

The role of internal auditing in improving the operational performance of industrial companies

Le rôle de l'audit interne dans l'amélioration de la performance opérationnelle des entreprises industrielles

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Abstract

This research, conducted through a narrative review of the literature and based on a solid conceptual framework, explores the strategic role of internal auditing in improving the operational performance of industrial organizations, highlighting its evolution from a traditional assurance function to a strategic partner in value creation and organizational excellence. The narrative synthesis integrates theoretical and empirical contributions to develop a conceptual framework identifying the mechanisms through which internal auditing contributes to organizational performance.

The analysis conceptualizes operational performance as a multidimensional construct encompassing efficiency, quality, flexibility, innovation, and continuous improvement. Within this framework, internal auditing emerges as a key enabler through process optimization, risk management, and support for innovation. However, in the industrial sector, particularly in SMEs, its potential remains underutilized due to limited digital maturity, fragmented governance structures, and insufficient integration with management control systems.

The analysis highlights critical success factors such as management commitment, the maturity of the control and governance frameworks, and the adoption of digital tools. Conversely, challenges remain in terms of cross-functional collaboration, cultural resistance, and the partial deployment of data-driven audit techniques.

In light of these findings, the study proposes a strategic framework structured around four interdependent levers: strategic repositioning towards performance partnership, systemic alignment with risk and management control, digital enablement via analytics and AI, and cultural transformation fostering collaboration and learning. Internal audit is no longer just a control mechanism but a true catalyst for innovation, resilience, and sustainable industrial performance, opening up significant opportunities for academic research and professional practice.

Keywords: Internal auditing; Operational performance; Industrial firms; Strategic management; Governance and innovation.

Classification JEL: M42, M41, L25, L60.

Paper type: Theoretical Research

Résumé

Cette recherche, menée à travers une revue narrative de la littérature et s'appuyant sur un cadre conceptuel solide, explore le rôle stratégique de l'audit interne dans l'amélioration de la performance opérationnelle des organisations industrielles, en soulignant son évolution d'une fonction d'assurance traditionnelle vers un partenaire stratégique de création de valeur et d'excellence organisationnelle. La synthèse narrative intègre des contributions théoriques et empiriques afin d'élaborer un cadre conceptuel identifiant les mécanismes par lesquels l'audit interne contribue à la performance organisationnelle.

L'analyse conceptualise la performance opérationnelle comme un construit multidimensionnel englobant l'efficacité, la qualité, la flexibilité et l'amélioration continue. Dans ce cadre, l'audit interne émerge comme un facilitateur clé grâce à l'optimisation des processus, la gestion des risques et le soutien à l'innovation. Cependant, dans le secteur industriel, particulièrement dans les PME, son potentiel reste sous-exploité en raison d'une maturité numérique limitée, de structures de gouvernance fragmentées et d'une intégration insuffisante avec les systèmes de contrôle de gestion.

L'analyse met en évidence des facteurs critiques de succès tels que l'engagement de la direction, la maturité des cadres de contrôle de gouvernance et l'adoption d'outils numériques. À l'inverse, les défis persistent concernant la collaboration inter-fonctionnelle, la résistance culturelle et le déploiement partiel des techniques d'audit basées sur les données.

La recherche propose un cadre stratégique structuré autour de quatre leviers interdépendants : le repositionnement stratégique, l'alignement systémique, l'habilitation numérique et la transformation culturelle. L'audit interne n'est plus seulement un mécanisme de contrôle mais un véritable catalyseur d'innovation, de résilience et de performance industrielle durable, ouvrant des perspectives significatives pour la recherche académique et la pratique professionnelle.

Mots clés : Audit interne ; Performance opérationnelle ; Entreprises industrielles ; Gestion stratégique ; Gouvernance et innovation.

JEL Classification : M42, M41, L25, L60

Type du papier : Recherche Théorique

1. Introduction

In recent decades, industrial companies have been confronted with intensifying competitive pressures driven by globalization, digital transformation, and rising customer expectations (Porter & Heppelmann, 2014). The acceleration of technological change and the adoption of Industry 4.0 have further exposed organizations to heightened levels of operational uncertainty, strategic complexity, and technological risks (Kagermann et al., 2013). In this environment, operational performance has become a central pillar of competitiveness, requiring firms to continuously optimize their processes, enhance efficiency, and reinforce the reliability of internal systems. As operational risks become more pervasive and interconnected, effective governance and performance-oriented management mechanisms are increasingly essential for ensuring stability and resilience (Beasley et al., 2005).

Parallel to these profound transformations, the internal audit function has undergone a major evolution. Traditionally centered on compliance, verification, and financial oversight, internal auditing has progressively expanded its mandate to include strategic advisory support, value creation, and holistic risk management (IIA, 2024). Contemporary internal audit practices now extend beyond the assessment of internal control systems to encompass risk anticipation, process improvement, governance support, and the facilitation of organizational learning. Several empirical studies highlight that mature internal audit functions contribute positively to operational efficiency, governance enhancement, and overall organizational performance (Arena & Azzone, 2009), suggesting that internal auditing can play a crucial role in supporting industrial firms' operational performance.

Although the strategic potential of internal auditing is well recognized, a review of empirical research reveals several limitations that justify the relevance of this study. Much of the early literature focused on internal audit as a governance mechanism (Carcello et al., 2005; Sarens & De Beelde, 2006), providing limited insights into its influence on operational performance. More recent studies have explored the relationship between internal audit quality and organizational effectiveness (Endaya & Hanefah, 2016), yet their findings remain fragmented and often restricted to specific contexts such as compliance quality or financial reporting. Only a few studies explicitly analyze the impact of internal audit practices on industrial firms, whose operational realities, marked by automation, lean systems, supply chain integration, and stringent quality requirements, are significantly different from those of service organizations. In addition, the present literature has focused on examining the internal audit function from separate individual perspectives, inhibiting researchers from taking an integrated approach that captures the full scope of both assurance and advisory functions provided by internal audit activities. As of now, there has not been a published conceptual framework that details the mechanisms by which internal auditors impact operational performance and within which environmental contexts and strategic consequences of that impact exist. Therefore, there are significant limitations to existing research with respect to understanding how internal auditors create value for their organizations, and there is a significant need for a collaborative, unified view of the many theoretical and empirical insights available within the different research streams to provide an integrated understanding of internal auditing's role.

Given the fragmented and heterogeneous nature of the existing literature, this article adopts a narrative literature review approach. This methodological choice is particularly appropriate for several reasons. First, the concepts related to internal auditing, risk management, organizational performance, and operational excellence are dispersed across multiple disciplines, making a systematic protocol too restrictive and potentially exclusionary. Second, the objective of this study is exploratory and theory-building, aiming to develop an integrated conceptual understanding rather than to classify empirical results according to predefined criteria. Third, empirical studies specifically focused on industrial internal audit practices remain limited, and

a systematic literature review (SLR) would risk narrowing the scope of the analysis and overlooking foundational or conceptual contributions. A narrative approach, therefore, offers the flexibility necessary to include academic, professional, and institutional sources, enabling a richer and more comprehensive synthesis.

The purpose of this study is to investigate the effects of internal auditing on improving operational performance in industrial organizations. The study will focus on how the role of internal audit has changed from that of a traditional oversight function to that of a strategic supporting entity for enhancing operational efficiency, supporting innovation, and creating resilience within industrial organizations (Deming, 1986). The article reviews the theoretical and empirical evidence and identifies how internal audit can improve operational performance through the mechanisms of process optimization, identifying risk, enhancing governance, and creating value, with the aim of creating a conceptual framework for analyzing the internal audit function.

The article has the following structure: In the first section, it presents a conceptual framework and methodology. The second section is concerned with the foundations and the contemporary challenges of operational performance of industrial firms. The third section focuses on the ways that internal auditing leads to improved performance and provides an integrative synthesis around the main challenges of a given industrial context. Finally, the paper concludes by presenting a summary of the overall findings, limitations, and perspectives on future research.

2. Conceptual and methodological framework

The analysis of the relationship between internal auditing and operational performance requires a solid conceptual foundation that clarifies the key constructs and their interactions. This section develops the theoretical foundations and research approach that guide this study to understand the role of internal auditing in performance improvement in the context of industrial firms. The conceptual framework develops the key constructs, and the methodological approach outlines the systematic approach taken for the narrative literature review to provide an analytical lens for improving audit-performance relationships in the context of industrial firms.

2.1. Conceptual framework

This section outlines the conceptual framework that guides this research, emphasizing the theoretical basis linking internal auditing to operational performance in industrial organizations. The conceptual framework of this research is grounded in the premise that internal auditing, when effectively aligned with organizational governance structures and strategic objectives, functions not merely as a control mechanism but as a catalyst for enhancing operational performance within industrial enterprises. This outlook goes beyond the conventional focus on compliance and risk assurance of internal auditing to endorse a more dimensional mindset of fostering value creation, ongoing improvement, and alignment with strategy (Spira & Page, 2003). By effectively bridging its assurance and advisory roles, internal auditing eventually refines operational processes, improves resource allocation, and establishes an environment that values accountability, innovation, and learning within production systems (Arena & Azzone, 2009).

According to the Institute of Internal Auditors (IIA, 2017), internal auditing, which is “an independent, objective assurance and consulting activity designed to add value and improve an organization's operations,” plays a critical role within industrial performance ecosystems. Within industrial contexts, this function extends beyond traditional financial validation and verification activities. It also encompasses process effectiveness assessment, quality assurance, risk assessment, and direct contribution to operational improvement (Uzun & Aslan, 2023). Integrating established frameworks such as COSO Enterprise Risk Management (COSO, 2017)

further fuses auditing with enterprise risk management and embedded performance governance arrangements. This promotes a systematic and proactive approach to achieving operational excellence.

Operational performance refers to a multifaceted construct that captures efficiency, quality, flexibility, and innovation (Neely et al., 1995). In the industrial context, each of these dimensions of operational performance translates and can be measured by specific metrics such as production throughput, quality yield, cycle time, and market responsiveness. Building on management control and organizational learning theories, internal auditing permits the establishment of a feedback system that identifies inefficiencies but also creates a pathway toward resolution through continuous improvement and strategic alignment (Anthony & Govindarajan, 2007). With theoretical contributions in mind, these insights provide the foundation for identifying the mechanisms through which internal auditing enhances operational outcomes.

Based on this integrated foundation, the conceptual model suggests that internal auditing aids operational performance through three discrete mechanisms:

- Strengthening control environments and risk management abilities to support process reliability;
- Supporting process improvement and quality enhancements through systematic evaluation and data-driven insights to inform decisions;
- Ensuring audit activities conform to strategic objectives to support informed decision-making and continuous improvement.

This conceptual framework informs a comprehensive understanding of the strategic and operational aspects of internal auditing in the context of generating performance optimization in industrial organizations.

2.2. Research methodology

The research employs a complete narrative literature review design due to its ability to present a holistic synthesis of the current state of knowledge, in addition to new theoretical informatics and development of conceptualization (Green et al., 2006; Ferrari, 2015). The methodology adheres to established protocols for narrative reviews in management research, and while some systematic thoroughness is required, it is less systematic and more analytically in-depth (Baumeister & Leary, 1997). This approach facilitates the exploration of complex organizational phenomena where multiple theoretical perspectives and contextual factors converge, making it particularly suitable for examining the multifaceted relationship between internal auditing and operational performance in industrial settings. A narrative review is notably relevant for addressing concepts related to the emerging strategic roles for internal auditing in instances where both theoretical & practical perspectives need to be integrated.

A structured literature search strategy was executed in the main academic databases, such as Scopus, Web of Science, Google Scholar, and ScienceDirect, to maintain methodological rigor. The search covered publications from 1990 to 2024, thereby capturing both foundational works and recent developments in the field, to obtain an understanding of both seminal and current literature. A keyword framework combining three conceptual domains was constructed to guide the literature identification process: internal auditing (e.g., “internal auditing,” “audit function,” “auditing”), operational performance (e.g., “efficiency,” “productivity,” “performance measurement”), and industrial context (e.g., “manufacturing,” “industrial,” “production,” “operations”). This tripartite structure facilitated comprehensive coverage of relevant studies while aligning with the research purpose.

The literature selection process utilized a stringent two-stage screening process to assess and determine the relevance and quality of published books included in the synthesis. First, involved screening selected publications based on titles and abstracts to identify studies related to internal

auditing and performance management. The second stage involved a full-text screening process, applying rigorous and explicitly stated inclusion criteria that emphasized methodological rigor, theoretical contribution, and relevance in the context of industries.

The analysis process combined thematic analysis with conceptual mapping to identify patterns and interrelationships across the literature. This process was iterative, and it developed an integrated framework showing changes in the internal audit's role from compliance monitoring to a strategic partner in performance. Systematic documentation of analytical decisions and triangulation across various types of source material helped ensure methodological rigor. However, the limitations of narrative synthesis as an interpretive process were acknowledged.

3. The operational performance of industrial companies

In line with the conceptual framework outlined, the operational performance in industrial companies is not only a measure of efficiency and quality of operations but also about monitoring, controlling, and optimizing their processes, which offers opportunities for the internal audit function to add strategic value. Operational performance plays a crucial role in the competitiveness of industrial firms. It refers to their ability to optimize resources, processes, and technologies to yield high levels of quality, efficiency, and responsiveness (Ejaz, 2023). This section considers, in turn, the conceptual foundations of operating performance, the contemporaneous challenges it faces, and then examines the specificities of performance in the industrial sector. By understanding these dimensions and their interdependencies, the groundwork is laid for identifying priority areas where the internal audit function can be introduced to improve not only operational performance but, ultimately, the strategic goals of the organization.

3.1. Definitions and dimensions of operational performance

Operational performance is a fundamental concept in management science, especially in industrial firms, where it can be defined as the ability of an organization to convert resources into valuable products efficiently, while ensuring continuous process optimization and stakeholder satisfaction (Neely et al., 1995). This multidimensional construct integrates five key dimensions that collectively determine industrial competitiveness: quality (compliance with specifications and reliability), cost efficiency (resource utilization and waste minimization), lead time/delivery (speed and punctuality), flexibility (adapting to changing demand), and innovation (process improvement and technology adoption).

The theoretical underpinnings of operational performance stem from many key frameworks. Porter's (1985) competitive advantage theory frames operational effectiveness as a strategic necessity, while quality management concepts highlight quality planning and control, systematic process improvement, and defect reduction (Juran, 1999). Deming's (1986) systems viewpoint connects performance to continuous improvement and employee engagement, while Hammer's (1990) process reengineering approach advocates for operational redesign in a radical fashion. Drawing on these viewpoints, these concepts provide a theoretical basis for positioning operational performance as both a tactical requirement and a strategic means to differentiate the firm.

In practice, these dimensions' manifest through key performance indicators such as productivity rates, overall equipment effectiveness (OEE), quality yield ratios, cycle time metrics, and customer satisfaction indices. The Balanced Scorecard framework (Kaplan & Norton, 1996) and the SCOR model provide comprehensive mechanisms that connect operational indicators with strategic objectives across financial, customer, internal process, and learning-growth perspectives.

The interconnectedness of performance dimensions creates a holistic Framework, where improvement in one area often leads to upstream benefits in other dimensions. The Lean philosophy (Womack et al., 1990) further enhances this integration by promoting waste elimination and continuous value flow optimization through the organization. Ultimately, operational performance in an industrial context is based on the fit between the control systems of processes, management practices, and innovation dynamics (Slack et al., 2004), providing an integrative mechanism that links strategic intent and operational execution, a crucial concern for internal auditors and management controllers seeking to enhance value creation and operational excellence.

3.2. Contemporary challenges of operational performance

In contemporary industrial environments, operational performance is increasingly influenced by the convergence of technological, organizational, and competitive pressures, which collectively redefine traditional efficiency paradigms. The digitalization of production systems, accelerated by Industry 4.0, has fundamentally reshaped how firms design, monitor, and optimize operations. Cyber-physical systems, the Internet of Things (IoT), artificial intelligence, and advanced robotics offer new possibilities for real-time data integration and predictive maintenance, significantly enhancing productivity and process reliability (Zhou et al., 2015). Nevertheless, these technological advancements introduce novel challenges, including cybersecurity vulnerabilities, interoperability issues, and workforce adaptation requirements, necessitating continuous development of both digital infrastructures and human capital to maintain competitiveness (Schwab, 2017).

Simultaneously, industrial companies are facing increased pressures to deliver the operational performance necessary in situations characterized by global volatility and frequent supply chain disruptions. Ivanov (2021) highlights that contemporary production systems must reconcile efficiency with resilience, ensuring operational continuity amid market fluctuations, regulatory changes, and logistical uncertainties. Achieving this balance requires firms to balance cost control with agility, integrating flexible production mechanisms and adaptive decision-making processes. From a strategic standpoint, Porter's (1985) concept of competitive advantage is especially relevant: operational performance has become a differentiator that depends on a company's ability to quickly adapt while delivering high-quality processes.

Lean management principles play a critical role in addressing these challenges. Emphasizing continuous improvement, waste elimination, and value flow optimization, the Lean philosophy provides a framework for achieving operational excellence, even in the context of technological transformation (Womack et al., 1990). When integrated with Industry 4.0 technologies, Lean practices facilitate "smart efficiency" models, in which new digital tools reinforce process discipline and data-driven decision-making (Ortega et al., 2022). This hybrid approach also promotes both operational agility and consistency, aligning with the broader goal of achieving long-term performance.

Sustainability constitutes an inseparable dimension of contemporary operational performance. Organizations are now evaluated not only on economic results but also on their environmental and social contributions. The emergence of circular economy principles encourages resource optimization, waste efficiency, and ethical governance within industrial operations (Khan, 2022). Furthermore, Christopher (2016) underscores that sustainable operational performance necessitates agile supply chains to balance profitability with ecological and social responsibility. This triple bottom line orientation reshapes performance evaluation systems and challenges traditional managerial logics focused solely on financial outcomes.

In sum, the interplay between digital transformation, operational excellence, and sustainability delineates the contemporary challenges confronting industrial performance. Success depends on the strategic alignment of technological innovation, human capital development, and process

governance within an integrated framework, which maximizes operational performance and ensures the effective adoption of new technologies (da Silva et al., 2022). For internal auditors and management controllers, this evolving landscape necessitates advanced performance assurance approaches, wherein risk-based auditing, continuous monitoring, and data analytics are central to fostering resilience, transparency, and sustainable value creation.

3.3. Specificities of performance in the industrial sector

Industrial enterprises exhibit distinct performance characteristics that differentiate them from service-oriented or knowledge-based organizations. These specificities stem from the tangible nature of manufacturing processes, capital intensity, and often complex value chain integration that define industrial firms.

The capital-intensive nature of industrial production creates unique performance dynamics. Significant investments in specialized equipment, manufacturing facilities, and production technologies necessitate performance metrics that are concerned with asset utilization, return on capital employed, and equipment effectiveness (Slack et al., 2004). While service-related organizations, where human capital dominates, industrial performance heavily depends on optimizing physical assets through measures such as OEE, which combines measures of availability, performance, and quality to give a more complete picture of overall manufacturing effectiveness (Nakajima, 1988).

Production system complexity represents another distinctive feature. Industrial operations involve interconnected processes where performance in one area has a direct impact on others. The process of transforming raw materials into finished products requires precise coordination across multiple stages, making performance measurement inherently multidimensional and dependent on factors such as quality, efficiency, flexibility, and innovation (Buer et al., 2018). The complexity of production systems requires integrated performance frameworks that capture both technical efficiency and economic effectiveness across the entire value chain (Womack & Jones, 2003).

Economies of scale and scope generate distinctive performance attributes in industrial contexts. In manufacturing, optimizing for operational excellence must balance the benefits of mass production with the flexibility required for product customization and rapid market response (Hayes & Wheelwright, 1984). This tension between efficiency and adaptability manifests in performance trade-offs that industrial organizations must continuously manage through sophisticated production planning and control systems.

Furthermore, industrial performance is characterized by its direct link to physical constraints and technical limitations. There are boundaries imposed by production capacity, machine capacity, and characteristics of materials that create performance potential in some manner service organizations seldom encounter (Schmenner & Swink, 1998). These physical constraints demand that any performance measurement system incorporate technical feasibility while simultaneously driving continuous review and improvement within established operational parameters.

The integration of supply chain performance represents a critical specificity of industrial operations. Manufacturing excellence depends not only on internal processes but also on upstream supplier performance and downstream distribution efficiency (Christopher, 2016). This extended enterprise perspective distinguishes industrial performance measurement from narrower functional approaches, often accepted as standard in other sectors.

Lastly, the industrial performance exhibits significant interdependencies among quality, cost, and delivery objectives. Unlike service organizations, where these dimensions may operate somewhat independently, manufacturing systems demonstrate tight coupling, where quality improvement often leads to cost and delivery improvements as well (Deming, 1986). Therefore,

the interdependent nature of industrial performance calls for a more integrated and holistic approach to measurement that accounts for the synergistic effects across multiple objectives. These specificities necessitate the development of bespoke performance measurement frameworks that address the unique characteristics of industrial operations and provide a comprehensive assessment of manufacturing excellence at strategic, tactical, and operational levels.

The industrial performance dimensions analyzed above are not just goals to achieve operationally. Each of these dimensions is a major target area of intervention within the internal audit. Each dimension translates into specific audit objects: quality through the audit of non-conformities and control processes; costs through the analysis of inefficiencies, waste, and variances; OEE, and operational efficiency are evaluated by auditing equipment downtime, equipment availability, and the use of reliable processes; The lean dimension can be evaluated through the standardization, flow compliance, and waste reduction that have occurred via the internal audit process; the supply chain through the audit of suppliers and the associated risks, traceability, and planning; and sustainability through the monitoring of environmental impacts and compliance with standards. By linking all of the above dimensions together via monitored indicators and controlled risks, internal audit positions itself as a structuring lever for the management and continuous improvement of industrial performance.

Despite the richness of existing works on industrial performance covering these various dimensions, the literature remains marked by several notable limitations. First, few studies examine how internal control and internal audit mechanisms concretely influence, structure, or sustain these performance dimensions. Second, research focusing specifically on industrial SMEs is scarce, even though these organizations operate under distinct constraints related to limited resources, lower process maturity, and different governance structures. Also, empirical evidence from emerging economies, particularly in the context of Maghreb countries and Morocco, remains insufficient, limiting the generalizability of prevailing models and highlighting the need for a more contextualized analytical framework. These gaps provide an important rationale for investigating how internal audit can function as a structured and strategic driver of operational performance in industrial settings.

4. Internal audit's contribution to operational performance

Internal auditing has evolved far beyond its traditional role of verifying compliance and providing financial assurance. In contemporary industrial organizations, internal audit functions as a strategic partner in support of operational excellence and sustainable value creation. Internal auditors provide independent evaluations, assessments of risk, and recommendations for process improvements, enabling organizations to optimize resource utilization, strengthen internal controls, and enhance informed decision-making.

4.1. The evolving role of internal auditing: From traditional assurance to strategic partnership

The transformation of internal auditing represents a significant shift in the way organizations think about and use this crucial governance function. Previously limited to verification activities and compliance monitoring, the internal audit has expanded its scope to encompass strategic advisory and performance-enhancement roles (Arena & Azzone, 2009).

Historically, internal auditing was mostly focused on financial controls, regulatory compliance, and asset protection. Thus, that historic tradition has the consequence of putting the auditor in a position as an independent verifier of whether some process is being followed. The Institute of Internal Auditors (IIA, 2017), as it measures audit effectiveness, considers assurance

activities to be the primary function of the internal audit, thus establishing the internal audit mainly as a monitoring mechanism rather than a driver of organizational value.

Several interconnected forces have catalyzed this evolution toward strategic partnership. The increasing complexity of operations, the globalizing of supply chains, the digital revolution, and more stringent regulatory requirements have compelled organizations to leverage internal audit's uniquely cross-functional view (Soh & Martinov-Bennie, 2011). At the same time, the increasing emphasis on risk management and corporate governance is changing the role of internal audit from a backward-looking control function to proactive participation in the strategic decision-making process.

In industrial businesses, this evolution is evidenced by earlier stages of involvement in operational processes and continuous improvement initiatives. The function transitioned from a compliance-oriented approach to a performance-oriented approach in which audit findings are used for organizational learning, process reliability, and innovation capabilities (Appelbaum et al., 2017).

The contemporary internal audit function now integrates three complementary dimensions:

- **Assurance:** Maintaining traditional verification activities while adopting risk-based approaches;
- **Advisory:** Providing consultative support for process improvement and control optimization;
- **Strategic Insight:** Offering forward-looking perspectives on emerging risks, innovation potential, and performance opportunities.

The evolution requires corresponding changes in the competencies of auditors. Contemporary internal auditors must have the technical audit skills, operational knowledge, proficiency in data analytics, and business skills to effectively contribute to performance improvement (Lenz & Hahn, 2015). Consequently, the function's value proposition has shifted from focusing on "what went wrong" to anticipating "what could go wrong" and identifying "how to do better."

The strategic partnership role is evident through several organizational practices, including participation in strategic planning, embeddedness in enterprise risk management, collaboration with operational managers, and axial use of continuous auditing. This revamped position allows internal audit to signpost governance expectations with operational realities, developing sustainable synergies that sustain compliance imperatives with performance aspirations.

In addition, internal auditing strategic evolution must be understood in relation to internationally recognized frameworks that structure audit practices in industrial environments. The International Professional Practices Framework (IIA, 2024) promotes a risk-based and governance-oriented approach, positioning internal auditors as contributors to organizational value rather than simple compliance verifiers. In industrial settings, this evolution is reinforced by sector-specific standards, such as ISO 9001 for quality management, ISO 31000 for risk governance, and ISO 19011 for auditing management systems. These standards collectively guide auditors in assessing process robustness, operational risks, and the maturity of continuous improvement mechanisms. In parallel, frameworks such as the COSO Internal Control–Integrated Framework and COBIT provide structured guidelines for evaluating internal control systems and information systems in the industrial sector. Integrating these frameworks highlights how internal audit in industrial companies operates at the intersection of operational excellence, risk governance, and strategic performance monitoring, well beyond the boundaries of a traditional assurance function.

4.2. Key mechanisms for enhancing operational performance

Through various distinct yet interrelated mechanisms, the internal audit generates operational performance by converting traditional auditing activities into quantifiable and actionable value creation opportunities. These mechanisms employ the function's unique positioning at the

junction of governance, risk management, and operational processes to support ongoing improvements across industrial organizations.

Enhancing efficiency and process optimization represents a foundational mechanism through which internal audit adds value to operations. Internal auditors systematically evaluate production workflows, supply chain procedures, and resource allocation patterns to identify bottlenecks, redundancies, and improvement opportunities that may remain invisible to operational managers focused on daily production levels, who may not or cannot see them (Roussy, 2015). This impartial appraisal encourages and supports process streamlining through specific actionable data, shortened cycle times, and reduced resource utilization while creating additional efficiencies applicable to operational efficiency metrics.

In addition to these efficacious gains, the enhancement of risk-based control strengthening represents another crucial mechanism for improving performance. Unlike traditional compliance-focused approaches, modern internal auditing differs from surprise audits or compliance orientation by adopting risk-oriented methods to determine improvement of controls by quantitative and qualitative impacts on achieving operational objectives (IIA, 2017). This risk-oriented approach provides targeted performance improvement, ensuring that control enhancement is specifically relevant to operational performance reliability, quality assurance, and operations continuity rather than merely addressing regulatory requirements (Salin et al., 2025).

Insight generation from data has become a transformational mechanism in the digital age (El Bahi et al., 2025). Contemporary internal audit functions harness the benefits of advanced analytics, process mining, and IoT data to identify patterns, predict likely failures, and highlight opportunities for performance improvement beyond traditional sampling approaches (Alles, 2015). This analytical capability enables proactive interventions before operational issues manifest as performance deficiencies, moving the value created from hindsight verification to prescriptive value.

Cross-functional knowledge transfer facilitates organizational learning and performance improvement. Internal auditors have the distinct privilege of working in multiple departments or processes in a way that positions them to identify and disclose best practices across departmental silos (Sarens & De Beelde, 2006). Through this channel, this mechanism enables the transfer of successful process innovations, control methodologies, and efficiency experiences that can be shared across the organization to leverage localized success into enterprise-wide performance gains.

Strategic Alignment Assurance allows operational activities to remain aligned with organizational goals. By continually monitoring key performance indicators and value-based objectives for strategic initiatives, the internal audit function provides an independent verifier that operational execution is consistent with strategic intent (Arena & Azzone, 2009). This mechanism promotes and prevents strategic drift and ensures operational improvements are aligned with business objectives.

In industrial contexts, these mechanisms will be represented across specific applications such as production process validation, assessing supply chain resilience, evaluating quality management systems, and maintenance optimization analysis. The synergistic integration of these mechanisms creates a comprehensive framework through which internal audit systematically improves operational performance while maintaining its core assurance responsibilities.

4.3. Practical levers of contribution in industrial enterprises

The contribution of internal audit to operational performance in the context of industrial firms occurs via concrete, actionable levers that facilitate the transition from strategic intent into

measurable operational outcomes. These practical applications bridge theoretical mechanisms with daily industrial realities, creating tangible value across production environments.

Integrated continuous improvement systems provide a foundational lever for internal audit to engage others to assess, improve, and enhance production processes. Through collaborative assessment of manufacturing workflows, quality management systems, and Lean Six Sigma projects, auditors can identify non-value-added activities and process inefficiencies (Juran, 1999). In the automotive and aerospace industries, this is exemplified by working together on value-stream mapping and waste-elimination projects to enhance throughput and quality metrics while reducing operational costs.

By being proactive, risk-based operational auditing can identify and mitigate production risks early before impacting performance by aligning audit activities with the organization's operational risk map (Nkansa, 2025). The internal audit has focused on things such as supply chain vulnerabilities, equipment reliability problems, and safety compliance gaps (Beasley et al., 2005). The result is a shift away from retrospective compliance checking to forward-looking risk assurance, which is particularly relevant in industries with high reliability, such as chemical processing and energy production.

Cross-functional knowledge orchestration utilizes the internal audit's singular perspective across the organization to disseminate best practices across organizational silos. By systematically sharing process innovation, control methods, and efficiency improvements discovered in various business units, the internal audit takes localized success and takes it to organizational and enterprise-level performance improvement (Sarens & De Beelde, 2006). In a multi-plant industrial organization, this allows best practices to be standardized while keeping specific and contextual adaptations.

Strategic alignment of performance to maintain synchronization of operational activities and ensure organizational objectives by continuously monitoring key performance indicators and strategic plan initiatives. One-way internal audit can provide independent assurance that operational execution is consistent with the intended strategic intent, to prevent a strategic drift in complex industrial settings (Arena & Azzone, 2009). Moreover, internal audits can assure the validity of the operational relevance of balanced scorecards and ensure that performance metrics accurately reflect manufacturing realities.

Auditing supply chain resilience addresses the critical interdependencies in contemporary industrial systems. The internal audit reviews supply chain processes end-to-end, from the sourcing of raw materials to when they are delivered to the customer, identifying single points of failure and suggesting improvements to manage disruption risks (Ivanov, 2021). This lever has proved especially useful for global manufacturing organizations, where supply chain volatility affects production continuity and, therefore, cost structures.

Maintenance and reliability optimization examines the effectiveness of asset management strategies that come into play in capital-intensive industrial contexts. Internal auditors review pilot maintenance programs, spare parts inventory management, and reliability-centered maintenance strategies to increase equipment availability while minimizing operational costs (Nakajima, 1988). This has an impact on overall equipment effectiveness (OEE) and production capacity utilization.

For effective implementation of these practical levers, internal auditors need to gain sufficient knowledge of industrial processes, technical and technological systems, and operational management principles. By focusing on these operational applications, internal audit increasingly moves from a compliance-based assurance function to an embedded strategic partner that generates measurable value through systematic, evidence-based improvement to an enterprise's industrial operations while still fulfilling its assurance responsibilities.

5. Integrative synthesis and industrial challenges: Toward a strategic evolution of internal audit

This section highlights the complex interactions between internal audit and the operational performance of industrial firms. It integrates the theoretical frameworks, empirical data, and practical applications examined throughout this research to address the strategic evolution of internal audit within modern industries. The analysis progresses systematically, from consolidating cumulative knowledge and identifying context-specific challenges to developing targeted strategic recommendations. By linking academic perspectives with industrial realities, this section brings together scholarly contributions and practical guidance to provide an informed understanding of the transformation of internal audit into a strategic partner and to foster sustainable operational excellence in increasingly complex and digitalized industries. Controls and enhances decision-making.

5.1. Synthesis of literature contributions

Scholarly consensus positions internal audit as a multidimensional lever for organizational achievement, far exceeding its traditional insurance function. Its contemporary value is demonstrated across three interconnected domains: the ability to master risks through a structured approach to controls improvement, to promote continuous improvement, and to provide active support in enabling strategic innovation (Cohen et al., 2002; Gramling et al., 2004).

The literature converges to identify several critical success factors that determine the success of this expanded role. Executive commitment is a fundamental prerequisite, enabling the necessary cultural shift and resources to strategically evolve the function (Arena & Azzone, 2009). Furthermore, the maturity of the internal control system provides the essential foundation for value-added auditing (Mikes, 2009), while digital transformation provides internal audit with data analytics and technology capabilities needed in modern operating ecosystems (Prawitt et al., 2009).

These theoretical propositions have strong empirical evidence supporting them. Research has found that organizations that strategically leverage internal auditing for continuous improvement efforts have greater efficiency metrics for processes and significantly improved operational reliability (Juran & Godfrey, 1999; Lenz & Hahn, 2015). Additionally, taking a risk-based auditing perspective has been associated with a decrease in disruptions to operations, thus enhancing the resilience of organizations operating in conditions of volatility (Eulerich et al., 2022).

Although this intriguing possibility exists, the literature consistently highlights significant limitations that constrain the internal audit's strategic impact. A primary challenge is the lack of collaboration with management control systems that isolate the organization into silos and hinder holistic performance management (Sarens & De Beelde, 2006). This is often compounded by a weak culture of continuous improvement, prevalent in many organizations, that limits the audit function's role in supporting and amplifying sustainably improved processes. Most critical, almost certainly, is all organizations' ongoing underutilization of internal audit for strategic purposes. This represents a significant opportunity cost for organizations, taking away a powerful lever for competitive advantage and speed of innovation (Leventis et al., 2013).

To sum up, this synthesis integrates theoretical contributions with empirical validation and establishes clear evidence of the evolution of the internal audit function to a more strategic partner. It reflects the considerable progress made in understanding its operational value while sharply defining the carefully outlined large gaps that need additional academic focus and

organizational commitment, particularly in coordination, culture, strategic deployment, and strategic role.

However, despite its conceptual scope, the synthesis presented, although offering a structured overview of the main theoretical and sectoral contributions, remains essentially narrative and qualitative. Although rich and diverse, the existing literature largely describes mechanisms, conceptual linkages, or expected effects without providing quantitative validation, comparative evidence, or measurable indicators specific to industrial contexts. This body of work still suffers from a limited number of robust empirical studies. Consequently, the current synthesis does not yet allow for a precise assessment of causal relationships, effect magnitudes, or the relative contribution of internal audit practices to operational performance. This limitation underscores the need for more systematic and analytically grounded research capable of combining quantitative approaches, maturity assessments, and field-based validations in order to better objectify and substantiate the strategic role of internal audit within industrial settings.

5.2. Specificities and challenges of the industrial context

The theoretical potential of a modern, value-adding internal audit function, as established in the literature, faces a critical test when confronted with the operational realities of the industrial sector. The disparity in context is addressed here, as we explore the environmental influences that are the environment's unique cultural and structural characteristics, and these specificities both heighten the need for strategic auditing and simultaneously create significant barriers to its implementation. By addressing these contextual gaps, a realistic framework for operationalizing the internal audit's strategic role can be established (Tharouma & Oudai, 2022).

Industrial enterprises, which serve as crucial pillars in various economies, find themselves facing a uniquely challenging set of pressures when they operate within. They have highly interdependent and globally interconnected supply chains, where a single disruption can cascade with severe consequences, as seen in recent global crises, which highlighted systemic vulnerabilities (Craighead et al., 2020). This structural vulnerability is compounded by intense international competitive pressure and the accelerating, capital-intensive imperative urge toward technology and digital transformation, which compounds these challenges and vulnerabilities (Zhou et al., 2020). Therefore, in this climate, it is essential for industrial enterprises to not only have strong risk management and operational excellence as a competitive strategy but also a fundamental prerequisite for resilience and competitiveness.

Paradoxically, the internal audit function in many industrial companies, particularly SMEs, is often unsuited to meet this need. Empirical studies suggest that, by the nature of the sector, audit maturity is often protectionist, mainly concerning financial controls and compliance with regulations (Sarens & De Beelde, 2006). This protectionist paradigm creates a significant imbalance, further limiting the function from being driven into the strategic and operational performance continuum as well as evolving into the proactive lever of continuous improvement and innovation advocated by current literature (Arena & Azzone, 2009; Lenz & Hahn, 2015). This gap between potential and practice is further aggravated by several deep-rooted, interlinked challenges specific to the industrial landscape:

- **The digitalization gap:** Several industrial small and medium-sized enterprises (SMEs), unlike in the financial services industry, possess lower levels of digital maturity. This hinders the implementation of data-based audit procedures (e.g., technology-based audit techniques) and restricts the function's role to analyzing complex operational datasets, thus limiting the function's additional strategic relevance (Mikes, 2009; Appelbaum et al., 2017).
- **Cultural and organizational silos:** An ongoing deficiency in innovative culture and cross-functional collaboration impedes the synergy between internal audit, management

control, and operations teams. Such partitioned thinking is a key obstacle to integrated performance management, which is necessary to achieve operational excellence (Sarens & De Beelde, 2006).

- **Structural resource constraints:** The greatest defining challenge of a lot of organizations in this segment is the shortage of specialized human and financial resources. Most internal audit and management control functions have lean teams, with limited bandwidth or specialization, often creating hurdles that can make switching from regular compliance to a value-added strategic advisor impractical (Arena & Azzone, 2009).

Thus, the industrial setting poses an interesting dilemma: it is a setting that arguably requires the advantages of a well-developed internal audit function more than any other setting, while also being the one that faces the greatest barriers in terms of structure, culture, and resources. Understanding these specifics should not just be viewed as an academic task but as a crucial, necessary step in designing a practical and credible implementation framework that can be successfully mobilized in the real-life constraints of industrial enterprises.

5.3. Opportunities and strategic levers for evolution

The foundational imperative is a strategic metamorphosis of the internal audit paradigm. This requires a conscious shift from your typical "assurance provider" to a "strategic performance partner" looking forward. In this evolved role, the internal audit goes from just being a compliance check to co-creating value through optimizing opportunities, testing strategic assumptions, and fostering an environment of controlled innovation (Appelbaum et al., 2017). This aligns with the "Third Line of Defense" concept of evolving into a strategic advisor who directly contributes to the organization's strategic goals and resilient long-term sustainability (IIA, 2024).

Organizations must support the architectural integration of assurance and advisory services to initiate their new identity. The most significant opportunity lies in removing artificial boundaries to facilitate a unified Governance, Risk, and Performance (GRP) system. This integration allows for a seamless connection between internal audit, Enterprise Risk Management (ERM), and management control, breaking silos that have historically prevented collective oversight (Power, 2007). This structure provides the C-suite and board a synthesized, real-time view of risk exposures and performance drivers, enabling more agile and informed strategic decision-making in complex industrial contexts (Kaplan & Mikes, 2012).

Concurrently, the digital revolution provides an unprecedented opportunity to increase the scope and impact of the function. Strategic deployment of disruptive technologies such as predictive analytics, AI, and Robotic Process Automation (RPA) can fundamentally redefine audit methodologies. These tools allow internal audit to transition from an episodic, sample-based method of audit to an ongoing, full-population assurance and predictive risk-sensing function (Vasarhelyi et al., 2015). By mining vast datasets for outcomes and finding patterns and anomalies that allow the internal auditor to render predictive insights on operational failures, supply chain disruptions, and emerging risks, this implies an evolution of the role of the internal auditor, moving from a historical reporter to a forward-looking radar for the organization (Moffitt et al., 2018).

Ultimately, these structural and technological changes cannot last without a cultural shift to collaborative intelligence. This means engaging and empowering internal auditors to be "agents of transformation" to facilitate cross-functional dialogue and promote a culture of ongoing improvement. With elements of psychological safety and collaborative inquiry, audit can shift away from its policing nature and become a trusted partner in enabling operational managers to innovate safely and optimize processes efficiently. This cultural lever is the critical enabler that ensures technological and structural investments yield their full return (Edmondson, 2018).

To ensure that the strategic levers discussed previously are implemented effectively within manufacturing companies in emerging economies in the Maghreb region, particularly in Morocco, it is essential that the unique characteristics of SMEs as an important portion of the manufacturing sector are taken into consideration. The major challenges faced by manufacturing SMEs in these countries include their limited resource base, underdeveloped systems of governance, and lack of standardization for business processes (Masmoud & Tichoua, 2024). Therefore, internal auditing techniques must be designed around the constraints faced by SMEs, and, as such, the methodologies employed by internal auditors need to be tailored to assist SMEs in developing the most effective audit methods for their own businesses. An example of a methodology that could help SMEs develop and implement their internal audit practices is to provide appropriately contextualized and illustrative examples of how audit interventions are implemented in SMEs. This demonstrates how internal audit can contribute not only to operational efficiency but also to sustainable organizational learning and long-term competitiveness within the local industrial context.

In summary, the evolution of the internal audit realm in the industrial space provides a profound opportunity to create synergy between governance and value creation. The synergistic application of strategic repositioning, integrated systemic thinking, digital connectivity, and transformed cultural capabilities creates a significant opportunity for responsible change. This framework addresses the specific industrial challenges but positions internal audit as a vital pillar of organizational excellence and sustainable competitive advantage while pushing for scholarly validation and pioneering organizational implementation.

6. Conclusion

This article has investigated the changing nature of internal audit and its strategic contribution to the operational performance of industrial firms. Situated upon a solid conceptual frame and supported by a critical synthesis of the literature, the research has demonstrated that internal audit extends far beyond its traditional control and compliance functions. Internal audit is now a central aspect of organizational governance, performance management, and innovation processes, particularly in complex industrial settings where efficiency, flexibility, and risk management are interdependent drivers of competitiveness.

The examination of operational performance indicated that it has a multidimensional nature, encompassing efficiency, quality, flexibility, and continual improvement. Within this structure, internal audit is an important mechanism for aligning operational processes with strategic goals while providing control and agility. The transition of internal auditing from a retrospective, assurance-oriented function focused on reflecting on the past to a more proactive and performance-focused discipline demonstrates the opportunity to support decision-making, optimize processes, and strengthen value creation in the industrial system.

The review of the literature and contextual analysis of the industrial sector revealed meaningful opportunities and ongoing challenges. Digital innovation, integrated governance frameworks, and data analytics create new avenues for strategic impact, such as the lack of available limited resources, resistance to change, organizational culture, and a lack of specific managers' coordination between management control and management audit. In overcoming these barriers, being enablers or facilitators of change, a systems approach will need to apply technological renewal, organizational redesign, and development of new competencies for auditors.

A comprehensive framework for the strategic evolution of internal audit emerges, founded on four interrelated pillars: strategic repositioning towards value creation, systemic integration with governance and performance systems, digital empowerment through automation and analytics, and a cultural shift to promote collaboration and continuous learning. When

effectively implemented, these dimensions can transform the internal audit into an authentic partnership for operational excellence and sustainable industrial performance.

This study also lays the groundwork for several future research directions. In particular, quantitative empirical studies can assess the effects of the internal audit transformation on operational and financial performance, while qualitative studies would be useful for identifying how success is achieved in small and medium-sized enterprises. Further research should also examine the new skills that auditors employ in an increasingly digital and complex industrial context.

In essence, internal audit is no longer just a system of control; it is an emerging strategic function that will add value through resilience, innovation, and sustainable competitive advantage. Its evolution into a catalyst for operational performance is both a management necessity and a new avenue for academic research.

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