International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Pathways To Poverty Reduction Among MSMEs: From Challenges to Upgrading and Inclusion in Mining Value Chains in Zambia

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Abstract

Zambia's mining sector generates substantial export earnings and public revenue, yet poverty remains high in major mining regions. A persistent concern is the limited participation of local micro, small, and medium enterprises (MSMEs) in mining value chains. This study examined the barriers, upgrading mechanisms, and inclusion pathways through which MSME participation in mining value chains is associated with poverty-related outcomes in Zambia's Copperbelt and Northwestern Provinces. A convergent mixed-methods design combined a quantitative survey of 1,020 MSMEs with 30 key-informant interviews and document analysis. Quantitative data were analyzed using descriptive statistics, Confirmatory Factor Analysis (CFA), Structural Equation Modeling (SEM), and Regression Analysis. Qualitative data were analyzed thematically and integrated with quantitative findings during interpretation. Only 14% of surveyed MSMEs reported access to formal credit, more than 60% lacked required technical certifications, and fewer than 10% reported securing mining procurement contracts. Process upgrading was positively associated with mining-value-chain inclusion ($\beta = 0.626$, $p < 0.001$), while product upgrading also showed a significant association ($\beta = 0.162$, $p < 0.001$); together, the reported regression model explained 54.6% of the variance in inclusion ($R^2 = 0.546$). The study also reports a strong association between mining-value-chain inclusion and poverty-related outcomes ($\beta = 0.982$, $R^2 = 0.965$, $p < 0.001$). Qualitative evidence linked successful inclusion with employment creation, higher household income, and local economic development. The findings support a sequential framework in which barriers constrain MSME upgrading, upgrading facilitates value-chain inclusion, and inclusion is associated with improved poverty-related outcomes. Policy priorities include inclusive finance, supplier-development and certification support, transparent procurement, stronger institutional coordination, and deliberate inclusion of women, youth, and rural enterprises. Because the study is cross-sectional and relies partly on self-reported outcomes, the reported relationships should be interpreted as associations rather than definitive causal effects.

Keywords: Enterprise Upgrading; Micro, Small and Medium Enterprises (MSMEs); Mining Value Chain; Mixed-Methods Research; Poverty Reduction; Supply Chain Inclusion; Zambia.

INTRODUCTION

Resource-rich economies frequently face the challenge of converting mineral wealth into broad-based improvements in livelihoods. Zambia provides an important case because mining is central to the national economy while poverty remains substantial in the principal mining regions. The draft evidence indicates that mining accounts for more than 70% of export earnings, contributes approximately 30% of GDP, and generates nearly one-third of government revenue. At the provincial level, reported poverty rates are 35.9% in the Copperbelt and 61.6% in Northwestern Province, compared with a national rate of 54.4% (ICMM, 2021; UNDP, 2022; ZamStats, 2022; World Bank, 2023).

One explanation for the weak translation of mineral-sector activity into local welfare is the limited participation of domestic MSMEs in mining value chains. The literature identifies centralized procurement, demanding technical and certification requirements, information asymmetries, limited access to finance, and institutional fragmentation as important barriers to local supplier participation (Kapembwa, 2021; UNCTAD, 2022; Chileshe & Tembo, 2022; OECD, 2023). When local firms cannot enter or upgrade within mining supply chains, potential multiplier effects through employment, skills transfer, enterprise development, and local expenditure are reduced.

International experience suggests that supplier development, local-content implementation, procurement transparency, and targeted finance can strengthen domestic participation. Evidence cited in the draft from Botswana, Chile, South Africa, Australia, Canada, and Ghana points to the importance of coordinated policy, lead-firm engagement, technical assistance, and sustained monitoring (Morris *et al*., 2012; UNCTAD, 2018; World Bank, 2020; SEFA, 2022; Gaswa *et al*., 2023). However, such approaches are context dependent and may disproportionately benefit larger or urban firms unless inclusion is deliberately designed.

Conceptual Framework

The study draws on complementary theoretical perspectives to explain why mining-sector growth does not automatically translate into local enterprise development or poverty reduction. The Resource-Based View emphasizes firm-level resources and capabilities; Innovation Systems Theory highlights networks among government, industry, training institutions, and knowledge organizations; Institutional Theory emphasizes rules, enforcement, and organizational arrangements; Global Value Chain and upgrading theory explains movement into higher-value activities; and the Capability Approach and social-inclusion perspectives emphasize access to economic opportunities for groups that may otherwise remain excluded (Gereffi *et al*., 2021).

MSME barriers

The draft identifies four interconnected barriers: limited access to affordable finance; technical and managerial capacity gaps; exclusion from procurement opportunities; and fragmented institutional support. Finance constraints can prevent investment in equipment, certification, working capital, and technology. Technical and managerial gaps can prevent firms from meeting mining companies' quality, safety, environmental, and delivery requirements. Procurement barriers can arise through limited dissemination of tenders, complex documentation, information asymmetries, and established supplier

relationships. Institutional fragmentation can reduce the coherence and scale of supplier-development initiatives.

Upgrading and value-chain inclusion

Upgrading refers to improvements in processes, products, functions, and inter-sectoral capabilities that allow firms to move toward more demanding and higher-value activities (Humphrey & Schmitz, 2002; Kaplinsky & Morris, 2018). In mining value chains, process upgrading may involve efficiency, quality management, safety, or production improvements; product upgrading may involve improved specifications, new products, or certification; functional upgrading may involve movement into logistics, maintenance, engineering, environmental, or other higher-value services; and inter-sectoral upgrading may involve diversification into related markets.

The central proposition is that upgrading can improve a firm's ability to satisfy procurement requirements and therefore increase its probability of value-chain inclusion. However, upgrading is unlikely to be sufficient where procurement systems remain inaccessible or where finance, information, and institutional support are weak.

Inclusion and poverty-related outcomes

Inclusion is conceptualized as meaningful participation in mining procurement and supply chains, including the ability to meet industry standards and sustain commercial relationships. Inclusion may generate poverty-related benefits through employment, enterprise income, household income, skills accumulation, and local expenditure. Nevertheless, these outcomes depend on the distribution of opportunities and on whether women, youth, rural enterprises, and other potentially marginalized firms can participate.

Conceptual pathway

The study proposes the following sequence: (1) structural and institutional barriers constrain MSME capabilities; (2) targeted interventions address finance, skills, technology, information, and institutional constraints; (3) MSMEs undertake process, product, functional, and inter-sectoral upgrading; (4) upgrading increases readiness for mining procurement and value-chain inclusion; and (5) sustained inclusion is associated with employment, income, and local development outcomes.

Despite increasing policy attention to local content and supplier development in Zambia, the pathways connecting MSME upgrading to mining-value-chain inclusion and poverty-related outcomes remain insufficiently examined. Existing work has often emphasized policy compliance or aggregate economic effects rather than the sequence of barriers, interventions, upgrading, inclusion, and household/community outcomes (Hansen *et al*., 2020; UNDP, 2022). This study addresses that gap by examining these pathways in the Copperbelt and Northwestern Provinces.

Study objectives

To identify and analyze the principal barriers affecting MSME participation in Zambia's mining value chains.

To examine the relationship between MSME upgrading and inclusion in mining value chains.

To assess the association between mining-value-chain inclusion and poverty-related outcomes.
To integrate quantitative and qualitative evidence to identify practical mechanisms through which supplier development, procurement reform, institutional coordination, and inclusive finance may strengthen local economic benefits.

METHODS

A convergent mixed-methods design was used, combining quantitative survey evidence with qualitative interviews and document analysis. The quantitative strand was used to estimate relationships among barriers, upgrading, inclusion, and poverty-related outcomes, while the qualitative strand was used to contextualize and explain the observed statistical patterns.

Study setting and participants

The study focused on MSMEs operating in Zambia's Copperbelt and Northwestern Provinces. A quantitative sample of 1,020 MSMEs was selected using stratified random sampling, while 30 information-rich participants including MSME owners, sector experts, and policymakers—were purposively selected for key-informant interviews. Data collection took place from March to July 2023.

Instruments and data collection

The quantitative questionnaire was developed from the literature, expert consultation, and pilot testing with 15 SME managers. Constructs included institutional barriers, access to finance, upgrading activities, mining-value-chain inclusion, and poverty-related outcomes. The draft reports translation and back-translation to accommodate local-language use. Semi-structured interviews were used to obtain detailed accounts of barriers, upgrading experiences, procurement access, and enabling mechanisms.

Quantitative analysis

Quantitative data analysis was conducted using Structural Equation Modeling (SEM), facilitating the evaluation of complex relations among observed and latent variables (Hair *et al*., 2022). Data screening was undertaken in IBM SPSS Statistics version 28. The draft reports assessment of missing values and outliers using standardized scores and Mahalanobis distance, together with checks of normality, linearity, and multicollinearity. CFA and SEM were conducted in IBM AMOS version 28. The stated measurement criteria were factor loadings above 0.50, composite reliability above 0.70, average variance extracted above 0.50, and HTMT ratios below 0.85. Structural-model fit was assessed using CMIN/df, CFI, TLI, RMSEA, and SRMR, with statistical significance evaluated at $\alpha = 0.05$.

Regression analysis was used to estimate the reported associations between process/product upgrading and inclusion and between inclusion and poverty-related outcomes. The draft also reports MANOVA analyses of selected demographic variables.

Qualitative analysis and integration

Interview data were analyzed using inductive and deductive thematic analysis, with NVivo used for data organization and retrieval (Braun & Clarke, 2021). Credibility and dependability procedures included peer debriefing, member checking, an audit trail, and triangulation. Integration occurred at the

interpretation stage, with qualitative findings used to explain, contextualize, or challenge quantitative patterns (Lincoln & Guba, 1985; Nowell *et al*., 2017).

Ethical considerations

The draft states that ethical approval was obtained from the University of Zambia Research Ethics Committee. Participants provided informed consent, confidentiality and anonymity were protected through de-identification and secure data storage, and additional safeguards were applied when participants discussed sensitive information (Resnik, 2018).

Study limitations

The study is subject to potential non-response and recall or social-desirability bias because some measures were self-reported. Its geographic focus on two provinces limits direct generalization to all Zambian mining regions. Most importantly, the cross-sectional design limits causal inference: statistically significant associations should not be interpreted as proof that upgrading or inclusion caused subsequent poverty reduction.

RESULTS

Sample and data quality

The final quantitative sample comprised 1,020 MSMEs. The draft reports that data were screened for missing values and outliers and that the resulting data were considered suitable for inferential analysis. It also reports broadly balanced distributions across gender, age, education, and location, although the manuscript does not provide the underlying frequencies and percentages. These should be added to the final submission.

Principal barriers

Four principal barriers emerged from the quantitative and qualitative evidence. First, only 14% of MSMEs reported access to formal credit, with collateral requirements and stringent lending conditions identified as important constraints. Second, more than 60% lacked required technical standards or certifications. Third, fewer than 10% reported securing mining procurement contracts, with limited tender visibility and information asymmetry identified as important constraints. Fourth, fragmented institutional support and inconsistent enforcement of local-content provisions were reported as barriers to sustained participation as shown in table 1.

Table 1. Barriers to sustained participation

Barrier	Evidence reported in the study	Likely implication for inclusion
Finance	14% reported access to formal credit	Limits working capital and investment in upgrading
Technical/managerial capacity	>60% lacked required standards/certifications	Restricts eligibility for mining contracts
Procurement access	<10% secured mining procurement contracts	Limits market access and local value capture
Institutional support	Fragmented implementation and	Reduces coherence, scale, and

	inconsistent enforcement	predictability of support

MSME upgrading

The CFA/SEM results reported in the draft support a multidimensional conceptualization of upgrading. Process upgrading had a factor loading of 0.872 and product upgrading a loading of 0.663. Regression analysis showed significant positive associations between process upgrading and inclusion ($\beta = 0.626$, $p < 0.001$) and between product upgrading and inclusion ($\beta = 0.162$, $p < 0.001$). The reported model explained 54.6% of the variance in inclusion ($R^2 = 0.546$). Qualitative participants emphasized technical training, technology adoption, and peer learning as important enabling mechanisms.

MSME inclusion in mining value chains

Fewer than 10% of surveyed MSMEs reported substantial mining procurement contracts. Firms that achieved inclusion were described as more likely to demonstrate compliance with quality standards and reliable delivery. The draft reports that process and product upgrading were the strongest predictors of inclusion, whereas functional and inter-sectoral upgrading were not statistically significant in the relevant model (Table 2 & 3).

Table 2. MSME Inclusion in Mining Value Chains and Associated Poverty Outcomes

	NGO	Mining	Govern	Inter-sec	SMEs UPG	Process	Product	Functional	Inclusion	Poverty
Valid	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020
Mean	3.06	2.88	2.70	3.03	3.25	3.10	2.89	2.73	3.26	3.21
SD ±	1.43	1.29	1.06	1.14	1.39	1.43	1.27	1.06	1.38	1.40

Sample: 1,020 MSMEs, balanced by gender, age, education, and location.

Table 3. MSME Inclusion: Measurement and Structural Model Results

Predictor	Standardized Loading (CFA)	Unstandardized B (Path)	Std. Error	Standardized Beta (Path)	t	p-value
Inter-sectoral Upgrading	0.300	0.012	0.028	0.010	0.437	.662
Process Upgrading	0.872	0.607	0.025	0.626	24.18	.000
Product Upgrading	0.663	0.176	0.030	0.162	5.89	.000
Functional Upgrading	0.470	0.020	0.033	0.016	0.606	.545

Model Fit Indices: CFI = 0.947, TLI = 0.901, RMSEA = 0.077, AGFI = 0.938

Reliability: Cronbach's Alpha = 0.780

Model $R^2 = 0.546$, Adjusted $R^2 = 0.544$

Sample size: n = 1,020

Poverty-related outcomes

Poverty-related outcomes were operationalized using reported changes in household income, job creation, and community welfare linked to MSME participation in mining value chains (Table 4). The regression model reported a strong positive association between inclusion and these outcomes (β = 0.982, R^2 = 0.965, $p < 0.001$) (Table 5). Qualitative accounts similarly described employment generation, increased household income, and improvements in local infrastructure in locations where MSMEs were successfully integrated is summarized in table 6.

Table 4. Measurement Model for Poverty Reduction

Indicator	**Standardized Loading**
NGO Support	0.928
Mining Sector Support	0.627
Government Support	0.439
Process Upgrading	0.912
Product Upgrading	0.629
Functional Upgrading	0.462
Inclusion of SMEs	0.934

Model Fit Indices: CFI = 0.966; TLI = 0.948; RMSEA = 0.069; AGFI = 0.924
Reliability: Cronbach's Alpha = 0.930

Table 5. Regression Model: Inclusion of SMEs → Poverty Reduction

Predictor	Unstandardized Beta	Std. Error	Standardized Beta	t	p-value
(Constant)	-0.034	0.021	—	-1.635	.102
Inclusion of SMEs	0.996	0.006	0.982	167.97	.000

Model Statistics: R=0.982; R2=0.965; Adjusted R2=0.965; Std. Error of Estimate = 0.262;
F (1, 1018) = 28,212.71, p<.001

Table 6. Summary of Key Findings

Pathway	Std. Beta	R^2	p-value	Interpretation
Upgrading → Inclusion	0.72	0.546	<.001	Association, not causality
Inclusion → Poverty Reduction	0.982	0.965	<.001	Strong association; interpret with caution

Demographic variables

The gender, age, education, location, and warehouse ownership did not show statistically significant effects in MANOVA (Table 7)

Table 7. Demographic Variables and MANOVA Findings

Variable	Subgroups (n, %)	MANOVA Significance	Interpretation
Gender	Male (551, 54%) Female (469, 46%)	Not significant	No statistically detectable effect
Age	18–24 (231, 22.6%) 25–35 (375, 36.8%) 36+ (414, 40.6%)	Not significant	No statistically detectable effect
Education	Certificate (78, 7.6%) Diploma (292, 28.6%) Degree (369, 36.2%) Masters (281, 27.5%)	Not significant	No statistically detectable effect
Location	Mine area (290, 28.4%) Rural (256, 25.1%) Urban (236, 23.1%) Other towns (238, 23.3%)	Not significant	No statistically detectable effect
Warehouse Ownership	Own (409, 40.1%) Rent (611, 59.9%)	Not significant	No statistically detectable effect

Mixed-methods integration

Integration of the two strands produced a consistent pathway: financial, technical, procurement, and institutional barriers constrain upgrading; process and product upgrading are associated with stronger inclusion; and inclusion is associated with improved poverty-related outcomes. Qualitative evidence provides contextual support for the mechanisms underlying these statistical relationships.

DISCUSSION

This study identified four major barriers limiting MSME participation in Zambia's mining value chains and their potential contribution to poverty-related socioeconomic outcomes: limited access to finance, technical and managerial capacity constraints, procurement exclusion, and fragmented institutional support. Only 14% of the MSMEs reported access to formal credit, suggesting that most enterprises face difficulties financing investments in equipment, technology, certification, working capital, and other requirements necessary for mining-sector participation. Similar financial constraints have been reported among MSMEs in other developing-country contexts, including Nigeria and Tanzania (UNCTAD, 2018; Ayyagari *et al*., 2011). Although initiatives such as credit-guarantee and local-content programmes in Zambia seek to improve access to finance, the findings indicate that accessibility and uptake remain important challenges (Zambia Ministry of Commerce, Trade and Industry, 2022; World Bank, 2023).

Technical and managerial capacity represents another significant constraint. More than 60% of the MSMEs reportedly lacked the technical standards or certifications required by mining companies. This limitation can prevent otherwise viable enterprises from meeting requirements relating to quality, safety, reliability, technology, and regulatory compliance. Similar constraints have been reported in Ghana and other developing economies (Kaplinsky & Morris, 2018). Capacity-building initiatives in Zambia,

including technical training and supplier-development programmes, therefore remain important, but their scale and accessibility need to be sufficient to reach smaller and rural enterprises.

Procurement exclusion was also evident, with fewer than 10% of MSMEs reporting access to mining procurement contracts. Complex tendering procedures, limited information about opportunities, stringent prequalification requirements, and inadequate feedback may restrict the ability of smaller firms to compete for mining contracts. International evidence suggests that transparent procurement systems, supplier-development programmes, and targeted local-content mechanisms can improve participation (UNCTAD, 2018; World Bank, 2020). However, effective implementation and monitoring are essential to ensure that formal local-content provisions translate into actual opportunities for local MSMEs.

The quantitative findings further demonstrate significant positive associations between MSME upgrading and mining-value-chain inclusion. Process upgrading showed a relatively strong positive association with inclusion ($\beta = 0.626$, $p < 0.001$), while product upgrading also showed a positive and statistically significant association ($\beta = 0.162$, $p < 0.001$). Together, these variables explained 54.6% of the variance in mining-value-chain inclusion ($R^2 = 0.546$). This suggests that improvements in operational efficiency, technology, quality management, product quality, standards compliance, and certification are important characteristics associated with greater MSME participation in mining supply chains. The SEM results similarly indicated a positive association between overall upgrading and inclusion ($\beta = 0.72$, $p < 0.001$).

The findings suggest a potential pathway in which MSME upgrading is associated with greater mining-value-chain inclusion, which may in turn create opportunities for employment, income generation, entrepreneurship, and other socioeconomic benefits. However, because the study is cross-sectional, these relationships should be interpreted as associations rather than evidence of causality or definitive long-term poverty reduction. The reported very high R^2 for the relationship between inclusion and poverty-related outcomes should also be verified against the original SEM output and examined for possible measurement overlap, common-method variance, or model-specification issues before publication.

Overall, the findings indicate that increasing MSME participation in Zambia's mining sector requires an integrated approach combining enterprise upgrading, affordable finance, technical and certification support, transparent procurement systems, and stronger institutional coordination. Such interventions should also ensure accessibility for women-owned, youth-led, rural, and micro-enterprises so that mining-sector opportunities contribute to broad-based and sustainable socioeconomic development.

CONCLUSION

This study identifies a coherent pathway linking MSME barriers, upgrading, mining-value-chain inclusion, and poverty-related outcomes in Zambia's Copperbelt and Northwestern Provinces. The quantitative findings show significant associations between process/product upgrading and inclusion, while the mixed-methods evidence indicates that finance, technical capacity, procurement access, and institutional coordination shape firms' ability to participate in mining supply chains. The evidence supports a policy sequence in which barriers are addressed, enterprise capabilities are upgraded, procurement systems are made more accessible, and inclusion is monitored through measurable

outcomes. Importantly, the findings should be interpreted as evidence of association rather than definitive causal effects because the study is cross-sectional and relies partly on self-reported measures.

RECOMMENDATIONS

Expand supplier-oriented finance through credit guarantees, contract-linked working-capital facilities, and risk-sharing mechanisms that reduce collateral barriers. Establish a coordinated national supplier-development framework combining technical training, mentorship, certification support, technology upgrading, and direct links to mining procurement opportunities. Modernize procurement through accessible e-procurement platforms, simplified documentation, transparent tender communication, and feedback mechanisms for unsuccessful bidders. Strengthen coordination among government agencies, mining companies, financial institutions, training providers, development partners, and MSME associations, with clear accountability for local-content implementation. Design explicit mechanisms for participation by women-owned, youth-owned, rural, and smaller enterprises, while monitoring whether benefits are reaching these groups rather than concentrating among already-established firms. Introduce routine monitoring of procurement values, supplier survival, employment, household-income indicators, certification outcomes, and geographic distribution so that policy effectiveness can be evaluated over time.

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