ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26feb1297

Integrating Behaviour-Based Safety and Organisational Culture through the Balanced Scorecard: A Contextual and Theoretical Foundation for the Behaviour–Culture–Balanced Scorecard Safety Framework (BC–BSC–SF) in Ghanaian Construction SMEs

Justine Adua Avogo[1]

[1]Department of Management, Signum Magnum College – Malta

Publication Date: 2026/03/18

Abstract: This article advances the Behaviour–Culture–Balanced Scorecard Safety Framework (BC–BSC–SF) as a contextual and theoretical foundation for addressing persistent safety management challenges in Ghanaian construction small and medium-sized enterprises (SMEs). It is developed through a critical synthesis of Ghana's construction sector context, regulatory history, and operational realities, alongside a structured review of recent global and regional safety management literature. The synthesis suggests that conventional systems remain largely impractical for most Ghanaian SMEs due to high costs, informality, and capacity limitations, while participatory models often lack structured monitoring. The BC–BSC–SF is conceptually structured to address these issues by integrating low-cost digital tools, measurable key performance indicators (KPIs), and leadership routines into daily workflows, thus outlining a practical and scalable conceptual approach tailored to SME needs. The framework is conceptually designed to support future empirical evaluation using mixed-methods research, establishing a foundation for robust policy development and practical adoption. In conclusion, the BC–BSC–SF offers a comprehensive, evidence-based framework that unifies behaviour, culture, governance, usability, and cost-effectiveness, providing a structured conceptual foundation for improving construction safety management and offering a conceptually transferable framework for similar contexts in low- and middle-income countries. All abbreviations, such as SME (small and medium-sized enterprise), BSC (Balanced Scorecard), and KPI (key performance indicator), are defined at first mention in this abstract.

Keywords: *Behaviour-Based Safety, Organisational Culture, Balanced Scorecard, Construction SMEs, Ghana, Safety Framework, Digital Tools.*

How to Cite: Justine Adua Avogo (2026) Integrating Behaviour-Based Safety and Organisational Culture through the Balanced Scorecard: A Contextual and Theoretical Foundation for the Behaviour–Culture–Balanced Scorecard Safety Framework (BC–BSC–SF) in Ghanaian Construction SMEs. *International Journal of Innovative Science and Research Technology*, 11(2), 3238-3245. https://doi.org/10.38124/ijisrt/26feb1297

I. INTRODUCTION

A. Background and Motivation

Effective occupational health and safety (OHS) management in construction is a critical global concern, with heightened challenges in low- and middle-income countries such as Ghana. For example, Ghana's construction sector has recorded over 1,000 occupational injuries annually in recent years (GSS, 2024), underscoring the urgency of improved safety management. Informal practices, resource constraints, and fragmented regulatory oversight increase risks for workers, particularly within the small and medium-sized enterprises (SMEs) that dominate Ghana's sector.

B. Legal and Regulatory Context

Enforcement challenges persist, as studies indicate that regulatory inspections occur less than once per year for the average SME contractor, with limited follow-up on non-compliance (Sherratt & Aboagye-Nimo, 2022). Informal employment practices and limited site documentation further undermine regulatory effectiveness, leaving significant gaps in worker protection.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26feb1297

This article reviews Ghana's construction sector and examines recent global and regional research on BBS, WCC, and BSC (2021–2025), while also critically evaluating alternative approaches such as ISO 45001 and participatory models. ISO 45001, while comprehensive and standardised, is often inaccessible to most SMEs in Ghana due to its high implementation costs, technical expertise requirements, and complex documentation. Participatory models, though effective in promoting worker engagement and ownership of safety, frequently lack the formal monitoring mechanisms required for sustained compliance and continuous improvement. This comparative critique demonstrates that neither existing standards nor participatory models fully bridge the behavioural, cultural, and governance gaps present in Ghanaian construction SMEs.

C. Contribution of the Article

This article contributes to construction safety scholarship by advancing a novel, context-specific framework that uniquely integrates behavioural safety practices, organisational culture mechanisms, and strategic performance measurement, specifically for the Ghanaian SME context. This integration fills a gap in the literature, as few models combine these elements for low- and middle-income economies. By grounding the BC–BSC–SF in Ghana's regulatory and operational realities, the study extends safety management theory and offers a foundation for empirical validation and future policy development.

This article is derived from a structured contextual and theoretical synthesis undertaken in two stages: first, an in-depth analysis of Ghana's construction industry, regulatory evolution, and SME operational realities; and second, a critical review of contemporary behavioural, cultural, and strategic safety management literature (2021–2025), which together inform the conceptual design of the BC–BSC–SF.

II. LITERATURE REVIEW

This section situates the research within Ghana's construction industry, describing the regulatory history, sector structure, and operational realities that shape SME safety management. It systematically links contextual constraints to the rationale for an integrated, practical safety framework, setting the stage for the literature review.

A. Historical Evolution of Safety Regulation (1987–2025)

This subsection summarises Ghana's gradual regulatory formalisation and the persistent enforcement and resource challenges affecting SMEs.

Safety regulation in Ghana has gradually formalised but faces persistent practical challenges. The Workmen's Compensation Law (PNDC Law 187) provided compensation but had a limited preventive effect, especially for workers excluded due to informality (Boadu, Wang & Sunindijo, 2020; Torm & Oehme, 2024). Later acts, such as the Environmental Protection Agency Act (1994) and the Environmental Assessment Regulations (L.I. 1652), strengthened environmental oversight, but worker safety was insufficiently addressed and rarely integrated with labour inspections (Baghdadi, 2024; Gulis et al., 2022). The National Building Regulations (L.I. 1630, 1996) introduced standards for structural safety, fire protection, and ventilation, but enforcement lagged behind the growth of the SME sector (Boadu et al., 2020). The Labour Act (Act 651, 2003) clarified employer and worker responsibilities, such as safe work systems, hazard controls, and PPE use (Adebowale & Agumba, 2024). Despite these advances, fragmented enforcement weakened deterrence, particularly for SMEs, with recent studies suggesting that inspections often occur less than once per contractor annually and enforcement rarely has meaningful consequences (Fan et al., 2022; Sherratt & Aboagye-Nimo, 2022).

The Ghana Building Code (GS 1207:2018) aligned national practice with international benchmarks (World Bank, 2023). Still, uneven implementation is linked to cost, technical knowledge, and a lack of awareness (Adzivor et al., 2024). From 2021 to 2025, research has consistently reported high injury rates, underfunded inspectorates, and limited ISO 45001 adoption among SMEs (Asiedu et al., 2024; Liu et al., 2023; Jääskeläinen, Tappura & Pirhonen, 2022; Owusu, Chan & Wang, 2021).

In summary, while Ghana's regulatory regime has made formal advances, persistent shortcomings, including informality, weak enforcement, and resource constraints, remain. These challenges highlight the need for simple, low-cost, and easily implemented models like the BC–BSC–SF. The following section examines the industry structure and operational realities that further influence safety management in Ghanaian construction SMEs.

B. Industry Structure and SME Operational Realities

Here, the structure and operational realities of Ghana's construction sector are analysed, highlighting the dominance of SMEs and their unique constraints. Compared to other West African economies, Ghana's SME construction sector is notable for its high proportion of informal firms and limited access to formal safety resources, further exacerbating safety challenges (Al-Otaibi et al., 2025).

The construction sector makes a substantial contribution to Ghana's GDP growth, recording a 10.7% increase in the last quarter of 2024 (Ghana Statistical Service, 2025; Al-Otaibi et al., 2025). This macro-level expansion has concrete safety implications: intensified construction activity, compressed timelines, increased subcontracting, and rapid workforce mobility place additional pressure on SMEs, which often respond through overtime work, informal recruitment, and relaxed supervision rather than structured safety planning (Aidoo et al., 2024; Boakye et al., 2022). However, advances in safety management have not kept pace with this economic rise. SMEs dominate the sector, representing over 90% of businesses (GSS, 2024), a fact consistently highlighted in both government and academic reports (Ghana Statistical Service, 2024; Boakye et al., 2022). Their operations frequently rely on informal labour, fragmented supervision, and limited investment in safety infrastructure, all of which increase occupational risks

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26feb1297

(Boakye et al., 2022; Aidoo et al., 2024). Regulatory frameworks, such as Ministry of Works and Housing registration and Ministry of Roads and Highways classifications, set baseline expectations, but SMEs often lack the internal structures required to operationalise these standards (Boadu et al., 2021).

These structural conditions impose chronic constraints on SMEs in finance, supervision, technology, and regulation, collectively undermining their ability to adopt comprehensive safety management systems.

C. Systemic Drivers of SME Safety Deficits

This subsection identifies and explains the interconnected financial, regulatory, technological, and human factors that create persistent safety challenges for SMEs.

Multiple studies show that Ghanaian construction SMEs face interconnected financial, regulatory, and organisational constraints. Financial pressures, informality, weak enforcement, limited managerial capacity, and low technology adoption interact to constrain preventive investment, weaken documentation and compliance, reduce regulatory deterrence, and slow organisational learning within Ghanaian construction SMEs.

These challenges create ongoing safety issues, including irregular training, incomplete fall protection, unsafe access and exit points, and inconsistent electrical safety (Adzivor et al., 2024; Boadu et al., 2020). This highlights the need for practical, easy-to-use, and affordable frameworks rather than complex formal systems.

These systemic drivers directly inform the architecture of the BC–BSC–SF. Financial constraints highlight the need for low-cost tools; informality underscores the importance of simple behavioural routines; weak enforcement reinforces the necessity of internal cultural drivers; capacity gaps justify BSC-style governance structures for monitoring; and limited technology adoption supports the inclusion of usability and cost-effectiveness as mediating constructs. This mapping of contextual factors to framework components positions the BC–BSC–SF as an empirically grounded, practical response to the constraints shaping safety outcomes in Ghanaian construction SMEs. The following section provides a detailed breakdown of how each factor is integrated into the framework's design.

Table 1. Systemic Constraints Affecting Safety Management in Ghanaian Construction SMEs and their Alignment with BC–BSC–SF Constructs

Systemic Factor	Description	Key Sources	Safety Implications	BC–BSC–SF Construct
Financial Constraints	Limited financial capacity for preventive safety investment and formal management systems	Liu et al. (2023); Bageis (2024)	Delayed PPE purchase; inadequate scaffolding	Cost-effectiveness
Informality	High levels of informal employment and undocumented work practices	Boadu et al. (2020)	Weak compliance, inconsistent training	Behaviour & Culture
Insufficient Enforcement	Low inspection frequency and limited regulatory enforcement capacity	Fan et al. (2022); Sherratt & Aboagye-Nimo (2022)	Limited deterrence; persistent unsafe practices	Culture (leadership signalling)
Limited Managerial Capacity	Limited availability of trained safety personnel and supervisory expertise	Adzivor et al. (2024)	Poor hazard analysis; unstructured supervision	BSC governance
Low Technology Adoption	Low adoption of digital tools for hazard reporting and safety learning	Hashmi et al. (2024)	Slow reporting; repetitive incidents	Usability

Table 1 summarises the systemic constraints shaping SME safety behaviour and links each constraint to its corresponding BC–BSC–SF component. To recapitulate: financial constraints align with cost-effectiveness tools; informality is addressed through documentation routines; internal cultural drivers mitigate enforcement gaps; capacity gaps are bridged through governance and KPI monitoring; and technology limitations are addressed through usability and accessible digital tools. These linkages provide a clear rationale for the framework's structure and inform the measurable variables used in the subsequent evidence-anchored breakdown.

D. Evidence-Based Mapping of Safety Management Factors

This final subsection outlines how each contextual constraint may be operationalised as a measurable variable, providing a foundation for empirical validation of the proposed framework in later sections.

To illustrate how the framework may be empirically examined in future studies, the BC–BSC–SF incorporates measurable dimensions for each systemic constraint identified in Ghanaian SMEs. For example:

- Financial constraints: cost-effectiveness indicators, such as preventive investment scores
- Informality: documentation and reporting indices (e.g., percentage of projects with completed safety logs)
- Enforcement: self-reported inspection frequency and compliance checks
- Capacity: supervisor competence scales
- Technology limitations: usability items based on the Technology Acceptance Model (TAM)

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26feb1297

These variables provide a structured basis for future empirical investigation of the framework. These variables are presented illustratively to demonstrate conceptual testability rather than to prescribe measurement instruments or analytical procedures.

Detailed operational definitions, instruments, and analytical techniques are intentionally excluded from this article and reserved for subsequent empirical studies. This section has established the sectoral context, key constraints, and the rationale for an integrated, SME-oriented safety framework in Ghana.

E. Socio-Technical Systems Theory and Integration Rationale

➢ *Rationale for Integration: Addressing Unresolved Gaps*

This subsection outlines the persistent conceptual, empirical, and contextual gaps that existing safety frameworks fail to address for Ghanaian construction SMEs, setting up the rationale for the BC–BSC–SF.

Integration is grounded in socio-technical systems theory, which emphasises the interdependence of human behaviour, cultural norms, and organisational controls. In highly informal or resource-constrained LMIC contexts, the practical application of socio-technical systems theory is often limited by weak administrative capacity and the absence of formal organisational structures. By combining BBS, WCC, and BSC insights, the BC–BSC–SF responds to calls for holistic frameworks capable of addressing multi-layered safety challenges in dynamic, resource-constrained environments (Barile et al., 2024).

This study identifies three persistent gaps:

- *Conceptual gap:* Most models treat BBS, WCC, and BSC as separate domains rather than interconnected mechanisms. Few frameworks link leading indicators → cultural levers → BSC governance (Golabchi et al., 2024; Jääskeläinen et al., 2022).
- *Empirical gap:* There is little causal or longitudinal evidence for integrated safety models in LMIC SME settings; most Ghanaian studies remain descriptive or cross-sectional (Barile et al., 2024; Boadu et al., 2021).
- *Contextual gap:* High informality, weak enforcement, resource constraints, and high turnover remain largely unaddressed in existing frameworks (Boakye et al., 2022; Adzivor et al., 2024).

Collectively, these gaps underscore the need for a framework explicitly designed for SMEs, one that is simplified, affordable, behaviour-led, culture-reinforced, and performance-monitored. Previous models have often failed for Ghanaian SMEs because they require resources, administrative capacity, or regulatory enforcement that are not present in most SME settings. The BC–BSC–SF addresses these points by prioritising low-cost, easy-to-implement practices and building on existing informal routines.

In summary, this section has articulated the conceptual, empirical, and contextual justification for integrating behavioural, cultural, and governance mechanisms within a single SME-oriented safety framework.

➢ *Framework Constructs and Empirical Foundations*

Having established the need for integration, this subsection describes each of the BC–BSC–SF's five core constructs, explaining their empirical basis and their role in the framework's design.

The BC–BSC–SF includes five clearly defined constructs:

- *Behaviour-Based Safety (BBS):* operationalised through observation and feedback frequency (Curcuruto & Griffin, 2023; Yang et al., 2023).
- *Workplace Culture Change (WCC):* leadership commitment and worker participation indices (Mezentseva et al., 2023; Adzivor et al., 2024).
- *Balanced Scorecard (BSC):* KPI review cadence and integration of safety metrics with financial and internal process indicators (Mayo-Álvarez et al., 2024).
- *Usability:* perceived ease of use/usefulness based on TAM (Podrecca et al., 2024).
- *Cost-effectiveness:* ROI and cost–benefit measures of preventive effort (Wu, Wang & Kang, 2025).

Together, these constructs synthesise key literature into a practical, context-sensitive framework. BBS tracks frontline behaviours; culture indicators reflect leadership and participation; BSC measures embed safety into management; and usability/cost-effectiveness ensure SME adoption by focusing on ease of use and value.

The BC–BSC–SF clarifies how these constructs interact in practice: behavioural routines act as leading indicators, culture reinforces behaviour, BSC governance provides structured review, and usability/cost-effectiveness determine sustainability. This mapping from literature to framework supports theoretical coherence and defines testable hypotheses. The following section presents the framework's architecture and operational mechanisms.

III. CONCEPTUAL FRAMING AND ANALYTICAL LOGIC

This section clarifies the conceptual contribution of the BC–BSC–SF and explains the analytical logic underpinning the framework, without detailing empirical execution.

A. Conceptual Contribution to SME Safety Management

This subsection frames the BC–BSC–SF as a minimum viable, context-appropriate safety management system for Ghanaian construction SMEs, integrating behaviour, culture, and strategy into a unified, actionable model.

Conceptually, the BC–BSC–SF is presented as a 'minimum viable' safety system—that is, the simplest

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26feb1297

possible set of practices and routines that can achieve meaningful improvements in SME safety performance. This model integrates behaviour, culture, and strategy in a way specifically tailored to the operational realities of Ghanaian construction SMEs. It reframes safety from a mere compliance obligation to a practical, cost-effective management tool (Muraba, Mamogobo & Thango-Mabizela, 2024).

Accordingly, the BC–BSC–SF is positioned as a foundational safety management framework intended to structure future empirical inquiry rather than to serve as a prescriptive implementation model.

B. Analytical Design and Evidence Pathways

The framework has been conceptually structured to support future empirical evaluation, potentially using mixed-methods approaches such as surveys, interviews, and pilot case studies appropriate to SME construction environments. This article, however, remains focused on establishing the contextual, theoretical, and structural foundations of the BC–BSC–SF.

C. Integrative Frameworks and Empirical Gaps

Despite growing recognition that behaviour, organisational culture, and performance measurement are mutually reinforcing determinants of safety outcomes, existing studies rarely test these elements as an integrated system, particularly within SME-dominated construction environments in low- and middle-income countries. Empirical research remains fragmented, often focusing on single dimensions or short-term outcomes, with limited attention to usability, cost-effectiveness, or governance alignment. This unresolved gap justifies the development of the BC–BSC–SF as a foundational framework intended to be empirically examined in subsequent mixed-method research.

IV. FRAMEWORK ARCHITECTURE AND INTERPRETIVE DISCUSSION

This section presents the architectural structure of the BC–BSC–SF and illustrates how its five constructs interact to address safety challenges faced by Ghanaian construction SMEs.

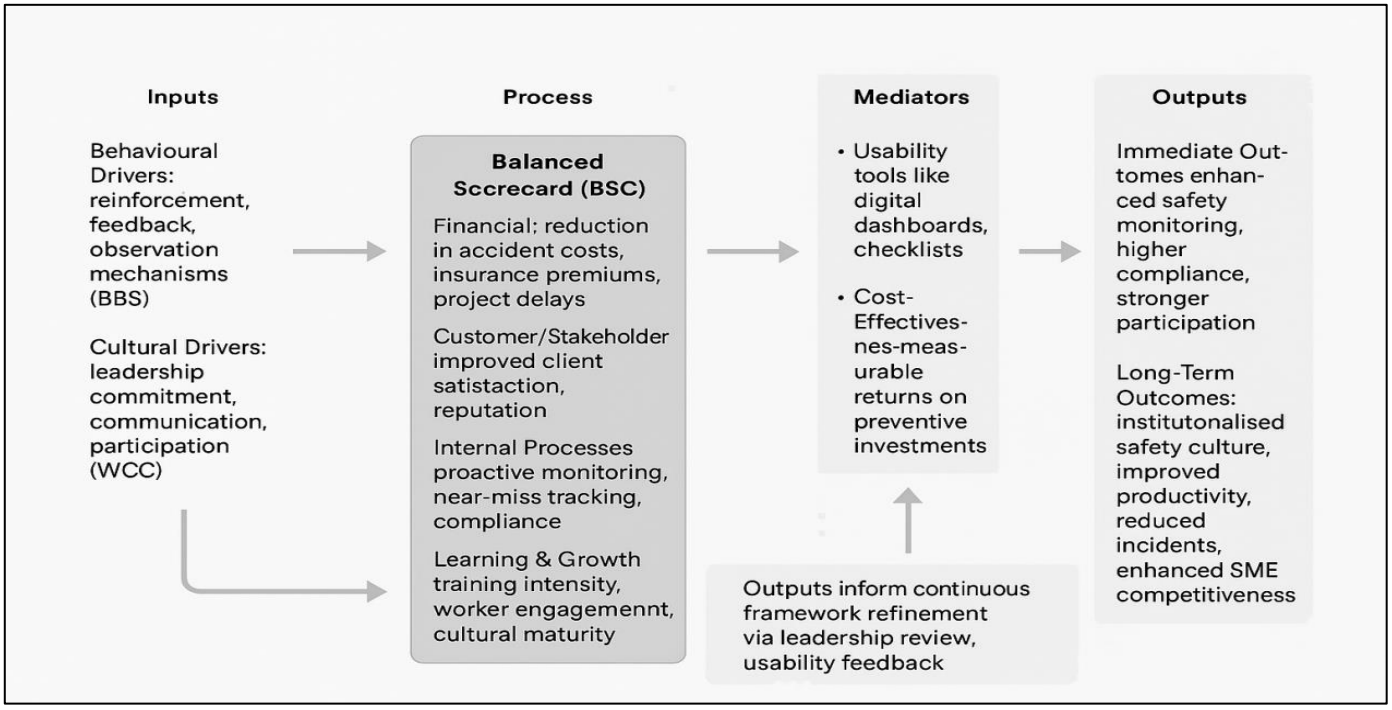

Fig 1. Conceptual Structure of the Behaviour–Culture–Balanced Scorecard Safety Framework (BC–BSC–SF) - Constructs and Linkages.

Figure 1 illustrates the interaction between contextual constraints, behavioural routines, cultural reinforcement, BSC governance, usability, and cost-effectiveness as they relate to safety performance in SMEs. The figure provides a visual summary of how the framework's five interlocking elements translate contextual constraints into measurable outcomes. This visualisation reinforces the framework's integrated nature and aids understanding of its practical application.

In relation to the central question, why Ghanaian construction SMEs require an integrated model that aligns behaviour, culture, and strategy, Figure 1 consolidates these dimensions into a single pathway from contextual constraints to measurable safety outcomes, clarifying how the BC–BSC–SF is expected to operate in practice.

The following subsections detail each construct and its operational mechanism, illustrating how the BC–BSC–SF addresses the practical realities faced by SMEs.

A. Behavioural Mechanisms

Embedding safety tasks into daily workflows, such as integrating safety observations into routine site inspections,

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26feb1297

improves behavioural consistency and reduces reporting fatigue (Jääskeläinen et al., 2022; Cagno et al., 2024). For instance, a Ghanaian SME piloting daily safety observation checklists alongside regular toolbox talks has been associated in prior studies with reported short-term reductions in near-miss incidents, particularly where reinforcement and supervisory engagement are present (Boakye et al., 2022). Incremental habit formation is essential in SME settings where formal systems are weak.

International systematic reviews show that BBS interventions reduce incidents in the short term, but their long-term impact depends on reinforcement through supervision, peer observation, and organisational culture (Bowdler et al., 2023; Yang et al., 2023). Jääskeläinen, Tappura & Pirhonen (2022) argue that behavioural gains require alignment with measurement systems and supportive leadership to prevent decay.

In SSA, studies confirm that peer-to-peer observation, participation in toolbox meetings, and supervisor signaling improve safety climate (Adebowale & Agumba, 2024). However, evidence regarding SMEs remains sparse and predominantly descriptive. This highlights a research gap in the long-term effectiveness of BBS approaches for SME settings, reinforcing the need for frameworks that integrate behavioural interventions with supportive leadership and measurement systems, as proposed in the BC–BSC–SF.

B. Cultural Reinforcement

Leadership commitment and peer-based participation strengthen cultural norms. In practice, this may involve owners and supervisors publicly recognising safe behaviour during weekly meetings, or incorporating cultural storytelling into toolbox talks to reinforce shared values (Osei & Asantewa, 2025). These mechanisms drive sustainable behaviour change more effectively than one-off training or PPE campaigns (Boakye et al., 2022; Hayashi et al., 2023).

Safety culture is shaped by shared norms, leadership commitment, and robust communication structures (Mezentseva et al., 2023). In the context of SMEs, organisational culture is strongly influenced by owner–manager attitudes, supervisory behaviours, and the prevalence of informal networks. Ghanaian research demonstrates that leadership signaling, targeted training, and systematic information-sharing are significant predictors of compliance; however, their effectiveness is constrained by limited resources and weak oversight mechanisms (Boadu et al., 2021; Adzivor et al., 2024).

C. Balanced Scorecard Governance

BSC reviews create structured learning forums in which supervisors, managers, and forepersons reflect on leading indicators, convert lessons into actions, and align prevention with project performance goals (Mezentseva et al., 2023; Podrecca et al., 2024). For SMEs, this governance mechanism compensates for thin inspection regimes.

The Balanced Scorecard integrates financial and non-financial indicators, providing strategic alignment and a monitoring cadence. For example, a simplified KPI for SMEs could be the percentage of weeks in which a safety checklist is completed and reviewed by a supervisor. Studies such as Mayo-Álvarez et al. (2024) and Jääskeläinen et al. (2022) demonstrate that aligning safety KPIs across the BSC's four perspectives (financial, customer/stakeholder, internal process, learning & growth) improves organisational learning and accountability.

However, BSC adoption among SMEs remains limited due to administrative burden, cost, and limited managerial expertise (Benková et al., 2020; Kumar, 2024). These limitations underscore why a simplified version, such as the BSC component of the BC–BSC–SF, is necessary, especially one that emphasises low-frequency KPI reviews and visual tracking tools appropriate for SMEs. This connection further illustrates why integrating BSC with behaviour and culture within a single, SME-focused framework directly addresses the gaps identified in the literature.

D. Usability and Cost-Effectiveness as Mediators

SMEs adopt systems they can realistically implement. Usability (ease of use, clarity, low administrative burden) and cost-effectiveness (value, ROI, affordability), therefore, mediate framework uptake and sustainability (Adzivor et al., 2024; Podrecca et al., 2024). Visual indicators, mobile checklists, and gradual scaling reduce complexity and cost barriers (Bayramova et al., 2023; Kwon et al., 2024).

The BC–BSC–SF conceptualises usability and cost-effectiveness as mediating conditions that shape framework adoption and sustainability, emphasising alignment with existing informal routines rather than imposing new administrative burdens.

A structured interpretive logic is proposed to guide future empirical assessment of the framework.

E. Policy and Procurement Implications

The BC–BSC–SF highlights the need for more substantial alignment between construction safety governance and public procurement systems in Ghana. Safety-related key performance indicators can be embedded within contractor prequalification and evaluation processes, enabling regulatory bodies and procuring entities to incentivise consistent safety practices among construction SMEs. Such alignment would encourage contractors to institutionalise behavioural monitoring, cultural reinforcement, and routine safety reporting as part of standard project delivery requirements rather than discretionary activities.

The framework also underscores the importance of improving SME access to cost-effective safety management tools. Targeted policy interventions may include facilitating the adoption of low-cost digital safety reporting platforms, standardised behavioural observation checklists, and simplified scorecard templates that reduce administrative burden while enhancing visibility of safety performance. Policymakers should anticipate potential challenges in aligning these tools with existing procurement and regulatory

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26feb1297

systems, and provide training or transitional support to ease integration. These measures would support broader participation by resource-constrained SMEs and improve the consistency of safety data across projects.

In addition, the framework highlights the value of targeted capacity-building initiatives for SME owners, site supervisors, and forepersons. Leadership and supervisory training programmes that emphasise behavioural reinforcement, safety communication, and cultural change can strengthen frontline implementation of safety policies. When combined with procurement incentives and regulatory oversight, such initiatives can contribute to sustained improvements in construction safety outcomes.

V. CONCLUSION AND DIRECTIONS FOR FUTURE RESEARCH

This article has advanced the BC–BSC–SF as an integrated, context-sensitive safety management framework designed to address persistent gaps in Ghanaian construction SMEs.

This article presents the BC–BSC–SF as an integrated, context-sensitive framework to address persistent safety management gaps in Ghanaian construction SMEs. The framework unifies behavioural, cultural, governance, usability, and cost-effectiveness elements, offering a scalable, evidence-based model for policy implementation and research.

Limitations of this study stem from the conceptual nature of the framework and its reliance on secondary literature and contextual analysis, rather than primary empirical data. Future research should incorporate empirical case studies and pilot implementations to strengthen the evidence base and assess real-world applicability.

The BC–BSC–SF is presented here as a conceptual and contextual foundation rather than an implementation manual, with its empirical testing, validation, and operationalisation intentionally deferred to subsequent studies.

ACKNOWLEDGMENT

This manuscript is derived from the corresponding author's doctoral research. It is based conceptually on Chapters Two and Three of the PhD thesis, which examine Ghana's construction SME context and the theoretical foundations of integrated safety management respectively. Appreciation is extended to the Department of Management at Signum Magnum College, especially Professor Michael Sunday Agba and Professor Helmut Siller, for their supervision and academic support.

REFERENCES

[1]. Adebowale, O. J., & Agumba, J. N. (2024). A Systematic Review of Challenges Undermining the Efficacy of Construction Health and Safety Regulations in Major African Countries. https://doi.org/10.5130/AJCEB.v24i4/5.9059

[2]. Adzivor, E.K., Emuze, F., & Das, D.K. (2023). Indicators for safety culture in SME construction firms: a Delphi study in Ghana.Journal of Financial Management of Property and Construction13 November 2023; 28 (3): 293–316.https://doi.org/10.1108/JFMPC-04-2022-0020

[3]. Aidoo, I., Fugar, F., Adinyira, E., & Danso, A.K. (2025). Organisational Barriers to Resilient Construction Safety Management Systems. AFRICAN JOURNAL OF APPLIED RESEARCH,11(1), 1-17.https://doi.org/10.26437/ajar.v11i1.822

[4]. Al-Otaibi, A., Bowan, P. A., Alabdullatief, A., Albaiz, M., & Salah, M. (2025). Barriers to Sustainable Building Project Performance in Developing Countries: A Case of Ghana and the Kingdom of Saudi Arabia.Sustainability,17(8), 3539. https://doi.org/10.3390/su17083539

[5]. Asiedu, M. T., Amegah, K. E., & Anane, M. (2024). Prevalence and associated factors of occupational injuries in an industrial city in Ghana. PLOS ONE, 19(3): e0301339. https://doi.org/10.1371/journal.pone.0301339 (Scopus) PLOS

[6]. Bageis, A. S. (2024). An Investigation into the Causes of Payment Delays and Deliberate Delay Tactics in Public Construction Projects in Saudi Arabia.Buildings,14(6), 1792. https://doi.org/10.3390/buildings14061792

[7]. Barile, B., Alfano, V., Guido, G., & Perri, A. (2024). Causal impact evaluation of occupational safety policies on firms' performance: Evidence from Italy. Scientific Reports, 14, 6201. https://doi.org/10.1038/s41598-024-60348-4

[8]. Bayramova, A., Edwards, D. J., Roberts, C., & Rillie, I. (2023). Constructs of leading indicators: A synthesis of safety literature.Journal of Safety Research,85, 469–484. https://doi.org/10.1016/j.jsr.2023.04.015s

[9]. Benková, E., Gallo, P., Balogová, B., & Nemec, J. (2020). Factors Affecting the Use of Balanced Scorecard in Measuring Company Performance. Sustainability, 12(3), 1178. https://doi.org/10.3390/su12031178 MDPI

[10]. Boakye, M. K., Adanu, S. K., Adzivor, E. K., Coffie, G. H., & Ayimah, J. C. (2022). Building construction artisans' level of access to personal protective equipment (PPE) and perceived barriers and motivators to its use. Journal of Environmental and Public Health, 2022, 4870731. https://doi.org/10.1155/2022/4870731

[11]. Boadu,F., Sunindijo, R.Y., Wang, C.C., & Frimpong, S. (2022). Client-led promotion of health and safety through the procurement process on public construction projects in developing countries. Safety Science,147. https://doi.org/10.1016/j.ssci.2021.105605.

[12]. Boadu, E. F., Wang, C. C., & Sunindijo, R. Y. (2021). Challenges for occupational health and safety enforcement in the construction industry in Ghana. Construction Economics and Building, 21(1), 1–21. https://doi.org/10.5130/AJCEB.v21i1.7482

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26feb1297

[13]. Bowdler, M., Steijn, W. M. P., & van der Beek, D. (2023). Effective components of behavioural interventions aiming to reduce injury within the workplace: A systematic review. Safety, 9(3), 46. https://doi.org/10.3390/safety9030046

[14]. Cagno, E., Accordini, D., Neri, A., Negri, E., & Macchi, M. (2024). Digital solutions for workplace safety: An empirical study on their adoption in Italian metalworking SMEs. Safety Science. 177. https://doi.org/10.1016/j.ssci.2024.106598.

[15]. Curcuruto, M., & Griffin,M.A.(2023). Upward safety communication in the workplace: How team leaders stimulate employees' voice through empowering and monitoring supervision. Safety Science, 157. https://doi.org/10.1016/j.ssci.2022.105947.

[16]. Daniel, E.I., Olalekan S.O., Nnaemeka, I.N., Emuze, F.A., & Chinyio, E. (2025). The Use of Digital Technologies in Construction Safety: A Systematic Review. Buildings, 15(8). https://doi.org/10.3390/buildings15081386.

[17]. Fan, F., Yeung, A.C.L., Yiu, D.W.Y., & Lo, C.K.Y.(2022). Safety regulation enforcement and production safety: The role of penalties and voluntary safety management systems. International Journal of Production Economics,248, https://doi.org/10.1016/j.ijpe.2022.108481.

[18]. Ghana Statistical Service. (2024). Ghana construction sector report 2023–2024. Accra: GSS.

[19]. Gulis, G., Krishnankutty, N., Boess, E. R., Lyhne, I., & Kørnøv, L. (2022). Environmental Impact Assessment, Human Health and the Sustainable Development Goals. International journal of public health, 67, 1604420. https://doi.org/10.3389/ijph.2022.1604420

[20]. Hashmi, F., Hassan, M. U., Zubair, M. U., Ahmed, K., Aziz, T., & Choudhry, R. M. (2024). Near-Miss Detection Metrics: An Approach to Enable Sensing Technologies for Proactive Construction Safety Management. Buildings, 14(4), 1005. https://doi.org/10.3390/buildings14041005

[21]. Hayashi, H., Li, Y., Sussman, D. D., Okuzono, S., Viswanath, K., & Kawachi, I. (2023). A scoping review of interventions to improve OSH of construction workers. American Journal of Health Promotion, 37(8), 1162–1170. https://doi.org/10.1177/08901171231193783

[22]. Kumar, S., Lim, W.M., Sureka, R., Jabbour, C.J.C., & Bamel, U. (2024). Balanced scorecard: trends, developments, and future directions. Review of Managerial Science, 18, 2397–2439. https://doi.org/10.1007/s11846-023-00700-6

[23]. Kwon, Y. H., Kwon, Y. B., Nwagbala, D. C., & Park, J. Y. (2024). The Cognitive Load Limits of Multiple Safety Signs. Buildings, 14(8), 2391. https://doi.org/10.3390/buildings14082391

[24]. Mayo-Álvarez, L., Del-Aguila-Arcentales, S., & Alvarez-Risco, A. (2024). Innovation using dynamic balanced scorecard design as an industrial safety management system in a company in the mining metallurgical sector. Journal of Open Innovation: Technology, Market, and Complexity, 10(3), 100362. https://doi.org/10.1016/j.joitmc.2024.100362

[25]. Mezentseva, A., Gracia, F.J., Silla, I., & Martínez-Córcoles, M. (2023). The role of empowering leadership, safety culture and safety climate in the prediction of mindful organizing in an air traffic management company. Safety Science, 168. https://doi.org/10.1016/j.ssci.2023.106321.

[26]. Muraba, J., Mamogobo, M., & Thango-Mabizela, B. (2024). The Balanced Scorecard Methodology: Performance Metrics and Strategy Execution in SMEs: A Systematic Review. 10.20944/preprints202410.1598.v1.

[27]. Osei, K., & Asantewa, D. (2025). Cultural storytelling and safety communication in Ghanaian construction SMEs. Safety Science, 175, 105517.

[28]. Podrecca, M., Molinaro, M., Sartor, M., & Orzes, G. (2024). The impact of ISO 45001 on firms' performance: An empirical analysis. Corporate Social Responsibility and Environmental Management, 31(5), 2157–2174. https://doi.org/10.1002/csr.2782

[29]. Transparency International. (2023). Corruption perceptions index 2023. Berlin: Transparency International.

[30]. World Bank. (2023). Ghana economic update: Enhancing construction sector productivity. Washington, DC: World Bank.

[31]. Wu, Y., Wang, J., & Kang, J. (2025). Cost–benefit evaluation of preventive safety investments in construction SMEs. Journal of Safety Research, 92, 45–58.

[32]. Yang, E., Kim, Y., & Rodgers, C. (2023). Effects of a behavior-based safety observation program: Promoting safe behaviors and safety climate at work. WORK, 77(1), 133-145. https://doi.org/10.3233/WOR-220465