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SENSING UNDER INSTITUTIONAL VOLATILITY: COMPETITIVE INTELLIGENCE CAPABILITY AND STRATEGIC RESILIENCE IN ZIMBABWE'S ARTISANAL GOLD-MINING ENTERPRISES

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Abstract

Artisanal and small-scale gold mining is economically indispensable across much of sub-Saharan Africa, yet the enterprises that sustain it often operate amid regulatory ambiguity, volatile gold markets, technological constraints, environmental pressures, and recurrent operational disruption. Although competitive intelligence has been widely examined in large and formal organisations, its value for informal, resource-constrained extractive enterprises remains insufficiently theorised and tested. This article examineds whether competitive intelligence capability is associated with strategic resilience among artisanal gold-mining enterprises in Chegutu District, Zimbabwe. Drawing on Dynamic Capabilities Theory and a capability-based conception of organisational resilience, competitive intelligence is conceptualised as a structured capacity to acquire and use regulatory, market, environmental, technological, and competitor information. The article reporteds one empirically tested objective from a broader sequential exploratory mixed-methods study. Contextual insights from 25 key informants informed construct refinement, after which questionnaires were administered to 382 respondents and 347 usable responses were obtained. Competitive intelligence capability and strategic resilience were measured with five-item composite scales. Simple linear regression showed a strong positive association between the constructs, $R = .708$, $R^2 = .501$, adjusted $R^2 = .499$, $F(1, 345) = 173.52$, $p < .001$. Competitive

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intelligence capability significantly predicted strategic resilience (B = .652, SE = .050, β = .708, t = 13.18, p < .001). The findings indicated that intelligence capability is a consequential organisational resource for anticipating change, maintaining continuity, adapting operations, managing risk, and learning from disruption. The article extended dynamic-capabilities scholarship into informal extractive enterprise settings and proposed a context-sensitive intelligence-to-resilience mechanism. Because the design is cross-sectional and based on self-reported measures, the results established predictive association rather than definitive causality. Policy and managerial implications centred on verified intelligence hubs, early-warning systems, accessible regulatory communication, mobile information channels, and collective learning arrangements.

Keywords: Artisanal and Small-Scale Gold Mining; Competitive Intelligence Capability; Dynamic Capabilities; Informal Enterprises; Strategic Resilience; Zimbabwe.

Résumé

L'exploitation aurifère artisanale et à petite échelle est économiquement indispensable dans une grande partie de l'Afrique subsaharienne ; pourtant, les entreprises qui la soutiennent opèrent souvent dans un contexte marqué par une ambiguïté réglementaire, la volatilité des marchés de l'or, des contraintes technologiques, des pressions environnementales et des perturbations opérationnelles récurrentes. Bien que la veille concurrentielle ait été largement étudiée au sein de grandes organisations formelles, sa valeur pour les entreprises extractives informelles aux ressources limitées reste insuffisamment théorisée et éprouvée. Cet article examine si la capacité de veille concurrentielle est associée à la résilience stratégique des entreprises d'exploitation aurifère artisanale dans le district de Chegutu, au Zimbabwe. En s'appuyant sur la théorie des capacités dynamiques et sur une conception de la résilience organisationnelle fondée sur les capacités, la veille concurrentielle est conceptualisée comme une capacité structurée à acquérir et à utiliser des informations relatives à la réglementation, au marché, à l'environnement, à la technologie et à la concurrence. L'article présente les résultats d'un objectif testé empiriquement dans le cadre d'une étude plus vaste utilisant une méthode mixte séquentielle exploratoire. Des informations contextuelles recueillies auprès de 25 informateurs clés ont permis d'affiner les concepts ; par la suite, des questionnaires ont été administrés à 382 répondants, permettant d'obtenir 347 réponses exploitables. La capacité de veille concurrentielle et la résilience stratégique ont été mesurées à l'aide d'échelles composites à cinq items. Une régression linéaire simple a révélé une forte corrélation positive entre ces concepts ($R = 0,708$; $R^2 = 0,501$; R^2 ajusté = 0,499 ; $F(1, 345) = 173,52$; $p < 0,001$). La capacité de veille concurrentielle s'est révélée être un prédicteur significatif de la résilience stratégique ($B = 0,652$; ES = 0,050 ; $\beta = 0,708$; $t = 13,18$; $p < 0,001$). Les résultats indiquent que la capacité de veille constitue une ressource organisationnelle déterminante pour anticiper les changements, assurer la continuité, adapter les opérations, gérer les risques et tirer des enseignements des perturbations. L'article étend la recherche sur les capacités dynamiques au contexte des entreprises extractives informelles et propose un mécanisme reliant la veille à la résilience, adapté à ce contexte spécifique. En raison de la nature transversale de l'étude et du recours à des mesures déclaratives, les résultats établissent une association prédictive plutôt qu'un lien de causalité définitif. Les implications en matière de politiques et de gestion portent notamment sur la mise en place de pôles de veille certifiés, de systèmes d'alerte

précoce, d'une communication réglementaire accessible, de canaux d'information mobiles et de dispositifs d'apprentissage collectif.

Mots-clés: Exploitation aurifère artisanale et à petite échelle ; Capacité de veille concurrentielle ; Capacités dynamiques ; Entreprises informelles ; Résilience stratégique ; Zimbabwe.

Introduction

Artisanal and small-scale gold mining (ASGM) has become a structurally important component of employment, household income, and mineral production across the Global South. More than a marginal subsistence activity, it supports extensive livelihood systems and connects rural producers to domestic and international gold value chains (Hentschel *et al.,* 2003; IGF, 2017; World Bank, 2019). Its importance is particularly visible in sub-Saharan Africa, where restricted formal employment, agrarian pressure, and macroeconomic instability have encouraged households and entrepreneurs to diversify into mineral extraction (Hilson, 2016). Yet the economic contribution of ASGM coexists with persistent institutional fragility, unsafe work, environmental degradation, market opacity, and limited access to finance and technology.

Zimbabwe offers an analytically important setting to study these tensions. Prolonged currency instability, industrial contraction, and constrained formal employment have accelerated participation in artisanal gold mining (Mkodzongi & Spiegel, 2019; Spiegel, 2015). Gold offers liquidity and a means of preserving value, but participating enterprises must navigate changing licensing requirements, uneven regulatory enforcement, fluctuating buyer conditions, environmental obligations, occupational hazards, and uncertain access to equipment and capital. The sector is consequently characterised by high levels of volatility, uncertainty, complexity, and ambiguity. Under such conditions, enterprise survival depends not only on mineral deposits, labour, or equipment, but also on the capacity to notice change early, distinguish credible signals from rumours, interpret their implications, and adapt operational decisions.

This informational dimension has received less attention than the sector's financial, technical, environmental, and formalisation challenges. ASGM interventions often assume that disseminating information will improve compliance or performance. However, information availability is not equivalent to organisational intelligence. Enterprises may receive fragmented or contradictory messages, rely on unverified peer networks, or lack routines for converting market and regulatory signals into coordinated action. The crucial capability is therefore not mere possession of information, but the systematic acquisition, interpretation, circulation, and strategic use of relevant intelligence.

Competitive intelligence (CI) provides a useful lens for analysing this capability. CI refers to the ethical and systematic process through which an organisation scans its external environment, evaluates strategically relevant information, disseminates intelligence to decision makers, and uses it to guide action (Calof & Wright, 2008; Dishman & Calof, 2008). Established scholarship, including (Eisenhardt & Martin, 2000; Teece, 2012), generally locates CI in formal corporations and small and medium-sized enterprises with identifiable managerial structures and information systems ( ). Far less is known about how CI operates in informal or semi-formal extractive enterprises, where information practices are relational, low-cost, decentralised, and embedded in local networks.

This gap matters theoretically and practically. Dynamic Capabilities Theory argues that organisations remain viable in changing environments by sensing opportunities and threats, seizing appropriate responses, and transforming routines and resources (Teece, 2007; Teece *et al*., 1997).

CI can be understood as the sensing and interpretive infrastructure that precedes adaptive action. Organisational resilience research similarly emphasises anticipation, coping, adaptation, and learning rather than simple recovery to a prior state (Duchek, 2020; Lengnick-Hall *et al.,* 2011). Connecting these perspectives suggests that enterprises with stronger intelligence capability should be better able to anticipate disruption, sustain operations, adjust strategies, manage risks, and learn from adversity.

The present article isolates and develops one empirically tested objective from a broader doctoral study: to examine the relationship between competitive intelligence capability and strategic resilience among artisanal gold-mining enterprises (AGMEs) in Chegutu District, Zimbabwe. Its central research question is: *To what extent does competitive intelligence capability predict strategic resilience among AGMEs in Chegutu District?*

The article makes three contributions. First, it moves CI research beyond its conventional formal-corporate setting and examines intelligence practices within informal and resource-constrained extractive enterprises. Second, it connects CI to a capability-based account of resilience, clarifying how environmental sensing can support anticipation, continuity, strategic flexibility, risk management, and organisational learning. Third, it provides enterprise-level evidence from Zimbabwe, a context in which institutional volatility makes information processing especially consequential. The analysis is deliberately cautious: because the evidence is cross-sectional, "effect" is interpreted statistically as predictive association rather than proof of temporal causation.

Study Context: Artisanal Gold Mining in Zimbabwe

The expansion of artisanal gold mining in Zimbabwe is closely connected to wider processes of economic restructuring and livelihood adaptation. Periods of hyperinflation, currency disruption, declining industrial employment, and pressure on agricultural livelihoods redirected labour and entrepreneurial effort toward informal economic activity (Mkodzongi & Spiegel, 2019). Gold has particular attraction because it is portable, globally valued, and capable of producing relatively immediate income. Artisanal mining therefore functions simultaneously as a survival strategy, a livelihood diversification mechanism, and an accumulation opportunity.

The sector nevertheless operates at the intersection of formal law and informal practice. Mining titles, environmental authorisation, operating licences, and gold-marketing rules create formal obligations, while the practical cost and complexity of compliance can exclude small operators. Enforcement may vary across locations and periods, and legitimate economic activity can coexist with legally ambiguous operating arrangements (Childs, 2014; Spiegel, 2015; Webb *et al*., 2009). Formal and informal gold-buying channels operate alongside one another, creating uncertainty about prices, payment, documentation, and regulatory exposure.

Environmental and occupational risks deepen this vulnerability. Mercury amalgamation remains a major concern because of its implications for human health, soil, and water systems (UNEP, 2019). Rudimentary shafts, limited protective equipment, unsafe processing, and inadequate emergency preparedness expose miners and surrounding communities to severe hazards. At the same time, safer technologies may be unaffordable or poorly understood, and technical guidance may not reach enterprises in a timely or usable form. Information about environmental standards, mine safety, weather, geological conditions, processing technologies, and equipment maintenance can therefore be operationally decisive.

Chegutu District in Mashonaland West Province is an appropriate empirical site because it contains a dense concentration of artisanal mining, milling, gold trading, and related activities.

Enterprises draw information from fellow miners, cooperatives, buyers, government officials, traditional leaders, suppliers, mobile platforms, and community networks. These channels offer speed and local relevance but also expose decision makers to rumours, inconsistent regulatory interpretations, strategic withholding, and outdated information. The ability to triangulate sources, identify significant changes, and translate information into decisions is thus central to resilience.

Literature Review and Theoretical Framework

Competitive Intelligence as an Organisational Capability

Environmental scanning has long been recognised as an essential managerial activity (Aguilar, 1967). CI develops this activity into a systematic organisational process involving the definition of intelligence needs, collection of information, analysis, dissemination, and strategic application (Calof & Wright, 2008; Rouach & Santi, 2001). It differs from informal information gathering in three respects. First, it is purposive: information is collected in relation to identifiable decisions or threats. Second, it is interpretive: raw observations are evaluated, compared, and transformed into meaning. Third, it is actionable: intelligence informs the allocation of attention and resources. CI scholarship frequently describes a multiphasic process through which market, competitor, technological, regulatory, and stakeholder information supports strategy (Dishman & Calof, 2008; Saayman *et al.,* 2008). The specific configuration of this process depends on organisational context. In large firms, CI may be supported by dedicated analysts, databases, subscriptions, and formal reporting. Resource-constrained enterprises are more likely to rely on owner-managers, suppliers, customers, associations, regulators, and interpersonal networks. The absence of specialist infrastructure does not imply the absence of CI; rather, intelligence capability may be embedded in routines of observation, consultation, verification, discussion, and rapid adjustment. For AGMEs, the most salient intelligence domains are regulatory, market, environmental and safety, technological, and competitive. Regulatory intelligence concerns licensing rules, enforcement practices, reporting duties, and government support. Market intelligence concerns gold prices, buyer requirements, payment processes, costs, and demand. Environmental and safety intelligence concerns hazards, mercury reduction, rehabilitation, occupational standards, and weather-related risks. Technological intelligence concerns mining and processing methods, equipment, maintenance, and safer alternatives. Competitive intelligence in the narrower sense concerns how other operators obtain inputs, manage risks, access markets, and respond to changing conditions.

Conceptualising CI as a capability is important. A capability is not a one-time act or isolated resource; it is a patterned capacity to perform related activities reliably (Eisenhardt & Martin, 2000; Teece, 2012). An enterprise may possess a smartphone, know a government official, or receive a price message, but these resources become an intelligence capability only when they are incorporated into repeatable practices of monitoring, validation, interpretation, communication, and action.

Strategic Resilience

Organisational resilience has evolved from a narrow emphasis on recovery toward a dynamic conception that includes anticipation, preparedness, absorption, adaptation, and learning (Duchek, 2020; Linnenluecke, 2017; Williams *et al.,* 2017). Resilience is not simply persistence. An enterprise can persist through harmful routines or return to an unsustainable pre-shock condition. Strategic resilience instead concerns the capacity to maintain core functions while revising strategies and capabilities in response to material change.

Lengnick-Hall *et al* (2011), described resilience as a capacity developed through cognitive, behavioural, and contextual resources. Duchek (2020) organised resilience around anticipation, coping, and adaptation. These perspectives are well suited to AGMEs because disruption is rarely a single, bounded event. Enterprises face recurrent regulatory changes, price fluctuations, equipment breakdowns, cash-flow interruptions, safety incidents, weather effects, disputes, and shifts in access to ore or markets. Resilience therefore depends on continuous preparedness and adjustment.

In this study, strategic resilience comprises five connected dimensions: rapid adaptation to regulatory change; continuity during market uncertainty or disruption; adjustment of operational strategy when conditions change unexpectedly; mechanisms for coping with operational risk; and learning from previous challenges. Together, these dimensions capture both short-term response and longer-term capability development.

Dynamic Capabilities Theory and the intelligence–resilience link

Dynamic Capabilities Theory explains how organisations integrate, build, and reconfigure competencies in rapidly changing environments (Teece *et al.,* 1997). Teece's (2007) sensing–seizing–transforming framework is particularly relevant. Sensing involves scanning, learning, interpretation, and the identification of opportunities and threats. Seizing concerns decisions and resource commitments. Transforming concerns the reconfiguration of assets, structures, and routines.

CI can be positioned as a microfoundation of sensing. Regular attention to regulatory, market, technological, environmental, and competitor developments increases the likelihood that decision makers will identify consequential change before it becomes an acute crisis. Intelligence analysis also supports sensemaking by helping enterprises distinguish signal from noise and evaluate the likely consequences of alternative responses (Daft & Weick, 1984; Thomas *et al*., 1993). This does not guarantee a successful response, because financial and technical constraints may prevent action, but it improves the informational basis on which scarce resources are deployed.

The relationship between CI and resilience can be represented through five mechanisms:

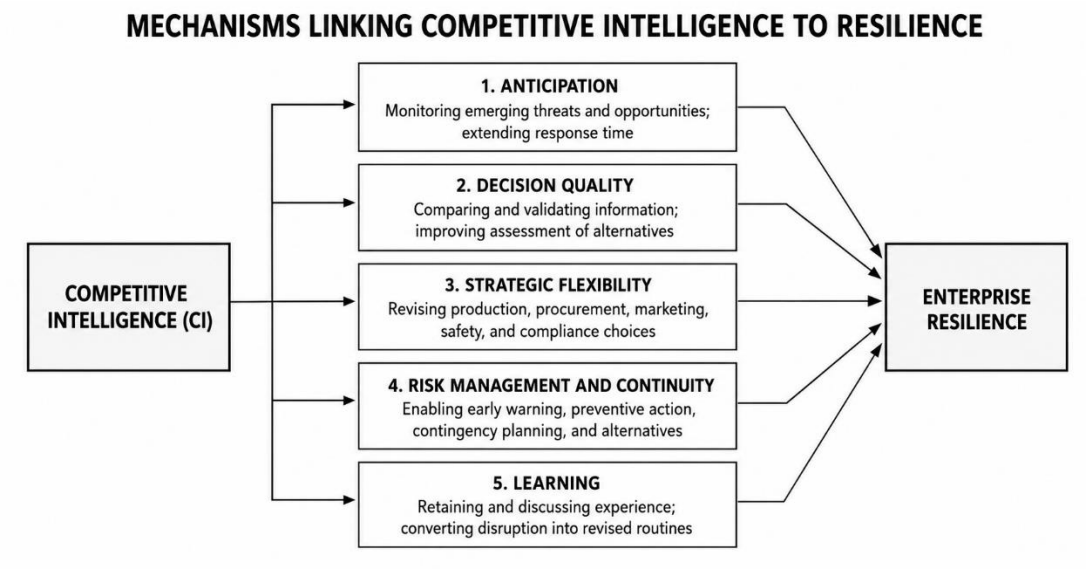

Fig. 1: Competitive Intelligence (CI) and Enterprise Resilience (ER) nexus
Source: Authors' Conceptualisation

The relationship between competitive intelligence (CI) and enterprise resilience operates through five interrelated mechanisms. First, CI strengthens anticipation by enabling enterprises to identify emerging threats and opportunities, thereby extending the time available for proactive responses. It also improves decision quality by facilitating the systematic collection, comparison, and validation of information, reducing reliance on rumours and supporting a more informed assessment of strategic alternatives. Furthermore, access to current intelligence enhances strategic flexibility by enabling enterprises to adjust their production, procurement, marketing, safety, and regulatory compliance practices in response to changing conditions. CI similarly strengthens risk management and operational continuity by providing early-warning information that supports preventive maintenance, contingency planning, safer operations, and alternative sourcing or marketing arrangements. Finally, it promotes organisational learning by enabling enterprises to retain, evaluate, and discuss previous experiences, thereby converting lessons from past disruptions into improved routines, adaptive practices, and more effective future responses.

The proposed relationship is also consistent with organisational information-processing theory. Environmental uncertainty increases the amount and quality of information required for effective decisions (Galbraith, 1973). Enterprises whose information-processing capacity fits their environmental demands should be better able to coordinate responses. Organisational learning scholarship further suggests that knowledge acquisition, distribution, interpretation, and memory shape adaptation (Huber, 1991; Levitt & March, 1988). CI therefore links external sensing with internal learning.

Informality as a Boundary Condition

Informality complicates the intelligence–resilience relationship. Informal enterprises may access dense local networks and adapt quickly because they have fewer bureaucratic constraints. Embedded relationships can facilitate rapid information exchange and mutual assistance (Uzzi, 1997). Conversely, informality can limit access to official notices, finance, technical training, legal protection, and formal markets. It can also discourage contact with regulators and increase dependence on unverified information.

Accordingly, CI in AGMEs should not be evaluated against an idealised corporate model. Context-sensitive capability may consist of low-cost routines: participation in cooperative meetings, verification of WhatsApp messages with responsible agencies, systematic recording of prices and incidents, consultation with equipment suppliers, joint review of near misses, and scheduled discussion of regulatory developments. The core criterion is whether these practices reliably transform external information into better strategic judgement.

Hypothesis

The theoretical argument leads to the following hypothesis:

H1: Competitive intelligence capability is positively and significantly associated with strategic resilience among artisanal gold-mining enterprises in Chegutu District, Zimbabwe.

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Methodology

Research Design

The evidence reported here derives from a broader sequential exploratory mixed-methods study grounded in a critical realist orientation. A qualitative phase preceded quantitative testing so that the meaning and indicators of CI could be refined for the artisanal mining context. This sequencing was appropriate because existing CI measures were developed mainly in formal organisational settings and could not be assumed to represent intelligence practice in AGMEs without contextual adaptation (Creswell & Creswell, 2018).

The article focuses on the quantitative test of the relationship between competitive intelligence capability and strategic resilience, while using qualitative evidence to clarify contextual meaning rather than to claim a separate mixed-methods causal test. Twenty-five information-rich key informants participated in the exploratory phase. They included enterprise owner-managers, cooperative leaders, officials responsible for mining and environmental governance, representatives of mining associations and gold-buying institutions, local government personnel, inspectors, community leaders, suppliers, and other sector stakeholders. Semi-structured interviews explored information sources, regulatory and market uncertainty, operational risk, adaptation, and learning. Thematic analysis informed questionnaire wording and the interpretation of the final findings.

Population, Sampling, and Respondents

The target population comprised approximately 2,600 artisanal gold-mining enterprises operating in Chegutu District. These included formal/licensed and informal/unlicensed enterprises involved in extraction, processing, milling, trading, transportation, and related activities. The enterprise was the intended unit of analysis, while the response was provided by an owner-manager, manager, supervisor, operator, cooperative representative, or another knowledgeable participant.

The quantitative sample was determined using Yamane's (1967) finite-population formula at a 5% margin of error, producing a minimum sample of 347. To allow for non-response and unusable questionnaires, 382 questionnaires were administered. A total of 347 complete and usable responses were retained, representing a usable response rate of 90.8%.

The sample reflected the operational diversity of the sector. Men accounted for 57% of respondents, women 36%, and 7% preferred not to disclose gender. Respondents aged 26–35 formed the largest age category (28%), followed by those aged 18–25 (25%). Operators/workers comprised 57% of respondents, supervisors 20%, managers 14%, owners 6%, and other participants 3%. In enterprise terms, 37% worked in operations with 11–20 workers, 29% in those with 6–10 workers, 24% in those with 1–5 workers, and 10% in those with more than 20 workers. Formal/licensed enterprises represented 40% of the sample, while 60% were informal/unlicensed.

Measures

Both principal constructs were measured with five-point Likert-type items ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Composite mean scores were calculated so that higher values indicated stronger capability.

Competitive intelligence capability (CIC). Five indicators assessed whether the enterprise: (1) regularly monitors changes in mining regulations and licensing requirements; (2) actively gathers

information about gold prices and buyer trends; (3) continuously monitors environmental and occupational safety requirements; (4) seeks information about emerging mining technologies and processing methods; and (5) monitors the activities and strategies of other mining operators. These items represent the regulatory, market, environmental, technological, and competitive domains identified as strategically salient during the exploratory phase.

Strategic resilience (SR). Five indicators assessed whether the enterprise: (1) adapts rapidly to changes in mining regulation and enforcement; (2) continues operating during market uncertainty or disruption; (3) adjusts operational strategy when external conditions change unexpectedly; (4) has mechanisms for coping with operational risks; and (5) learns from previous challenges to improve future decisions. The indicators capture adaptation, continuity, strategic flexibility, risk-coping capacity, and learning.

The study reported that the internal consistency of both composite scales was adequate. Composite scores were treated as approximately interval-level construct measures for regression analysis. This choice is common where several conceptually related Likert-type items are aggregated, but it does not eliminate the need for appropriate diagnostics or cautious interpretation.

Analytical Strategy

Data screening addressed completeness, response consistency, outliers, normality, and the assumptions relevant to regression. Descriptive statistics were used to profile respondents and enterprises. To test the stated objective and hypothesis, a simple ordinary least squares regression was estimated:

$$SR_i = \beta_0 + \beta_1 CIC_i + \varepsilon_i$$

where SR_i is the composite strategic-resilience score for enterprise (i), $CIC_i$is the composite competitive-intelligence-capability score, β_0 is the intercept, β_1 is the estimated change in SR associated with a one-unit increase in CIC, and ε_i represents unexplained variation.

Statistical significance was evaluated through the coefficient's *t* test and the model *F* test. Explanatory power was assessed using R^2 and adjusted R^2. Because the data are cross-sectional and non-experimental, regression terminology such as "predicts" denotes statistical prediction and not definitive causal effect.

Ethical considerations

Participation was voluntary. The study procedures emphasised informed consent, confidentiality, anonymity in reporting, secure handling of responses, and the right to withdraw. No personally identifying statements are reported in this article.

Results

Regression model

Table 1: Model Summary: Competitive intelligence capability predicting strategic resilience, N = 347

R	R^2	Adjusted R^2	Standard error of estimate
.708	.501	.499	.423

Note. Outcome variable: strategic resilience. Predictor: competitive intelligence capability.

The regression results show a strong positive association between competitive intelligence capability and strategic resilience. The multiple correlation was $R = .708$. The model explained 50.1% of the observed variance in strategic resilience ($R^2 = .501$; adjusted $R^2 = .499$), with a standard error of the estimate of .423. For a one-predictor organisational model, this represents substantial explanatory power.

The omnibus model was statistically significant, $F(1, 345) = 173.52$, $p < .001$. The null hypothesis that the regression coefficient equals zero was therefore rejected.

Table 2: Analysis of variance for the regression model

Source	Sum of squares	df	Mean square	F	p
Regression	61.28	1	61.28	173.52	< .001
Residual	121.84	345	.353		
Total	**183.12**	**346**			

The omnibus model was statistically significant, $F(1, 345) = 173.52$, $p < .001$. The null hypothesis that the regression coefficient equals zero was therefore rejected.

Table 3: Regression coefficients, N = 347

Predictor	B	SE	β	t	p
Constant	1.214	.183	—	6.63	< .001
Competitive intelligence capability	.652	.050	.708	13.18	< .001

Note. Outcome variable: strategic resilience.

The unstandardised regression coefficient for CIC was positive and statistically significant, $B = .652$, $SE = .050$, $\beta = .708$, $t = 13.18$, $p < .001$. Thus, a one-unit increase in the CIC composite score was associated with an estimated .652-unit increase in the strategic-resilience score. The fitted model was:

$$\widehat{SR} = 1.214 + 0.652(CIC)$$

These results support H1. Enterprises reporting stronger regulatory, market, environmental, technological, and competitor-monitoring practices also reported greater capacity to adapt, continue operating during disruption, revise strategy, cope with risk, and learn from prior challenges.

Contextual Interpretation

The exploratory evidence helps explain why this association is plausible in Chegutu. Participants consistently described information as operationally valuable when it was timely, credible, simple, and connected to a decision. Regulatory information allowed enterprises to anticipate licensing or enforcement changes. Transparent price and buyer information reduced uncertainty in marketing. Technical intelligence supported equipment selection, maintenance, and safer processing. Safety and environmental intelligence improved hazard recognition and preparedness. Information about weather, local conflict, input availability, and emerging technologies supported contingency planning.

Participants also distinguished useful intelligence from the rapid circulation of unverified claims. Peer networks and mobile messaging were important because they provided low-cost and immediate access, but information was not always accurate. Resilience therefore depended on verification, interpretation, and collective discussion, not only on communication speed. Cooperatives, mining associations, regulators, buyers, suppliers, traditional leaders, and community structures were identified as potential nodes in a credible intelligence system.

Discussion

Competitive intelligence as resilience infrastructure

The central empirical result is that competitive intelligence capability is strongly associated with strategic resilience among AGMEs. CIC alone accounted for approximately half of the variance in the resilience composite. This finding supports the argument that intelligence is not a peripheral administrative function but part of the infrastructure through which enterprises cope with institutional volatility.

The result is consistent with Dynamic Capabilities Theory. Sensing is the first requirement for informed adaptation: an enterprise cannot seize an emerging opportunity or reconfigure operations in response to a threat that it has not identified or understood (Teece, 2007). In Chegutu, sensing encompasses changes in mining rules, enforcement, gold prices, buyer conditions, safety requirements, environmental expectations, equipment, and the practices of other operators. Enterprises that monitor these domains more systematically possess a richer basis for anticipating change and selecting responses.

The result also strengthens a capability-based interpretation of organisational resilience. Resilience is not produced only during a crisis. It is cultivated before, during, and after disruption through anticipation, coping, and adaptation (Duchek, 2020). CI contributes at each stage. Before disruption, scanning provides early warning. During disruption, current and verified information guides resource allocation and continuity decisions. After disruption, reflection and retained knowledge support learning. CI and resilience are therefore linked through an iterative rather than linear process.

The strength of the association is noteworthy but should not be overstated. The unexplained 49.9% of variance reminds us that intelligence does not automatically create capacity to act. Enterprises may correctly identify a safer technology but lack finance to acquire it. They may understand a regulatory requirement but be unable to meet its administrative cost. They may anticipate market disruption but have no alternative buyer. Managerial competence, finance, equipment, skills, network position, legitimacy, institutional support, and the severity of shocks are likely to shape whether intelligence can be converted into resilient action.

Extending competitive-intelligence theory

This study expands the empirical domain of CI research. Conventional descriptions sometimes imply formal systems, specialised staff, and extensive databases. Such a model is poorly matched to informal extractive enterprises. The findings support a more portable definition: CI is a patterned capability for acquiring, validating, interpreting, sharing, and applying strategically relevant information, irrespective of whether those activities are performed by a dedicated intelligence unit. In AGMEs, capability is distributed across relationships and routines. A miner receives a market update through a mobile group, verifies it with a buyer or cooperative, discusses its implications with colleagues, compares it with production cost, and modifies the timing or channel of sale. A safety warning is discussed after a near miss and incorporated into inspection or maintenance. A

change in licensing practice is clarified with officials before an enterprise commits resources. These are recognisable intelligence processes even when they are not labelled as CI.

This contextualisation also addresses a blind spot in dynamic-capabilities research. Informal enterprises are often treated as deficient versions of formal firms. Yet they can possess agile, relational, and improvisational sensing mechanisms. Their challenge is not necessarily an absence of information, but variable credibility, weak documentation, restricted institutional access, and limited capacity to convert knowledge into investment. The relevant theoretical question is therefore how dynamic capabilities are assembled under conditions of informality and resource scarcity.

Information processing, sensemaking, and learning

The observed relationship can further be understood through information-processing and organisational-learning perspectives. High uncertainty raises information requirements (Galbraith, 1973). If information capacity does not increase accordingly, decisions become reactive and exposed to error. CI reduces this mismatch by broadening the enterprise's field of attention and improving the relevance of signals used in decisions.

However, more information can also produce overload or confusion. Sensemaking is therefore crucial (Daft & Weick, 1984; Thomas *et al.,* 1993). Miners must interpret whether a reported rule change is official, whether a price movement is temporary, whether a technology is appropriate to local ore and scale, or whether a competitor practice can be safely imitated. Collective interpretation through cooperatives, associations, suppliers, regulators, and experienced operators can improve judgement, provided that power asymmetries and strategic misinformation are managed.

Learning completes the mechanism. Repeated disruption without reflection does not necessarily build resilience. Enterprises become more resilient when experience is encoded into altered routines: updated safety checks, diversified information sources, documented supplier alternatives, revised maintenance schedules, or clearer thresholds for suspending operations. Intelligence capability therefore supports resilience when it produces organisational memory rather than transient awareness.

Implications for formalisation and governance

The finding has implications for debates about formalisation. Formalisation policies often focus on registration, licensing, monitoring, and enforcement. These are important, but compliance-oriented approaches can neglect the information and capability deficits that make formal requirements difficult to navigate (Hilson & McQuilken, 2014; Spiegel, 2015). If official information is inaccessible, inconsistent, overly technical, or delayed, enterprises are pushed toward informal interpretation and reactive compliance.

A resilience-oriented governance model would treat regulatory communication as a capability-building function. Agencies would issue clear and timely updates, harmonise messages across departments, explain operational implications, and provide channels for clarification. Formalisation could then improve access to verified intelligence, training, technical assistance, finance, and markets rather than merely increasing surveillance. This would make institutional participation more instrumentally valuable to enterprises.

Practical and Policy Implications

The findings support several interventions that are feasible in a resource-constrained setting.

i). First, mining cooperatives and associations should develop **verified intelligence hubs**. These need not be technologically elaborate. A designated focal person could collect updates from responsible agencies, buyers, suppliers, and environmental authorities; verify them; translate them into accessible language; and circulate concise action notes.

ii). Second, stakeholders should establish a **district early-warning mechanism** covering regulatory changes, weather and flooding, shaft safety, disease outbreaks, price anomalies, buyer requirements, and environmental hazards. Mobile messaging is appropriate because it is already embedded in local information practice. Its speed should be paired with source identification, timestamps, correction procedures, and escalation channels.

iii). Third, enterprises should institutionalise **brief intelligence routines**. Weekly or fortnightly discussions can review changes in regulation, prices, safety, equipment, and community relations. Decisions and responsibilities should be recorded. Even simple notebooks or mobile forms can build organisational memory.

iv). Fourth, regulatory and technical agencies should provide **plain-language intelligence products** rather than relying only on legal notices or occasional workshops. Short guides should explain what has changed, who is affected, required actions, deadlines, costs, and points of contact.

v). Fifth, resilience training should integrate information skills with operational planning. Miners should learn how to verify sources, compare buyer offers, interpret regulatory notices, identify misinformation, calculate response options, conduct risk assessment, and document lessons from incidents.

vi). Sixth, the intelligence system should be inclusive. Women, younger miners, informal operators, community representatives, and workers at different organisational levels must be represented in information and decision structures. Exclusion weakens both the coverage of environmental sensing and the legitimacy of collective responses.

vii). Finally, intelligence support must be connected to **action resources**. Information about safer technologies or compliance requirements will have limited effect without finance, equipment access, technical advice, and realistic transition periods. CI should therefore be incorporated into a wider ecosystem of enterprise development and responsible mining.

Theoretical Contribution

The study proposes an intelligence-to-resilience pathway appropriate to institutionally volatile and informal enterprise settings:

$$\begin{aligned} &Environmental\ signals \rightarrow systematic\ monitoring \rightarrow verification\ and\ interpretation \\ &\rightarrow decision\ relevance \rightarrow adaptive\ action \rightarrow learning \\ &\rightarrow strategic\ resilience \end{aligned}$$

This pathway refines Dynamic Capabilities Theory in three ways. First, it specifies CI as a practical microfoundation of sensing. Second, it shows that sensing in informal enterprises is distributed through stakeholder relationships rather than confined within formal organisational boundaries.

Third, it positions credibility and accessibility as central properties of intelligence capability under institutional ambiguity.

The study also contributes to resilience scholarship by identifying information capability as an antecedent of anticipation, continuity, flexibility, risk coping, and learning. Much resilience research focuses on resources, structures, leadership, or post-crisis response. The present evidence demonstrates that enterprises' capacity to interpret their environment deserves equal attention.

Limitations and Future Research: Several limitations qualify the findings:
First, the cross-sectional design does not establish temporal order. Resilient enterprises may invest more in intelligence, creating reciprocal causality. Longitudinal research should measure intelligence routines before, during, and after identifiable regulatory, market, or environmental disruptions.

Second, both constructs were measured through self-reports from the same survey instrument. Common-method variance and social-desirability bias may inflate the observed association. Future studies should combine survey measures with external indicators such as production continuity, incident records, regulatory compliance, buyer diversification, response time, and recovery following disruption.

Third, although the enterprise was the intended unit of analysis, respondents occupied different roles. Operators, supervisors, managers, and owners may have unequal knowledge of enterprise-level routines. Future designs should prioritise key decision makers or obtain multiple respondents per enterprise and evaluate inter-rater agreement.

Fourth, the model uses a composite measure and simple regression. Further research should validate the dimensionality of CIC and SR through confirmatory factor analysis or PLS-SEM, report reliability and validity statistics in full, and test for endogeneity, nonlinearities, and alternative model specifications.

Fifth, the study is geographically bounded. Chegutu's institutional relationships, mining ecology, and market channels may differ from those of other districts and countries. Comparative research across Zimbabwean mining regions and other African ASGM settings would clarify transferability.

Finally, the present article intentionally examines only one objective. Subsequent studies may test whether stakeholder coordination transmits the influence of CI to resilience, and whether formalisation, financial capacity, digital access, gender, enterprise size, or environmental turbulence conditions the relationship.

Conclusion

This article examined one empirically tested objective from a broader study of artisanal gold-mining enterprises in Chegutu District: the relationship between competitive intelligence capability and strategic resilience. The evidence indicates a strong positive predictive association. Competitive intelligence capability explained 50.1% of the variance in strategic resilience, and its regression coefficient was positive and statistically significant.

The substantive conclusion is straightforward: in institutionally volatile environments, resilience depends partly on how well enterprises sense and interpret change. AGMEs that systematically monitor regulation, prices, buyer trends, environmental and safety requirements, technology, and other operators are better positioned to anticipate threats, sustain operations, revise strategies, manage risks, and learn from disruption.

The result does not mean that information alone is sufficient, nor does the cross-sectional design prove causality. Intelligence acquires strategic value when it is credible, timely, interpreted, connected to decisions, and supported by resources for action. For managers and policymakers, the priority is therefore to build accessible intelligence systems alongside finance, technology, training, coordination, and realistic formalisation pathways. For scholarship, the study demonstrates that competitive intelligence and dynamic capabilities are relevant beyond large formal firms and can illuminate adaptation within informal, resource-dependent enterprise systems.

Declarations

i). Conflict of interest: The author declares no conflict of interest.
ii). Funding: No external funding is reported for the study.
iii). Data availability: The underlying data contain information from participants in a sensitive and partly informal economic sector. Access should be considered subject to the study's ethical commitments and applicable institutional requirements.
iv). Ethics: Participation was voluntary and based on informed consent. Confidentiality and anonymity were maintained in the reporting of findings.

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