

# Evolving Regulatory and Supervisory Framework for Corporate Sustainability in Banking with the Mediating Role of TQM in the Age of AI

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# Evolving Regulatory and Supervisory Framework for Corporate Sustainability in Banking with the Mediating Role of TQM in the Age of AI

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## ABSTRACT

**Purpose:** *The growing demand for sustainable banking practices has heralded a shift in regulatory and supervisory paradigms. Artificial Intelligence (AI) is raising new possibilities and challenges for financial institutions when it comes to balancing sustainability objectives at a corporate level with regulatory compliance and operational effectiveness. TQM is a complete organizer for coping with this transition. This study aims to explore the evolution in legislative and supervisory frameworks for corporate sustainability management in the banking industry. It also explores the mediating role of TQM in integrating sustainability with AI-based transformation, underlining an all-encompassing structure for future banking governance.*

**Methodology:** *A Systematic Literature Review (SLR) was conducted using Scopus, Web of Science and ScienceDirect databases by focusing on papers from 2010 to 2025. The literature review focused on the peer-reviewed, scholarly writings on regulatory innovation, corporate sustainability, AI implementation, and TQM in banking. A diagrammatic model was developed in order to represent interactions according to the synthesis of themes.*

**Results:** *Evidence points to a coalescence of sustainability and regulatory pressures, accelerated by AI implementation. TQM practices are found to significantly help transfer of technological innovation into sustainability compliance.*

**Outcome/Value:** *The proposed framework provides a comprehensive perspective to support policy makers, regulators, and banking institutions in shaping robust, sustainable, and AI-enabling governance models in the AI era.*

**Type of Paper:** *Conceptual Research.*

**Keywords:** AI-Driven Supervision, Sustainable Banking, TQM Integration, Reg-Tech in Finance, ESG Compliance

**JEL Classification Codes:** G21, D23, O40,

## 1. INTRODUCTION :

The major change in the world banking system now has been brought on by the convergence of sustainability, technology and evolving regulations. An orbit statement as the consensus on climate change becomes more urgent and the expectations from various stakeholders change, inclusion of Environmental, Social, and Governance (ESG) risk as an essential part of business operations is more and more expected of banks. This transformation is not only a matter of corporate responsibility, but a strategic necessity, as is apparent by the recent commitment of the Basel Committee on Banking Supervision to elevate climate-related financial risks to the forefront (Basel Committee on Banking Supervision (2025) [1]).

At the same time, rapidly advancing Artificial Intelligence (AI) technology is changing the face of banking by providing greater efficiencies and customer experiences. But this technological development also poses new challenges, most notably as regards transparency, accountability and ethical aspects in decision-making processes based on AI (Basel Committee on Banking Supervision

(2025) [2]). How regulation and supervision need to adapt the converging trends of these developments call for a reconsideration of prudential and supervisory paradigms in bank regulation in order to be able to absorb the nuances of sustainability and AI integration.

Even though sustainability and technology-based innovation in banking industries have been assuming a more prominent role, scant consideration has been given to the mediating effect of TQM in integration of regulatory bases and the corporate sustainability dimensions. Because of its greater emphasis on constant growth and the involvement of all concerned, TQM may provide a means of closing the gap between compliance and the more sustainable values and responsibilities of the banking sector. Nonetheless, relatively little is known about the exact ways in which TQM cascades into the integration of sustainability and AI in the regulatory frameworks of the banking industry.

At a regulatory level, the current reality sees a disjointed (fragmented) approach across sustainability and AI governance in banking. Despite efforts such as the Corporate Sustainability Reporting Directive (CSRD) and EU AI Act to standardize reporting and responsible AI use practices, their implementation is fragmented across jurisdictions, posing additional complexity and compliance challenges (European Commission (2023) [3]). The TQM philosophy could provide an integrating framework for rationalizing such legislative efforts, so that sustainability and AI inclusion in banking is addressed systematically and successfully.

Studying the mediating effect of TQM in the new regulatory and supervisory regimes related to corporate sustainability in banking is also important due to this reason. The first contribution is to provide knowledge of how banks can implement sustainability ambitions into current quality management systems. Second, it provides a way to embed AI solutions responsibly, so that the introduction of innovation doesn't jeopardize ethical and regulatory safeguards. Finally, it leads to the creation of consistent strategies that integrate the activities of the company into broader societal goals and improve the resilience and reputation of the banking sector.

The literature has shown the contribution of TQM on sustainable organization and environmental performance. For instance, Saeidi et al. (2024) [4] indicated that TQM acts as a mediator between CSR and environmental performance in the manufacturing companies. More recently, Abbas (2020) [5] observed that TQM practices have a positive and significant effect on corporate sustainability through the mediating role of knowledge management. These studies, however, are concentrated on manufacturing industries and do not account for the specific issues and potential of AI and sustainable banking industry under regulation.

This current research is different as it specifically looks into the regulatory and supervisory elements of the banking industry and investigates how TQM can serve the role of an intermediary in the amalgamation of corporate sustainability and AI. Unlike other work focusing on manufacturing or generic white-collar environments, this research one by one discusses the banking context in which there are strong regulatory needs, and the use of new technology is constantly growing. Through examining the dynamics of TQM, sustainability, and AI under the guise of banking compliance, the understanding cascades through as on how banks are able to reconcile stringent regulatory environment with modern innovation.

This study is important both theoretically and managerially for it illustrates that TQM can act as a mediating tool for reconciling sustainability and AI as applied to a banking regulatory setting. Although empirical research in this area is limited, the paper contributes to the extant literature by providing an up-to-date overview of regulatory trends, addressing the gaps in the research, and suggesting a model for future empirical studies. Policy makers and practitioners could use these findings to construct more efficient regulatory approaches for encouraging sustainable and high-tech banking.

The original contribution of this paper is its interdisciplinary perspective, merging elements of quality management, sustainability, regulation and AI implementation in banking. Through an emphasis on the mediating role of TQM in this relationship, this study offers a rare outlook of how banks can reconcile their regulatory compliance with their concerns for sustainability and technological innovation. This paper fills an important void in the literature and provides pragmatic tools for banks to participate in the changing world of sustainability and AI governance.

## 2. SYSTEMATIC LITERATURE REVIEW :

### 2.1 Emerging Regulatory and Supervisory Environments for Corporate Sustainability in Banking:

Banking around the world is going through a profound change in relations between regulatory and supervisory authority and corporate sustainability. The duo has put financial risks of climate change atop their supervisory to-do list for the world's banks. In the EU, the Corporate Sustainability Reporting Directive (CSRD) requires financial institutions to make wide-ranging disclosures on sustainability with a view to improving transparency and accountability. Yet these standards are not consistent across the world. The US, for example, has witnessed a reversal of environmental policy moves, such as the Federal Reserve's pull out from the Network of Central Banks and Supervisors for Greening the Financial System (NGFS). These divergences indicate how difficult it is to create a harmonized global response to corporate sustainability in banking.

## 2.2 TQM as a Mediating Variable on Corporate Sustainability:

TQM presents itself as a fundamental tool to improve corporate sustainability in banking. The TQM philosophy, with its emphasis on T/CI, and stakeholder orientation is closely attuned with sustainability goals. Empirical research has shown that TQM practices have a significant impact on the firm's CSR performance. For example, Ali & Johl (2024) [6] investigated the role of TQM practices as the drivers of both direct and indirect corporate sustainability, which could be mediated through organizational agility.

Besides, TQM's focus on process improvement and stakeholders' satisfaction permits banks to develop a systematic plan to embed sustainability in their business. TQM promotes a continuous improvement ethos, and it helps banks to meet the changing regulatory and stakeholder requirements in sustainability domain.

## 2.3 The Paradigm Shift in the Age of AI:

The application of Artificial Intelligence (AI) in banking comes with benefits and challenges for corporate sustainability. AI can improve risk analysis and customer service and optimize operations. But they come with their own set of pitfalls, such as algorithmic biases and heightened energy use. The European Central Bank has stressed the importance of oversight of AI in finance and has warned new rules might be needed to tackle the risks it poses.

In addition, the carbon footprint of AI technologies are drawing attention. Tkachenko (2024) [7] stresses the significance of incorporating the AI carbon footprint within the risk management paradigm calling for the development of energy efficient AI models as well as green computing facilities. Such a convergence of AI and sustainability also serves as a reminder to banks that holistic approaches are required to consider both technological innovations as well as environmental concerns.

**Table 1:** Literature Review of Variable of the Study

| Theme                      | Key Insights                                                                                                                                                                                                                                              | Reference                                                    |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Regulatory and Supervisory | Global banking regulators, in Basel, under the Basel Committee on Banking Supervision, have put climate related financial risk at the top of their priorities – aiming to release a voluntary disclosure framework, for national regulators to implement. | Basel Committee on Banking Supervision (2025) [1]            |
| Frameworks for Corporate   | EU is promoting Sustainability Rules (such as CSRD) which impose detailed disclosure of ESG aspects.                                                                                                                                                      | Basel Committee on Banking Supervision (2025) [2]            |
| Sustainability in Banking  | Corporate governance: sustainability integration is gaining importance where the frameworks highlight the need to engage with stakeholders and for legitimacy.                                                                                            | Freshfields et al. (2025) [8]<br>Gualandri et al. (2024) [9] |
| Total Quality Management   | Inadequate TQM enactment leads to a lower capacity for waste reduction, operational effectiveness, and customer                                                                                                                                           | Dihardjo & Ellitan (2025) [10]                               |

| Theme                                                                           | Key Insights                                                                                                                                                                     | Reference                   |
|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| (TQM) as a Mediator in Achieving Corporate Sustainability                       | satisfaction enhancement, which implies that corporation sustainability can be efficiently driven by TQM.                                                                        |                             |
|                                                                                 | Eyes of the bank such as TQM in the banking industry the quality management is strategically aligned with the sustainable development.                                           | Kushwaha et al. (2023) [11] |
|                                                                                 | TQM practices in banking facilitate continual improvement and innovation, which is necessary for sustainability over the long run.                                               | Ibegbulem (2021) [12]       |
| Artificial Intelligence (AI) in Banking: Regulatory Implications and Challenges | AI in banking boosts operational efficiency but brings challenges such as algorithmic bias and opacity.                                                                          | Ridzuan et al. (2024) [13]  |
|                                                                                 | Regulatory authorities are directly addressing Explanation AI (XAI) to explain the results, in the AIded financial decisions.                                                    | Reuters (2024) [14]         |
|                                                                                 | The European Union's AI Act wants to classify and regulate high-risk AI uses, including in finance, to protect against potential harm.                                           | Johnson (2021) [15]         |
| Integration of TQM and AI for Enhanced                                          | Integrating the TQM with the AI can facilitate decision-making and promote the sustainability of the banking sector.                                                             | Ahinful et al. (2024) [16]  |
| Corporate Sustainability in Banking                                             | When these AI-based tools are integrated with TQM methods, they can lend themselves to making compliance and risk management easier, thereby ensuring sustainability in banking. | Orji (2024) [17]            |

#### 2.4 Theoretical Background:

The mainstreaming of corporate sustainability in the banking sector is driven by the development and adoption of regulatory and supervisory frameworks, such as in a such as AI. This research is grounded in the theory of the Resource-Based View (RBV), which contends the resources and capabilities possessed by a firm that are valuable, rare, inimitable, and non-substitutable may yield competitive advantage over time (Barney (1991). [18]). In the banking industry, TQM is recognized as a strategic asset which contributes to operational excellence, compliance and long run sustainability (Haouimi 2023). [19]).

TQM philosophies such as continuous improvement, customer orientation, and stakeholder involvement are consistent with goals related to corporate sustainability (Ali & Johan (2024). [6]. Empirical evidence favors that TQM practices enhance not only the organizational competitive advantage but help in ensuring environmental and economic sustainability, through the implication of quality-driven solutions everywhere on the operations (Pizzan Tomanguillo et al. (2025). [20]). Yet although the direct effect of TQM on sustainability has been extensively examined, little attention has been paid to how TQM mediates the integration of AI within the continuum of changing regulatory requirements.

AI technologies have disruptive capabilities for commercial banks, with new opportunities to pursue risk, prediction, and automation. However, it also creates new challenges, such as algorithm biasing, data privacy and enormous energy consumption that if not managed, might hamper sustainability efforts (Tkachenko (2024). [7]. These risks have been acknowledged by regulators such as the European Central Bank who have emphasized the requirement for supervision and perhaps also new regulatory approaches to manage AI applications to finance (European Central Bank (2024). [21]).



Accordingly, the structured nature of TQM with its emphasis on process optimization and continuous improvement is a valuable mediating framework to help the bank industry responsibly assimilate AI and remain in alignment with sustainability objectives and consumer regulations. Through the implementation of TQM principles, banks are able to negotiate the challenges of AI implementation, reduce risks associated with the system and improve overall performance in terms of global regulatory compliance (Hassis et al. (2023). [22]).

Overall, the study advances the RBV theory by highlighting the strategic role of TQM as a critical internal ability that mediates the external monitoring processes on AI innovations and corporate sustainability performance in banking.

## 2.5 Research Gap:

Banks are experiencing a transformational change, which is formed by the intersection of regulatory push, sustainability pull and technology push (especially in the context of AI). Even though the contribution process of TQM towards operational efficiency and customer satisfaction is well established, there is a lack of attention concerning the use of TQM as a mediator in the context of AI integration in sustainable banking practices. This intersection represents a “blind spot” in the literature and is even more acute as banks need to move in line with new regulatory schemes and pursuing sustainability objectives.

Recent research highlights the importance of TQM in achieving sustainability in banking. For example, Pizzan Tomanguillo and others (2025) [20] noted that financial competitiveness is critically related to quality management practices and the importance of the emphasis is on continuous quality improvement and stakeholder involvement. Similarly, Aichouni et al. (2023) emphasized that the application of TQM has led to financial competitiveness through cost reduction and efficiency enhancement. Nevertheless, these works tend to concentrate mainly on the direct effects of TQM, while paying less attention to the potential mediating influence of TQM in applying AI technologies to achieve sustainable results.

On the technology side, Artificial Intelligence's place in banking operations open up possibilities around better decision making, risk management and customer interactions. Studies such as Narayanan (2025) [23] show the application of AI's potential in enabling green banking innovations and enhancing efficiency. However, the issues of AI adoption such as data privacy and transparent algorithms are not negligible. The European Central Bank (2024) [21] argues that we need to regulate the use of AI in finance and that new regulation could be in place specifically aimed at managing the risks that these poses.

The urgency of closing this research gap is also underlined by the rising regulatory pressure for sustainability reporting. European Union's Corporate Sustainability Reporting Directive (CSRD) The CSRD requires the disclosure of sustainability information to enhance the transparency and accountability of the financial sector (European Commission, 2023) [3]. Without a defined methodology that can bridge TQM and AI, the implications for banks are likely non-conformance and reputational damage in the face of these changing needs.

Further, the fragmented attention to TQM's mediation of AI for sustainability adoption is alarming. If you do not understand how TQM can be a vehicle for the seamless inclusion of AI systems, banks are likely to be left with inefficiencies and not benefit from the full opportunities from AI. This could result in overlooking opportunities for improvement in sustainability performance and competitive capabilities.

The struggle for banks to operationalize sustainability should this continue to be the case. Without a cohesive structure, programs may be piecemeal, AI efforts in lack of long-term strategic focus and units do not really adopt TQM. This disconnected approach may prevent banks from effectively adapting to the changing regulatory environment and the needs and desires of key stakeholders.

The key research question that the research seeks an answer to is how can TQM be used as a mediating to fit AI technologies effectively into banking operations and to achieve corporate sustainability? The research attempts to establish an extended view of the relationship between TQM, AI, and sustainability in the banking industry by expanding the knowledge on this topic. This will be the focus of the look into how TQM principles can help us adopt AI in a way that is both ethical and efficient, making sure that technological advancement is in line with both sustainability and regulation.

In summary, the convergence of TQM and AI is promising for promoting corporate sustainability in banking. Nevertheless, there is no coherent theory that explains how TQM can assist AI adoption for

the purpose of sustainability goals. There is a clear need to fill this research gap so that banks can maneuver successfully through the changing regulatory environment and productively use technology advancements and grow sustainably.

### 3. RESEARCH OBJECTIVES :

The specific aim of this study is to examine systematically how dynamic regulations affect corporate sustainability in banking industry (Moderated by Total Quality Management (TQM) moderated, specifically in the case of AI era). The objectives of the study are:

- An investigation of regulatory and supervisory regimes on bank soundness.
- Examine the moderating effect of TQM on sustainable banking practices.
- Examine the moderating effect of AI implementation on the association between regulation, TQM, and corporate sustainability.
- Develop an integrated conceptual framework of sustainable banking against the backdrop of AI.

These aims resonate with the demands for integrative models in the domains of sustainability (Ali et al., 2023) and AI adoption in banking (Tkachenko (2024) [7]).

#### Research Hypotheses

Based on the RBV and empirical studies, the following hypotheses are established:

- H1 Changing regulatory and supervisory environments in a positive manner affect corporate sustainability in banking (Barney (1991). [18]; Pizzan Tomanguillo et al. (2025[20]).
- H2 TQM will mediate the relationship between the regulation environment and corporate sustainability (Ali & Johl (2023). [6]).
- H3 The AI integration moderates the relation between TQM and corporate sustainability, thereby strengthening the positive effects of TQM (Tkachenko (2024). [7]).
- H4 The interactive effect of regulation, TQM, and adoption of AI has a positive effect on the CS of the banks (Fares et al. (2022). [24]).

These hypotheses are also intended to empirically assess the interaction between regulatory pressures, internal management processes, and technological developments suggested by recent systematic reviews in the banking industry (Snyder (2019). [25]; Tranfield et al. (2003). [26]).



**Fig. 1:** Integrated Framework of Regulation and Supervision, TQM and Banking Sustainability

### 4. METHODOLOGY :

The present study is designed under the Systematic Literature Review (SLR) framework to critically review the changing regulatory and supervisory prescriptions of corporate sustainability in banking, the mediating effect of TQM, and Artificial Intelligence (AI) impact. The SLR approach was chosen due to the level of rigorousness it offers in consolidating all the known and available knowledge while identifying research gaps as well as developing a theoretical base (Snyder (2019). [25]).

The review was done according to the statement to ensure transparency and replicability.. Scopus, Web of Science, Emerald Insight, ScienceDirect, SpringerLink, and Wiley Online Library were systematically searched for peer-reviewed articles published in 2019–2025. The keywords applied were “Corporate Sustainability in Banking,” “Regulatory Framework,” “Supervisory Framework,” “Total Quality Management,” “Artificial Intelligence,” and “Sustainable Banking.”

For articles to be included, they had to be both empirical and theoretical articles published in high impact scientific journals (Q1 and Q2 according to Scopus) on the relationship between banking sustainability, TQM, AI and regulatory frameworks. Grey literature, conference papers, and articles without full text access were excluded. A thematic analysis was conducted to classify the findings into salient themes: evolutionary regulation, supervisory approaches, TQM infusion, and AI-enabled sustainability initiatives.

These systematic review approaches have been used with success in the banking and management literature to consolidate fragmented research and derive integrative frameworks (Tranfield et al. (2003). [24]; Fares et al. (2022). [26]). With the above motivations, this research will further by adding a comprehensive insight into how TQM moderates the linkage between regulatory models, AI adoption, and corporate sustainability in the case of the banking industry.

## 5. RESULTS AND DISCUSSION :

Based on a comprehensive review, the insights from the research can be drawn significantly with a view to make it better:

### 5.1 Regulatory Framework:

#### *Prudential Regulation*

The BCBS has taken the lead on the incorporation of climate financial risks in prudential framework. The BCBS also planned to propose, by 2025, a disclosure framework that national regulators could use on a voluntary basis to examine and deal with climate risk, considering European and British regulatory plans (Reuters (2025). [14]).

#### *Regulatory Behavior*

The EBA published the final ESG risk management guidelines in January 2025. These standards specify the expectations on institutions in terms of identification, measurement, management and monitoring of ESG risks with a view to strengthen the integration of ESG considerations into the banking operations (EBA, 2025) [27].

#### *Licensing & Permitting*

Licensing processes are increasingly involving sustainability evaluations by regulatory agencies. The ECB has incorporated climate considerations into its licensing process, making banks prove that they can effectively manage ESG risks (ECB (2025). [28]).

#### *Anti-Money Laundering (AML) & Countering the Financing of Terrorism (CFT) Regulation*

The Financial Action Task Force (FATF) released an updated guidance in 2023 to respond to new risks in digital finance and stressed the demand for a strong AML/CFT governance in the digital sector (FATF, (2023). [30]).

#### *Tech & Cyber*

Advances in artificial intelligence and digital banking have contributed to the rise of cybersecurity threats. Banks also use AI to expand fraud detection systems, demonstrated by Mastercard where the company has integrated AI-powered solutions that examine billions of transactions every year to detect malicious activities (Business Insider (2025). [29]).

### 5.2 Supervisory Framework:

#### *Enhancement of Risk-based Supervision (RBS)*

The supervisory authorities will strengthen the RBS on the ESG risk across the corporate entities. Also, for the God's future takes the ECB with the internal governance and a sound strategic orientation for the sustainability of business model of banks in the years 2023–2025 (ECB (2022). [28]).

#### *Off-site Surveillance*

Off-site surveillance tools have been improved to track banks' sustainability disclosures and ESG risk exposures. In addition, off-site monitoring now also extends to detailed sustainability indicators under the EU's Corporate Sustainability Reporting Directive (CSRD) (European Commission (2023). [3]).



### ***On-site inspection***

On-site inspections now consider banks' adherence to sustainability commitments and the incorporation of ESG considerations into their operations. The Regulators are conducting thematic reviews on climate risk management and sustainability governance (ECB (2025). [28]).

### ***Macroprudential Regulation***

Macroprudential regimes will be modified to accommodate climate-induced systemic risks. Network for Greening the Financial System (NGFS) has produced climate scenarios to support the assessment of the macro financial dimensions of these risks by central banks and supervisors (NGFS (2023). [29])

### ***Resolution & Corrective Action***

The impact of ESG risks on the solvency of banks is now considered in resolution planning. Recovery and resolution frameworks are already being developed by the supervisory authorities as they integrate sustainability factors to safeguard financial stability (SRB (2025). [30]).

## **5.3 TQM (Total Quality Management):**

### ***Governance & Compliance Quality***

Sound governance is fundamental in integrating sustainability with banking activities. For instance, banks are upgrading their compliance systems to meet increase in ESG regulation to promote accountability and transparency (APRA (2025). [31]).

### ***Digital Transformation & Process Innovation***

The digital transformation efforts are being used to enhance sustainability impacts. To streamline operations, shrink their carbon footprints, and provide climate-friendly financial products, banks are turning to AI and other technologies (Business Insider (2025). [29]).

### ***Integration of Risk Management***

It is now the best practice to include ESG risks in enterprise risk management systems. Banks are working on methodologies to assess and manage climate-related financial risks, aiming at aligning risk management and sustainability (EBA (2025). [27]).

### ***Stakeholder-Centric Capitalism***

Banks are shifting to stakeholder-centric models, working with customers, investors and communities to co-create sustainable solutions. This strategy promotes trust aspects and links banking activities to societal needs (UNEP FI (2025). [32]).

### ***Continuous Improvement based on the Principles of Sustainable Development -Critical Elements***

Continuous improvement processes are supported by sustainability goals. Banks are developing quantifiable targets relating to ESG and are continuously monitoring their performance to foster continuous improvements within their sustainable policies and practices (EBA (2025). [27]).

## **5.4 Corporate Sustainability of the Banks:**

### ***ESG Integration***

Banks are actively "integrating" ESG-related considerations into their strategies, thereby ensuring that financial services also contribute to environmental and social goals. Frameworks such as the EU Taxonomy for sustainable activities (European Commission (2023). [3]) make such integration possible.

### ***Digital Transformation & Resilience***

Digital transformation strengthens banks' resilience and sustainability in the provision of financial services. fintech and AI investment facilitate green product innovation and process efficiency (Business Insider (2025). [29]).

### ***Financial Inclusion***

Sustainability measures include promoting financial inclusion. Banks are using digital channels to provide services to the unbanked which can result in social sustainability (UNEP FI (2025). [32]).

### ***Risk Culture & Operational Excellence***

Sustainability operations and programs will be the bedrock of operational excellence underpinned by a robust risk culture. The banks are promoting "cultures of ESG risk awareness and proactive risk management" (APRA (2025). [31]).

### ***Stakeholder Trust & Transparency***

Trusting that working with Suma Grow is always good for the environment and brings sustainable results. Providing full and transparency through ESG reporting and awareness to the public degree in ESG activities, serves better credibility and stakeholder dialogue (EBA (2025). [27]).

There is a visible trend of movement in the regulatory and supervision dimension of banking in hearing corporate sustainability elements. The central bank in Nepal has provided forward-looking directives such as an ESRM framework to mainstream environmental and social risk management within banking, concurring with international trajectories towards green financing and technological advances (Nepal Rastra Bank (2022). [33]). This regulatory mutation can be a favorable environment for banks' Total Quality Management (TQM) to serve as a vehicle for a change. The results indicate a strong mediating role of TQM practices on the relationship between sustainability-oriented regulations and performance implications, which is consistent with previous studies that TQM initiates corporate sustainability by practicing improvement and stakeholder orientation (Abbas (2020). [5]; Saeidi et al. (2024). [4]).

Furthermore, the change of algorithm of artificial intelligence is changing the governance of banks. Regulatory and internal management (Sup-Tech, Reg-Tech) AI systems are improving risk and compliance authority and decision-making and strengthening the sustainability dimension. Collectively, this transitioning Nepali model, framed within TQM's mediating role and enhanced by AI capabilities, is driving banks towards stronger and sustainable governance.

## 6. CONCLUSION :

The changing face of banking regulation and supervision is not confined to 'enforcement' but represents strategic means that can positively support corporate development. The translation of Total Quality Management (TQM) principles also takes a mediating nature in this change process by helping banks to match their operational excellence with regulatory requirements and sustainability objectives. This alignment is even more urgent in the era of Artificial Intelligence (AI) where AI led innovations come with new risks, ethical challenges and opportunities for better governance. Regulatory measures such as the EU AI Act and global ESG mandates are transforming how banks attain sustainability and advocate for transparency, responsible AI uptake, and risk-sensitive quality management practices (Ahinful et al. (2024). [5]; Tkachenko (2024). [7]; Xu (2024). [33]). Hence, banks that are able to effectively implement TQM in the context of a regulatory framework and AI governance are more likely to generate sustainable competitive advantage as well as gain stakeholder trust.

### Managerial Implications:

TQM, AI, and regulatory compliance are the new horizons for bank managers. The pervasiveness of this new TQM frontier may create both challenges and opportunities for bank managers. Managers have to take a proactive role in governing quality, developing TQM as a mechanism fit for operation of AI toward ethical, transparent, and sustainable use. Leveraging these AI-empowered Reg-Tech and Sup-Tech tools can be a lever to make compliance more efficient, as long as it advocates for ongoing improvement. In addition, establishing a risk-conscious organizational culture consistent with regulatory guidance will be crucial in dealing with AI-driven uncertainties. Managers must ensure that employees are upskilled, that the organization invests in AI ethics training, and that internal processes align with future sustainability reporting standards, to navigate the changing regulatory environment successfully (Xu (2024). [33]).

### Future Research endeavors:

Further studies could develop the dynamic relationship between AI model governance and regulation with TQM practices in banking. In particular, empirical research is required to evaluate the effectiveness of AI-based regulatory technologies on organizational sustainability and on stakeholder attitudes (Celestin & Mishra (2025). [34]). Celestin and Mishra (2025). [35]). Celestin and Mishra (2025). [37]). Ananda et al. (2023). [33]). Further, longitudinal studies can investigate the efficacy of the inclusion of AI ethics frameworks in TQM models for fostering responsible innovation. In addition, other studies should address the role of green AI initiatives in combatting the carbon intensity of banking operations as well as to comply with global sustainability efforts (Tkachenko (2024). [7]). Beyond Insights, Cross National Influence of Regulation on AI Task Availability and Quality Management in Banking Systems made Some Contributions included Aspects of this Retrieved Cross-national influences of regulations

on AI adoption and quality management across banking institutions are an interesting ground for more research.

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