reliability, digital connectivity), banking penetration ratios, and industrial composition statistics sourced from the Annual Survey of Industries, RBI district credit reports, and the Jharkhand government's economic survey series. The survey covered a retrospective reference period of five to seven years to approximate dynamic performance trajectories within a single cross-sectional instrument.

3.3 Variable Framework

The dependent variables capturing MSME performance are: (i) annual turnover growth rate (percentage), (ii) employment growth rate (percentage), (iii) labour productivity (output per worker, in INR thousands), and (iv) enterprise survival probability (estimated via survival analysis). The key independent variables include: the Resource Linkage Index (RLI), a composite measure of the intensity of backward linkage integration with mining supply chains; district mining intensity score; infrastructure quality index; formal credit access (dummy and continuous measure); cluster membership (dummy); and post-2020 policy intervention participation (Udyam registration, ECLGS uptake).

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Control variables include firm age, firm size (number of employees), sector classification, ownership category (proprietorship/partnership/company), and entrepreneur education level.

3.4 Resource Linkage Index (RLI)

The RLI is a novel composite indicator constructed from four dimensions: (a) proportion of inputs sourced from mining-related supply chains; (b) share of revenue derived from mining or heavy industry clients; (c) frequency and depth of formal contractual relationships with large industrial firms; and (d) participation in mining-sector ancillary service markets. Each dimension is scored on a standardized 0–10 scale and combined as an equal-weighted average. Cronbach's alpha reliability testing confirmed acceptable internal consistency ($\alpha = 0.78$).

3.5 Econometric Models

Four analytical approaches are employed. OLS regression models turnover and employment growth against the RLI, infrastructure quality, and control variables. Tobit regression addresses censoring in productivity measures. Difference-in-Differences (DiD) estimation compares pre- and post-policy MSME performance between treated (policy-participant) and comparison groups, controlling for enterprise fixed effects. Propensity Score Matching (PSM) constructs matched samples of mining-linked and non-linked enterprises to isolate causal effects of resource linkage on performance outcomes. Survival analysis using a Cox proportional hazard model estimates the probability of enterprise exit as a function of structural and financial determinants.

All models employ robust standard errors clustered at the district level to correct for intra-district error correlation. Endogeneity in the RLI measure is addressed through instrumental variable estimation, using district-level geological resource intensity as an instrument for firm-level linkage depth.

4. RESULTS AND ANALYSIS

4.1 Sample Profile and Descriptive Statistics

The final analytical sample comprises 420 MSMEs: 58.3 percent from mining districts and 41.7 percent from non-mining districts. Manufacturing enterprises account for 61.4 percent of the sample, with service enterprises comprising the remainder. Micro enterprises (investment < INR 1 crore) represent 52.6 percent, small enterprises 35.7 percent, and medium enterprises 11.7 percent. Mean firm age is 8.4 years (SD = 5.2). Approximately 67 percent of enterprises are registered under Udyam, reflecting improved formalization following the 2020 reforms.

The mean RLI score is 4.2 (SD = 2.1, range 0–10), with substantially higher scores in mining districts (mean = 5.8) compared to non-mining districts (mean = 2.1), confirming the geographical specificity of mining supply chain integration. Formal credit access is reported by 44 percent of enterprises, with notable variation between mining districts (52%) and non-mining districts (33%).

4.2 District-Level Performance Heterogeneity

Descriptive comparative analysis reveals significant performance heterogeneity across districts. Mining-dominant districts show higher mean infrastructure scores and credit access rates; however,

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MSME turnover growth and employment growth are not uniformly superior in these districts. Non-mining districts such as Ranchi display competitive turnover growth rates attributable to diversified service sector demand, while Dhanbad and Bokaro exhibit moderate MSME performance despite high mineral output.

A key finding is that output in mining districts is concentrated among a small proportion of enterprises that are directly integrated into mining supply chains, while the majority of MSMEs in these districts remain peripheral to the dominant industrial sector. This concentration effect suppresses mean performance metrics and creates within-district inequality.

4.3 Determinants of MSME Performance: Regression Results

OLS results indicate that the RLI exerts a positive and statistically significant effect on both turnover growth ($\beta = 0.23$, $p < 0.01$) and employment growth ($\beta = 0.19$, $p < 0.05$), after controlling for firm characteristics and district effects. The infrastructure quality index demonstrates a positive moderating effect on the RLI-performance relationship, consistent with the hypothesis that enabling infrastructure amplifies the productivity benefits of resource linkage.

Formal credit access is positively associated with labour productivity ($\beta = 0.31$, $p < 0.01$) and negatively associated with exit hazard (HR = 0.64, $p < 0.05$), confirming that financial inclusion is a critical survival determinant. Cluster membership significantly reduces the hazard of enterprise exit (HR = 0.51, $p < 0.01$), supporting the agglomeration benefits hypothesis.

Tobit estimation of labour productivity confirms that technology adoption (proxied by ownership of modern machinery) and skilled labour intensity are significant positive predictors ($\beta = 0.28$ and $\beta = 0.21$ respectively, $p < 0.01$). These results are consistent with Chen et al. (2022) and Emmanuel et al. (2023), who find that human capital and technology are complementary drivers of MSME competitiveness.

4.4 Policy Intervention Effects

DiD estimation comparing enterprises that participated in post-2020 reforms (Udyam registration + ECLGS uptake) against matched comparators reveals a significant positive treatment effect on turnover growth (ATT = 8.4 percentage points, $p < 0.05$) and employment growth (ATT = 5.2 percentage points, $p < 0.10$). PSM estimates confirm the direction and magnitude of these effects.

Heterogeneity analysis reveals that the policy benefits are concentrated among small and medium enterprises with prior formal banking relationships, while micro enterprises and first-generation entrepreneurs in peripheral districts demonstrate lower uptake and weaker performance responses. This finding indicates a compliance and awareness gap that limits the inclusiveness of reform impacts (Nugroho et al., 2024; Ogbolu et al., 2025).

4.5 Survival Analysis

Cox proportional hazard models estimated over the five-to-seven-year retrospective window identify several significant predictors of enterprise exit risk. Early-stage enterprises (age 1–3 years) face substantially elevated exit hazard (HR = 2.74 relative to mature enterprises, $p < 0.01$). District-level

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institutional support quality significantly reduces exit probability (HR = 0.69, $p < 0.05$). The RLI score exhibits a non-linear inverted-U relationship with survival: moderate integration (RLI score 4–6) is associated with lower exit risk, while very high integration (RLI > 8) increases vulnerability, likely reflecting dependency on single large-industry demand cycles.

5. DISCUSSION

5.1 Conditional Nature of Resource Linkage Benefits

The results support a nuanced reading of Linkage Theory: resource linkages are a potential source of competitive advantage for MSMEs, but their realization is conditional on enabling structural factors. In districts with reliable physical infrastructure, responsive institutional support, and active cluster ecosystems, the RLI translates into meaningful productivity and growth gains. In contrast, in districts where these enabling conditions are weak, the RLI yields limited or no performance benefit, confirming the systemic rather than purely locational nature of resource-driven development (Zulu-Chisanga et al., 2020; Abdullahi et al., 2025).

This finding extends the RBV by demonstrating that external resource endowments at the regional level constitute a distinct category of strategic resource that is neither automatically accessible nor uniformly beneficial. The absorptive capacity of individual firms—their ability to identify and leverage available linkage opportunities—mediates the relationship between external resource environments and firm performance, consistent with dynamic capabilities theory (Arbelo et al., 2021; Widnyani et al., 2025).

5.2 The Infrastructure-Finance Nexus

A consistent finding across models is the complementarity between infrastructure quality and formal credit access in driving MSME performance. Enterprises in infrastructure-advantaged districts show higher returns to formal credit, while those in infrastructure-deficient areas demonstrate limited productive deployment of borrowed capital. This complementarity suggests that infrastructure investment and financial deepening must be co-designed to generate synergistic effects—a policy insight that uniform national credit expansion programs may miss.

5.3 Post-2020 Reforms: Gains and Remaining Gaps

The post-2020 MSME reform package has produced measurable gains in formalization rates and credit uptake among eligible enterprises. The Udyam registration system has reduced compliance barriers and improved enterprise visibility in formal market ecosystems. ECLGS uptake has provided critical liquidity support to enterprises weathering post-pandemic demand disruptions. However, the most vulnerable enterprises—micro, informal-proximate, peripheral-district enterprises—remain partially excluded due to documentation barriers, limited financial literacy, and insufficient district-level institutional outreach (Mandataris et al., 2025; Yuwono et al., 2025).

5.4 Theoretical Contributions

This study advances theoretical understanding on three dimensions. First, it operationalizes the RBV at the regional-structural level by introducing the RLI as a quantified measure of external resource

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integration, complementing internal capability assessments. Second, it refines Linkage Theory by distinguishing between the existence of linkages and their functional quality, demonstrating that asymmetric power relationships and institutional gaps can render nominal linkages nonproductive for MSMEs. Third, it contributes to regional development theory by providing empirical evidence that intra-state disparities in mediating structures—not merely resource distribution—explain uneven industrialization in mineral-rich regions.

6. POLICY IMPLICATIONS

6.1 Cluster Ecosystem Development

The evidence supports cluster-based industrial policy as a priority intervention for MSME development in Jharkhand. Cluster formation should emphasize internal cohesion, inter-firm cooperation, and shared infrastructure, rather than merely geographical co-location. In mining-dominant districts, cluster strategies should consciously promote sector diversification to reduce single-industry dependency risk. Institutional intermediaries such as industry associations and technology service centers should be embedded within cluster frameworks to facilitate knowledge transfer and market access (Asamoah et al., 2020; Crespi et al., 2020).

6.2 Infrastructure Equalization

Targeted infrastructure investment should address last-mile connectivity gaps in peripheral and non-mining districts rather than reinforcing existing industrial corridors. Reliability of electricity and digital infrastructure deserves equal priority alongside physical connectivity. Digital infrastructure development should be accompanied by enterprise digital capability building, ensuring that MSMEs can productively deploy available connectivity (Yadegaridehkordi et al., 2023; Mittal et al., 2022).

6.3 Financial Deepening

Credit guarantee schemes and priority sector lending targets require redesign to reach peripheral-district and early-stage enterprises that lack collateral and formal credit histories. Cash-flow-based lending models, leveraging digital payment records and GST transaction data, offer a more appropriate assessment framework for MSMEs with irregular income streams. Financial literacy programs targeting first-generation entrepreneurs in resource-periphery districts are an essential complement to supply-side financial expansion (Frimpong et al., 2022; Ogbolu et al., 2025).

6.4 Value Chain Integration

Supplier development programs that build the technical, financial, and compliance capacity of MSMEs to meet large-industry procurement standards represent a high-return intervention. Mandatory local sourcing provisions in state-level mining lease conditions, combined with transparent public procurement set-asides for MSME suppliers, can institutionalize backward linkages that current market mechanisms fail to generate (Nugroho et al., 2024; Crespi et al., 2020).

6.5 Coordinated Policy Architecture

The interlocking nature of infrastructure, finance, and linkage constraints implies that sector-specific policies operating in isolation will yield suboptimal results. An integrated policy framework

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harmonizing state-level industrial infrastructure investment, financial inclusion mandates, and enterprise support programs—aligned with district-specific structural profiles—offers the greatest potential for inclusive and sustainable MSME development in resource-based regional economies (Kaur and Kumar, 2026; Yahaya and Nadarajah, 2023).

7. CONCLUSION

This paper has examined the structural and institutional determinants of MSME performance in Jharkhand, India, a mineral-rich state that encapsulates the central paradox of resource-dependent development: high aggregate industrial output coexisting with uneven small enterprise ecosystem outcomes. Using a multi-method empirical strategy, including OLS, Tobit, DiD, PSM, and survival analysis, we demonstrate that resource linkages, infrastructure quality, formal credit access, and cluster membership are the principal mediating factors through which structural resource endowments translate into firm-level performance gains.

Resource proximity is neither a guarantee of competitive advantage nor an insurmountable disadvantage for MSMEs. The benefits of mining-area location are conditioned on firms' ability to integrate into supply chains, access institutional finance, and operate within supportive industrial ecosystems. Post-2020 MSME reforms have generated measurable positive effects among formalized, mid-scale enterprises, while leaving peripheral and early-stage enterprises partially outside the reform dividend.

The study's novel Resource Linkage Index provides a replicable, adaptable tool for quantifying external resource integration in resource-based economies, with potential for deployment in comparative studies across Odisha, Chhattisgarh, and international resource-dependent contexts. Future research should extend this framework through longitudinal panel studies, qualitative exploration of entrepreneurial decision-making under resource dependency, and application of advanced spatial econometric methods to capture geographic spillover effects.

The broader conclusion is that inclusive industrialization in resource-based regional economies requires deliberate, coordinated policy architecture—not laissez-faire resource exploitation—to convert mineral wealth into sustained enterprise development and employment generation.

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