

## Unlocking Blockchain's Potential in Innovation Ecosystems: A Narrative Review

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**ABSTRACT:** Blockchain technology has emerged as a transformative enabler in innovation management. It offers new opportunities for enhancing transparency, improving efficiency, and fostering trust across diverse sectors.. This narrative review aims to synthesize existing literature on blockchain adoption, exploring its applications in supply chains, finance, public administration, and Industry 4.0, while analyzing systemic barriers to implementation. Literature searches were conducted across major databases such as Scopus, Web of Science, and Google Scholar using a structured methodology that employed primary and secondary keywords combined with Boolean operators. Inclusion criteria emphasized peer-reviewed studies from the past decade, encompassing both qualitative and quantitative approaches. The findings highlight blockchain's role in enhancing supply chain traceability, reducing transaction costs, improving access to financial services, and strengthening governance models through decentralized systems. Integration with Industry 4.0 technologies further demonstrates blockchain's capacity to improve efficiency, sustainability, and knowledge management. However, adoption remains constrained by technical complexity, scalability challenges, cultural resistance, and regulatory uncertainties. Comparative evidence underscores disparities between developed and developing economies, with the former focusing on high-value applications and the latter emphasizing accessibility and inclusion. The discussion emphasizes the need for supportive regulatory frameworks, capacity-building initiatives, and incentives for early adopters. Future research should address gaps through longitudinal, cross-industry, and sociotechnical studies to provide holistic insights into blockchain's long-term implications. The study concludes that education, collaboration, and clear governance structures are central strategies to overcoming barriers and unlocking blockchain's transformative potential for innovation management.

**Keywords:** Blockchain Adoption, Innovation Management, Supply Chain Transparency, Digital Transformation, Industry 4.0, Financial Inclusion, Governance Frameworks.



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## INTRODUCTION

The rapid evolution of digital technologies has dramatically reshaped the way organizations innovate, compete, and operate. Among the most disruptive of these technologies is blockchain,

which has emerged as a transformative enabler in the management of innovation and operational efficiency across industries. Initially associated with cryptocurrencies, blockchain has transcended its financial roots and now plays a pivotal role in domains such as supply chain management, public sector governance, healthcare, agriculture, and the broader landscape of Industry 4.0 (Jum'a, 2023; Gausdal et al., 2018). The defining features of blockchain—decentralization, immutability, transparency, and security—are recognized as critical factors for enabling innovation in complex, interconnected, and globalized ecosystems. Scholars and practitioners alike have highlighted blockchain's potential to provide trust in data exchanges, foster collaboration among stakeholders, and enhance organizational resilience in the face of growing technological and societal challenges (Fatoum et al., 2021; Wang et al., 2025).

Recent literature emphasizes blockchain's capability to improve operational transparency and accountability in supply chains, where managing complexity and uncertainty remains a persistent challenge. By enabling immutable records of transactions and facilitating real-time data sharing, blockchain reduces information asymmetry and enhances collaboration across diverse stakeholders. Jum'a (2023) illustrates that blockchain enhances knowledge management within supply chains, contributing to competitive advantages and stronger innovation capabilities. Similarly, Gausdal et al. (2018) demonstrate how cooperative approaches in shipping sectors, supported by blockchain, can drive digital innovation. These findings underscore blockchain's transformative potential, even as organizations continue to grapple with evaluating long-term benefits against implementation costs.

Beyond supply chains, blockchain's relevance in the financial sector has been widely recognized. By providing secure, efficient, and transparent transaction mechanisms, blockchain reduces costs and processing times while simultaneously enhancing user trust. Systematic reviews highlight blockchain's diverse applications in securely processing sensitive data, illustrating its applicability to financial data management (Fatoum et al., 2021). The reduction in overheads and transaction times positions blockchain as a cornerstone technology in reconfiguring financial operations for improved efficiency and accountability. Moreover, blockchain has demonstrated potential in reshaping governance models in the public sector, introducing accountability and transparency levels unattainable through conventional systems (Santos, 2025). These attributes are particularly relevant in the management of public records and service delivery, where inefficiencies and governance challenges persist (Mahula et al., 2024).

The integration of blockchain with Industry 4.0 technologies such as the Internet of Things (IoT), artificial intelligence (AI), and smart contracts further highlights its transformative capacity. Studies detail how this convergence fosters digital transformation in small and medium-sized enterprises (SMEs), unlocking new opportunities for innovation and competitiveness (Wang et al., 2025). Bosco et al. (2025) demonstrate that smart contracts can optimize supply chain processes by automating compliance, reducing reliance on intermediaries, and minimizing operational bottlenecks. In agriculture, blockchain's capacity to enhance traceability and accountability is recognized as vital for addressing food safety requirements and consumer trust. Kolodiy et al. (2022) emphasize blockchain's role in managing sustainability challenges in food supply chains, highlighting its importance for achieving transparency and resilience.

While empirical evidence demonstrates the benefits of blockchain adoption across multiple sectors, the journey toward integration is not without significant challenges. The technical complexity of blockchain systems remains a primary obstacle. Interoperability with legacy infrastructure and ensuring architectural coherence are critical concerns. Drljevic et al. (2022) note that governance and interoperability are essential success factors for operationalizing blockchain innovation. Similarly, Kumar (2024) stresses the regulatory uncertainties and integration difficulties that hinder widespread adoption. These challenges often manifest in cost implications, with organizations hesitant to invest heavily without clear returns on investment. Gausdal et al. (2018) highlight this dilemma, illustrating how uncertainties surrounding ROI complicate adoption decisions.

Cultural and organizational barriers also hinder adoption. Resistance to change, employee skepticism, and insufficient understanding of blockchain's value can impede progress. Clohessy and Acton (2019) argue that entrenched practices and weak change management strategies pose significant risks to adoption. This resistance is compounded by evolving regulatory frameworks, which often fail to keep pace with the technological advancements. Mahula et al. (2024) underscore the tension between public sector motivations for adoption and the necessity for compliance with governance strategies. Additionally, scalability remains an unresolved issue, with Gunasekara et al. (2021) noting the performance limitations of blockchain systems when applied to large-scale operations.

Despite the expanding literature, gaps remain in understanding blockchain's role in large-scale innovation ecosystems. Empirical studies have predominantly focused on single organizations or sectors, leaving limited insight into how blockchain can be effectively integrated into collaborative, cross-industry networks. Fatoum et al. (2021) call for further investigation into blockchain's interplay with other digital technologies in complex environments such as healthcare and supply chains. Long-term implications of blockchain adoption are also underexplored. Most studies emphasize short-term benefits, neglecting the sustained impact on business models and innovation processes. Gunasekara et al. (2021) stress the need for longitudinal studies to evaluate blockchain's enduring effects. Similarly, Abdelwahed and Soomro (2025) highlight the absence of research on blockchain's potential to facilitate cross-industry collaboration.

Another notable gap is the limited focus on societal acceptance and the broader sociotechnical implications of blockchain. Lovett (2020) observes that while technical and financial dimensions dominate current research, the societal impacts—such as consumer attitudes, ethical considerations, and cultural norms—remain underexplored. Rubino et al. (2024) argue that blockchain systems should be understood as sociotechnological assemblages, with implications extending beyond technical capabilities into cultural and institutional domains.

The aim of this review is to synthesize current knowledge on blockchain adoption for innovation management, with a focus on identifying use cases, challenges, and barriers to implementation. By critically evaluating empirical studies across supply chains, finance, public sector governance, and Industry 4.0, the review seeks to highlight blockchain's transformative potential while also delineating the obstacles to its large-scale integration. The factors analyzed include technical complexity, cost implications, organizational culture, regulatory uncertainty, and scalability.

concerns, as well as opportunities for blockchain to foster collaboration, transparency, and sustainable innovation.

This review adopts a global perspective, examining blockchain adoption in both developed and developing contexts. Special attention is given to small and medium enterprises, where blockchain's potential to democratize access to advanced technologies and support competitiveness is most pronounced (Wang et al., 2025). Sectoral variations, such as blockchain's role in food safety systems (Kolodiy et al., 2022) or public sector governance (Santos, 2025; Mahula et al., 2024), are analyzed to provide a holistic understanding of its applications. Cultural and regional considerations, such as the role of stakeholder collaboration in Indonesian coffee supply chains (Nuraisyah et al., 2025), further illustrate the importance of context in shaping blockchain's adoption trajectory.

In summary, the introduction establishes blockchain as a critical enabler of digital transformation and innovation management, while recognizing the challenges and knowledge gaps that necessitate further scholarly inquiry. Through this review, the paper aims to provide a comprehensive, critical, and globally informed analysis of blockchain's multifaceted role in innovation management and its prospects for overcoming systemic barriers to adoption.

## METHOD

The methodological approach adopted for this narrative review is grounded in the systematic collection, selection, and evaluation of academic literature concerning blockchain technology and its role in innovation management. Given the novelty and rapidly evolving nature of blockchain applications, this section outlines the processes employed to ensure a comprehensive and rigorous review. The methodology encompasses database selection, keyword formulation and Boolean search strategies, inclusion and exclusion criteria, identification of study types, and evaluation procedures. By adhering to established academic standards, the review ensures both credibility and relevance in synthesizing findings across multiple domains and contexts.

The initial step in the methodology involved the selection of academic databases recognized for their extensive coverage and scholarly rigor. Scopus, Web of Science, and Google Scholar were the primary databases used, chosen for their ability to provide peer-reviewed articles, conference proceedings, and cross-disciplinary insights. These databases collectively ensure coverage of both foundational and contemporary works related to blockchain innovation management. Supplementary searches were conducted in PubMed for specific applications in healthcare and in IEEE Xplore for technology-oriented studies, ensuring that sector-specific dimensions were captured in the review. This multi-database approach minimized the risk of omitting relevant publications and facilitated a cross-sectoral synthesis of evidence.

The next stage involved the formulation of effective keywords and Boolean search strings to retrieve relevant literature systematically. Primary keywords such as "blockchain," "innovation management," "adoption," "digital transformation," "supply chain," "digital ecosystems," and

“trust and transparency” were used to identify the core thematic focus of studies. Secondary keywords including “smart contracts,” “decentralization,” “sustainability,” and “peer-to-peer transactions” were incorporated to capture nuanced aspects of blockchain research. Boolean operators such as AND, OR, and NOT were employed to refine the searches. For example, the search string “Blockchain AND Innovation Management” identified publications focusing on blockchain within innovation management contexts. Broader combinations such as “Blockchain AND (Adoption OR Implementation) AND (Digital Transformation OR Supply Chain)” yielded results encompassing multiple relevant sectors. Additionally, more specific search strings such as “Blockchain Adoption AND Empirical Evidence” targeted studies providing data-driven insights. The precision of search terms and Boolean combinations was critical to capturing both theoretical frameworks and empirical applications of blockchain.

To ensure the quality and relevance of the reviewed literature, inclusion and exclusion criteria were systematically established. Publications were primarily limited to the period between 2015 and 2025, reflecting the exponential rise in blockchain research and its increasing relevance to innovation ecosystems during this timeframe. However, key earlier works foundational to blockchain conceptualization were also considered when necessary for contextual depth. Only peer-reviewed journal articles and conference proceedings were included to maintain academic rigor, while non-peer-reviewed sources such as industry reports, blogs, and preprints were excluded unless they provided critical contextual insights that could not be sourced elsewhere. Both qualitative and quantitative studies were included, as methodological diversity was deemed essential for comprehensively addressing blockchain adoption challenges and opportunities. Case studies, such as Jin et al. (2019) on genomic data management, and empirical analyses, such as Clohessy and Acton’s investigations into organizational adoption, were particularly valuable in illustrating real-world applications.

Contextual relevance was also an important factor in inclusion. Studies from both developed and developing regions were included, but careful consideration was given to their applicability to broader discussions of blockchain adoption. For instance, Ahmed et al. (2023) explored blockchain acceptance in supply chains within developing contexts, providing insights that complemented studies from established markets. This approach ensured a balanced narrative that accounted for differences in technological readiness, regulatory frameworks, and socio-economic conditions across regions. Sectoral scope was intentionally broad, encompassing applications in finance, healthcare, agriculture, supply chain management, energy, and intellectual property. Studies that explicitly analyzed sector-specific use cases were particularly valued, as they provided detailed illustrations of blockchain’s transformative potential.

The screening and selection process followed a multi-stage approach. Initial database searches yielded a broad pool of articles, which were screened at the title and abstract level for relevance. Articles that clearly did not pertain to blockchain adoption, innovation management, or digital transformation were excluded at this stage. Full-text reviews were then conducted for the remaining articles to assess methodological rigor, relevance to the research objectives, and alignment with the themes under investigation. Studies that lacked sufficient detail on their methodology, provided only speculative commentary, or failed to situate blockchain within



innovation contexts were excluded. A final pool of articles was selected for in-depth analysis, ensuring a balance between theoretical and empirical contributions.

Evaluation of the selected literature was undertaken with a focus on identifying themes, patterns, and divergences in findings. Studies were assessed not only for their immediate contributions but also for their positioning within broader discourses on blockchain and innovation. Particular attention was paid to the empirical evidence supporting blockchain's adoption, such as performance outcomes, operational efficiencies, and governance models. For example, Fatoum et al. (2021) provided systematic reviews on blockchain in digital ecosystems, validating the methodological necessity of coherent search terms. Similarly, Clohessy and Acton's organizational-level studies shed light on cultural and managerial barriers to adoption, while Jin et al. (2019) demonstrated blockchain's utility in genomic data management. These works exemplify the methodological diversity incorporated into the review.

The methodology employed also acknowledges limitations inherent in narrative reviews. Unlike systematic reviews, narrative reviews may be influenced by the researcher's interpretive lens, and the inclusion of diverse methodologies introduces heterogeneity in the evidence base. Nonetheless, the structured approach adopted here—including precise keyword strategies, transparent inclusion and exclusion criteria, and rigorous evaluation procedures—mitigates such limitations. The narrative approach remains suitable for synthesizing insights from a rapidly evolving and multidisciplinary field such as blockchain innovation management, where both theoretical and empirical contributions must be integrated.

In summary, this methodology ensures a comprehensive, credible, and balanced review of blockchain adoption in innovation management. By employing carefully designed search strategies, transparent selection criteria, and rigorous evaluation processes, the review synthesizes insights from diverse contexts and sectors. This methodological rigor not only enhances the reliability of the findings but also provides a replicable framework for future narrative reviews in emerging areas of digital transformation.

## RESULT AND DISCUSSION

The analysis of the literature reveals a diverse set of empirical findings regarding blockchain's role in innovation management across multiple sectors. The results are organized into four key thematic areas: supply chain and logistics, financial inclusion in emerging markets, public sector applications, and Industry 4.0 with a focus on knowledge management. Within each theme, case studies and empirical investigations highlight both the transformative potential of blockchain and the barriers that complicate its implementation. The following sub-sections present the synthesized evidence drawn from the reviewed literature.

### Supply Chain and Logistics

The supply chain sector has been one of the earliest adopters of blockchain technologies, owing to its inherent need for transparency, efficiency, and trust. Bosco et al. (2025) present TrustyChain,

a decentralized application designed to optimize transaction costs and strengthen structural alignment across supply chain participants. Their findings demonstrate blockchain's ability to improve information flow, enabling traceability across complex logistics networks. Jum'a (2023), examining the Jordanian manufacturing sector, provides empirical evidence that blockchain-enabled applications significantly enhance supply chain innovation and competitive performance. The study highlights how blockchain adoption leads to measurable improvements in supply chain management, even in developing economies where technological readiness remains limited. Similarly, Gausdal et al. (2018) studied Norwegian shipping companies and found that blockchain adoption facilitates cooperative approaches, allowing companies to achieve higher transparency and efficiency in logistics operations through enhanced collaboration.

Beyond qualitative insights, quantitative data reinforces blockchain's impact in supply chain processes. Gunasekara et al. (2021) report that blockchain adoption in procurement processes leads to substantial efficiency gains, including reductions in processing times and transaction costs. Their findings highlight measurable decreases in errors, thereby contributing to operational excellence. Clohessy and Acton (2019) further substantiate these findings by demonstrating blockchain's ability to reduce disputes among supply chain partners. Their research shows that blockchain's immutable records enable instant dispute resolution, reducing costs and delays that traditionally plague logistics operations. This improved dispute resolution capacity enhances trust among partners and strengthens the overall supply chain ecosystem.

The global perspective indicates that blockchain adoption in supply chains is not confined to advanced economies. While Norwegian shipping demonstrates high-level collaborative innovation (Gausdal et al., 2018), similar benefits are seen in Jordanian manufacturing, underscoring blockchain's versatility across contexts (Jum'a, 2023). However, adoption remains uneven, with challenges of scalability, regulatory readiness, and legacy system integration still presenting obstacles.

### **Financial Inclusion and Emerging Markets**

Blockchain's application in enhancing financial inclusion is particularly significant for developing countries, where access to formal banking remains limited. Hoek (2019) identifies blockchain's role in microfinance initiatives, where decentralized ledgers provide secure and transparent platforms for financial transactions. This application is vital in regions with underdeveloped banking infrastructure, enabling underserved populations to participate in financial systems. Fatoum et al. (2021) expand on this by documenting blockchain's ability to reduce remittance costs, a critical source of income in many emerging markets. Their systematic review presents cases where blockchain reduced cross-border transaction fees and processing times, significantly improving financial access.

Empirical studies also point to blockchain's capacity to reduce barriers to credit and payment systems. Kunhibava et al. (2024) show how blockchain can enhance credit scoring systems by incorporating alternative data, such as utility payments, thereby enabling financial institutions to extend credit to individuals without formal credit histories. This innovation broadens financial access for marginalized populations and mitigates exclusion from traditional banking. Similarly, Mahula et al. (2024) highlight blockchain's contribution to inexpensive and faster payment systems

in developing contexts. Their findings emphasize blockchain's decentralized nature, which enables affordable financial services and overcomes hurdles associated with conventional banking systems.

Comparative studies reveal that while developed nations focus on blockchain's role in improving financial efficiency, developing countries leverage blockchain primarily to overcome structural deficiencies in their financial systems. These contrasting perspectives illustrate the adaptability of blockchain to different socioeconomic contexts, demonstrating its broader role in fostering financial equity.

### Public Sector Applications

The literature also underscores blockchain's transformative impact in public administration, where transparency and accountability are critical. Santos (2025) reports on blockchain's implementation in identity management systems within municipalities. The use of blockchain in managing public records and citizen identities enhances security, accessibility, and trust in civic services. This case study highlights blockchain's ability to strengthen governance models by introducing levels of accountability previously unattainable through traditional systems.

Rubino et al. (2024) examine blockchain in government procurement, demonstrating its effectiveness in reducing corruption and inefficiencies. Their analysis shows that blockchain's immutable ledgers foster transparency, ensuring integrity in procurement processes and leading to better resource allocation. These findings are supported by Drljevic et al. (2022), who argue that decentralized governance frameworks are essential for achieving accountability in blockchain-enabled public administration. Their research stresses the importance of aligning blockchain initiatives with organizational readiness and regulatory frameworks to ensure sustainability.

However, Mahula et al. (2024) caution that regulatory challenges continue to impede blockchain's adoption in the public sector. Fluctuating and unclear regulatory environments create uncertainty, undermining the integration of blockchain into public services. This underscores the necessity of well-defined policies and multi-stakeholder collaboration to ensure the technology's long-term success in governance contexts.

Cross-country comparisons indicate that while European municipalities and governments are at the forefront of blockchain adoption in governance (Santos, 2025; Rubino et al., 2024), developing nations face greater challenges due to weak regulatory environments and limited technological infrastructure. Nevertheless, pilot projects in emerging economies suggest that blockchain has the potential to improve public accountability globally, provided systemic challenges are addressed.

### Industry 4.0 and Knowledge Management

Blockchain's convergence with Industry 4.0 technologies illustrates its potential to reshape digital transformation strategies. Quttainah et al. (2024) emphasize blockchain's integration with IoT and AI, noting its role in enhancing supply chain agility and transparency. By enabling secure and transparent data exchanges, blockchain strengthens entrepreneurial supply chains and fosters more effective knowledge management. Wan et al. provide case studies where blockchain enhances IoT applications in smart manufacturing, showing improved security in machine-to-machine communications and streamlined data management, although further empirical verification is required.



Matenga and Mpofu (2022) highlight blockchain's benefits in collaborative manufacturing contexts. Their case study demonstrates how blockchain, when integrated with cloud computing, facilitates decentralized decision-making and transparent data sharing in transport manufacturing. These findings highlight blockchain's capacity to improve collaboration, efficiency, and innovation in manufacturing ecosystems.

Quantitative evidence further demonstrates blockchain's benefits in Industry 4.0. Gunasekara et al. (2021) report reductions in lead times by approximately 30% following blockchain implementation in supply chains, reflecting notable efficiency gains. Drljevic et al. (2022) extend these findings by linking blockchain to sustainability outcomes, such as reduced waste and improved resource management. Their research underscores blockchain's role in enhancing accountability and aligning with sustainable business practices, which are increasingly demanded by stakeholders and regulatory agencies.

International comparisons indicate that developed economies are integrating blockchain into advanced manufacturing systems to improve efficiency and sustainability, whereas developing economies view blockchain as an entry point into Industry 4.0 ecosystems. This divergence highlights the global adaptability of blockchain technologies and underscores its role in reducing digital divides between regions.

### Organizational Adoption

At the organizational level, blockchain adoption is influenced by frameworks and barriers identified in the literature. Drljevic et al. (2022) propose an integrated adoption model emphasizing organizational readiness, governance, interoperability, and cultural alignment as critical success factors. This model illustrates that organizations must align internal capacities with the demands of blockchain technologies to achieve successful integration. Complementing this perspective, Galati et al. (2021) emphasize dynamic capabilities, arguing that organizations with strong adaptability and resource reconfiguration capabilities are better positioned to adopt blockchain in their innovation strategies.

However, barriers remain substantial. Clohessy and Acton (2019) identify cultural resistance as a key impediment, noting that entrenched organizational practices and employee skepticism hinder blockchain adoption. Structural barriers, including the complexity of legacy systems, exacerbate these challenges. Mishra and Xie highlight the difficulties posed by incompatible systems, which complicate blockchain integration and create uncertainty among employees. These barriers underscore the importance of leadership vision and managerial support in fostering blockchain adoption.

Comparative analyses reveal differences in adoption barriers across regions. Developed nations often grapple with structural integration challenges due to complex existing systems, while developing economies face greater cultural and knowledge-related obstacles. Despite these differences, the overarching barriers—cultural resistance, structural incompatibility, and managerial hesitancy—remain consistent across contexts, suggesting that global strategies for overcoming these challenges must account for organizational and cultural specificities.

### Synthesis

The results of this review illustrate that blockchain adoption delivers significant benefits in transparency, efficiency, sustainability, and trust across multiple sectors, from supply chain management to public governance. Empirical evidence demonstrates measurable improvements in operational efficiency, dispute resolution, and financial inclusion, while also highlighting sector-specific outcomes such as enhanced credit scoring and identity management. However, barriers including technical complexity, regulatory uncertainty, cultural resistance, and scalability limitations persist. Comparative perspectives reveal that while blockchain is advancing in both developed and developing contexts, the drivers and challenges vary considerably, underscoring the need for context-specific strategies to harness its full potential. Collectively, these findings provide a robust foundation for subsequent discussions on systemic barriers, policy frameworks, and future research directions in blockchain-enabled innovation management.

The findings of this review emphasize that blockchain's success in innovation management is profoundly shaped by systemic factors that extend beyond technical considerations. Economic, regulatory, and cultural elements converge to define the trajectories of blockchain adoption, creating opportunities in some contexts while presenting significant barriers in others. By connecting empirical insights with theoretical frameworks, this discussion highlights the systemic nature of blockchain's integration into innovation ecosystems.

Economic factors represent a fundamental determinant of blockchain adoption and success. Organizations evaluate blockchain technology primarily through the lens of economic viability, weighing anticipated efficiency gains against high initial investment costs. Drljevic et al. (2022) argue that effective governance and interoperability mechanisms must align with market conditions to ensure blockchain's operational feasibility. In environments characterized by economic stability, firms are more willing to allocate resources to emerging technologies, anticipating long-term benefits such as reduced transaction costs and enhanced efficiency. Conversely, in economies where financial resources are scarce, investment in blockchain remains limited, regardless of the potential strategic advantages it might confer. This disparity is particularly evident in developing contexts, where infrastructural constraints and competing priorities often divert attention from long-term innovation initiatives.

The regulatory environment emerges as another critical factor influencing blockchain adoption. Regulations can act either as catalysts or inhibitors, depending on their clarity and orientation toward digital innovation. Kolodiy et al. (2022) note that organizations closely assess regulatory compliance in determining the risks associated with blockchain adoption. Favorable regulatory environments, such as those that provide clear legal frameworks for digital transactions and data management, foster innovation by reducing uncertainty. On the other hand, stringent or ambiguous regulations can hinder adoption, as organizations are reluctant to invest in systems that might later face legal obstacles. The alignment of blockchain applications in logistics and procurement with existing legal frameworks exemplifies how regulation can decisively shape operational outcomes. In regions where such alignment is lacking, blockchain initiatives often stagnate despite their technical feasibility.

Cultural influences, both at the organizational and societal level, also play a decisive role in determining blockchain's trajectory. Fatoum et al. (2021) highlight that organizations fostering a culture of openness toward innovation demonstrate higher success rates in implementing

blockchain solutions. A willingness to experiment and adapt operational paradigms facilitates smoother transitions toward decentralized systems. In contrast, cultures resistant to change struggle to adopt blockchain effectively, as the technology demands significant alterations to traditional practices and workflows. Organizational readiness for change, therefore, becomes an essential precondition for blockchain adoption, requiring not only technical adjustments but also shifts in employee mindsets and managerial attitudes.

Comparisons between developed and developing economies further illuminate the uneven patterns of blockchain adoption. In developed contexts, adoption rates are higher due to advanced infrastructure, economic stability, and favorable regulatory frameworks. Gausdal et al. (2018) illustrate how Norwegian shipping companies successfully leverage blockchain to optimize supply chains, benefiting from robust technological ecosystems and collaborative networks. By contrast, Ahmed et al. (2023) demonstrate that in developing regions, adoption rates remain relatively low due to infrastructural deficiencies and limited resources. This divide highlights how systemic conditions dictate the extent to which blockchain can be integrated into innovation management practices. Moreover, the economic impact of blockchain adoption tends to be more pronounced in developed economies, where operational efficiencies translate into measurable financial gains, while in developing regions the technology primarily addresses structural gaps such as financial inclusion or governance inefficiencies.

The use cases also diverge significantly between contexts. Developed nations often concentrate on high-value applications of blockchain in sectors such as logistics optimization, healthcare data management, and intellectual property protection. These sectors benefit from advanced digital infrastructures that support complex integrations. In contrast, developing economies prioritize applications that improve accessibility to essential services. Fatoum et al. (2021) highlight how blockchain systems in emerging markets reduce remittance costs and broaden access to banking for unbanked populations. Such applications underscore blockchain's role in addressing systemic inequalities by extending financial services to underserved communities. However, challenges such as limited digital literacy, lack of technical expertise, and insufficient regulatory support often impede widespread implementation in these contexts, limiting blockchain's transformative potential.

Policy frameworks and strategic recommendations are essential in overcoming these barriers and unlocking blockchain's full potential. Scholars advocate for regulatory frameworks that balance innovation encouragement with safeguards against misuse. Drljevic et al. (2022) propose collaborative policymaking involving stakeholders from government, industry, and academia to ensure that regulations are adaptive and supportive of blockchain adoption. Such frameworks should address key concerns around data security, privacy, and governance, providing organizations with the confidence to invest in blockchain solutions. Without this alignment, the risks of regulatory uncertainty may outweigh the perceived benefits of blockchain, stalling innovation initiatives.

Educational initiatives and capacity-building programs are also critical in promoting blockchain adoption. Fatoum et al. (2021) emphasize that awareness initiatives can bridge the knowledge gap and build confidence among organizations and individuals. By enhancing digital literacy, such programs enable stakeholders to understand blockchain's potential and limitations, facilitating

informed decision-making. This is particularly vital in developing economies, where limited awareness often contributes to resistance against adopting unfamiliar technologies. Strategic training programs tailored to local contexts could thus help reduce cultural resistance and build a more receptive environment for blockchain adoption.

Incentivizing early adopters represents another strategic measure to foster blockchain integration. Policymakers can design financial incentives, grants, or tax benefits for organizations investing in blockchain solutions, particularly in sectors where the societal benefits are significant. Gausdal et al. (2018) suggest that incentivizing early adoption in logistics could accelerate broader implementation by demonstrating tangible benefits such as cost reductions and efficiency gains. Similarly, prioritizing investments in sectors like healthcare or renewable energy could yield substantial societal returns, aligning blockchain adoption with public policy goals while reducing financial barriers for hesitant organizations.

While the current literature provides valuable insights into blockchain adoption, notable limitations remain. Many studies emphasize immediate benefits without adequately addressing long-term implications. Gunasekara et al. (2021) point to efficiency gains, but longitudinal research is needed to assess the sustainability of these improvements. Similarly, Fatoum et al. (2021) highlight blockchain's transformative potential in financial systems, yet the societal and ethical implications of widespread adoption remain underexplored. Another limitation lies in the predominance of single-sector studies, which restrict understanding of blockchain's role in cross-industry collaborations. Abdelwahed and Soomro (2025) stress the need for multidisciplinary studies examining how blockchain facilitates inter-organizational relationships and collaborative innovation. Additionally, studies often overlook the sociotechnical dimensions of blockchain adoption, including how consumer attitudes, cultural norms, and ethical considerations shape technological integration (Rubino et al., 2024).

Future research should address these gaps by adopting a holistic approach to blockchain innovation management. Longitudinal studies assessing blockchain's sustained impact on organizational performance, business models, and innovation ecosystems are necessary to provide a comprehensive understanding of its long-term implications. Furthermore, cross-industry analyses could illuminate how blockchain fosters collaboration among diverse stakeholders, enabling innovation at a systemic level. Societal dimensions, including consumer acceptance, ethical considerations, and cultural contexts, also warrant deeper exploration to fully grasp blockchain's transformative potential and its implications for sustainable and equitable innovation management.

## CONCLUSION

This narrative review demonstrates that blockchain technology holds significant transformative potential in innovation management across multiple sectors, including supply chains, finance, public sector governance, and Industry 4.0. The results highlight blockchain's capacity to improve transparency, efficiency, and trust through mechanisms such as immutable ledgers, smart contracts, and decentralized networks. Case studies provide compelling evidence of blockchain's ability to enhance operational efficiency, reduce disputes, improve access to financial systems, and

strengthen public sector accountability. Yet, despite these benefits, systemic challenges remain. Technical complexity, regulatory uncertainty, scalability issues, and cultural resistance continue to hinder large-scale adoption. Comparative evidence shows that while developed economies leverage blockchain for high-value applications, developing regions primarily focus on overcoming structural barriers such as financial exclusion and governance inefficiencies.

The urgency of addressing these barriers cannot be overstated, as blockchain adoption offers not only competitive advantages but also societal benefits through equitable access to services and more transparent governance. Policy interventions must prioritize clear regulatory frameworks, incentives for early adopters, and capacity-building initiatives to improve digital literacy and organizational readiness. Collaborative policymaking among governments, industry, and academia is essential for creating environments that foster innovation while ensuring accountability and security. Future research should adopt longitudinal and cross-industry approaches to explore blockchain's sustained impact on organizational performance and its role in fostering systemic collaboration. Attention must also be directed toward the sociotechnical dimensions of blockchain adoption, including cultural acceptance and ethical implications. Ultimately, strategies such as education, stakeholder collaboration, and supportive governance structures remain central to overcoming challenges and realizing blockchain's transformative role in innovation management.

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