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CIRCULAR PROCESS INNOVATION FOR SUSTAINABLE OPERATIONS: A REVIEW OF TQM AND GREEN INTELLIGENCE

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Abstract

This study systematically reviews the development of Total Quality Management (TQM) practices in relation to Green Quality Intelligence Capabilities (GQIC), Circular Process Innovation (CPI), and Sustainable Operational Performance (SOP). Responding to the need for a clearer review method and a more focused novelty, this article applies the PRISMA 2020-based Systematic Literature Review approach. Articles were identified from the Scopus database using keyword combinations related to TQM, quality management practices, green capability, green innovation, circular economy, circular process innovation, Industry 4.0, Quality 4.0, and sustainability performance. After identification, screening, eligibility assessment, and quality appraisal, 27 articles published between 2016 and 2026 were included in the final synthesis. The findings show that TQM literature has shifted from traditional quality control and customer satisfaction toward digital, green, and sustainability-oriented quality management. Soft TQM dimensions, such as leadership, employee involvement, training, and quality culture, and hard TQM dimensions, such as process management, quality tools, continuous improvement, and data-based decision making, remain dominant. However, prior studies still frequently use general mediators, including knowledge management, organizational culture, innovation capability, and competitive advantage. This review proposes CPI as a more specific mediation mechanism that translates TQM and GQIC into sustainable operational outcomes through waste reduction, resource efficiency, material reuse, energy efficiency, and circular process redesign. The study contributes by offering an integrated conceptual model and propositions for future empirical research on quality management, green intelligence, circular innovation, and sustainable operations.

Keywords: *Total Quality Management Practices; Green Quality Intelligence Capabilities; Circular Process Innovation; Sustainable Operational Performance; Systematic Literature Review.*

1. INTRODUCTION

Total Quality Management (TQM) has long been recognized in operations management as a strategic approach for improving quality, process efficiency, customer satisfaction, and organizational competitiveness. Classical TQM literature explains that quality improvement is not only a technical activity, but also an organizational system involving top management commitment, employee participation, customer focus, process management, continuous improvement, information use, and quality tools (Antony et al.,

2002; Rahman & Bullock, 2005; Sadikoglu & Olcay, 2014). In this sense, TQM provides both soft and hard foundations for operational excellence. Soft TQM shapes leadership, culture, learning, and human involvement, while hard TQM strengthens process standardization, measurement, data-based decision making, and continuous improvement routines. These foundations remain relevant because organizations currently face stronger pressure to improve quality while simultaneously reducing waste, improving resource efficiency, and responding to sustainability demands.

The development of TQM research shows that quality management is no longer sufficient when it is only understood as an internal quality-control mechanism. Recent studies increasingly connect TQM with sustainability performance, environmental performance, service innovation, organizational innovation, and green innovation. For example, TQM has been linked to corporate sustainability through green supply chain management and green innovation mechanisms (Albloushi et al., 2023; Bouzaabia & Ben Salem, 2025). In the public service context, TQM also supports sustainability through service innovation, indicating that quality routines need to be converted into innovation before they generate broader performance outcomes (Ali AlShehail et al., 2022). Similarly, studies in manufacturing and SMEs show that TQM contributes to sustainable performance when it is integrated with green supply chain management, competitive advantage, and environmentally oriented practices (Husnaini & Tjahjadi, 2020; Masudin et al., 2025; Rashid et al., 2025).

At the same time, digital transformation has changed the way organizations manage quality. Industry 4.0, big data analytics, information systems, and digital readiness make quality management more data-driven and predictive. Prior systematic reviews have shown that the integration of TQM and Industry 4.0 can support sustainability performance, but the field still requires clearer conceptual frameworks that connect quality practices, digital technologies, and sustainability outcomes (Aichouni et al., 2024; Saha et al., 2022). Empirical evidence from the hospitality sector also shows that IT applications influence hotel performance indirectly through hard TQM practices, suggesting that digital technologies only become useful when they are embedded in structured quality routines (Dam Thi & Thanh, 2023). These studies indicate that the future of TQM lies in its ability to combine traditional quality principles with digital information capability and sustainability orientation.

However, the relationship between TQM and performance is not always direct. Several studies show that internal organizational mechanisms are needed to translate quality practices into performance improvement. TQM has been found to strengthen organizational culture and innovation capability, which then mediate its effect on organizational and environmental performance (Xu et al., 2026). Other studies demonstrate that competitive advantage can mediate the relationship among TQM, organizational innovation, and organizational performance (Al-Kahtani & Saif Al-Mekhlafi, 2024). Knowledge

management is also important because TQM depends on the ability to acquire, share, and apply knowledge for quality improvement, project delivery, and innovation (BUKARI et al., 2026). Meanwhile, innovation capability is frequently used to explain how TQM practices become innovation outcomes and improved performance (Yusr, 2016). This pattern suggests that TQM needs a more specific mediating mechanism that is directly connected to sustainability and circular operations.

Green Quality Intelligence Capabilities (GQIC) are introduced in this review to capture an organization's ability to collect, process, analyze, and use quality-related environmental information for sustainable decision making. The concept is theoretically connected to green absorptive capacity, green dynamic capabilities, and green intellectual capital. Green absorptive capacity helps organizations acquire and use environmental knowledge for green process innovation and environmental performance (Du & Wang, 2022). Green dynamic capabilities enable firms to reconfigure resources toward environmental innovation and performance (Salem et al., 2025). Green intellectual capital supports green innovation and corporate sustainability because organizations need environmental knowledge, relational capital, and structural routines to create sustainable value (Li et al., 2022). Thus, GQIC complements TQM by ensuring that quality decisions are informed by environmental data, green customer expectations, resource-efficiency information, and sustainability standards.

Circular Process Innovation (CPI) is positioned as the central mechanism in this article. CPI refers to process innovation aimed at reducing waste, improving resource efficiency, reusing materials, redesigning operational flows, minimizing emissions, and supporting circular-economy principles. Circular economy literature emphasizes that sustainable performance is not only determined by the final product, but also by how processes are designed, controlled, and continuously improved. Process innovation is therefore a key pathway for moving from linear operations toward circular operations (de Araujo et al., 2026; Nohra et al., 2022). The integration of EFQM, TQM, and circular economy also shows that business excellence has shifted from a narrow financial orientation toward resource efficiency, sustainable lifecycle management, environmental responsibility, and circular value creation (Ghazo, 2025).

The novelty of this study lies in the integrated argument that TQM Practices and GQIC are two complementary antecedents of Sustainable Operational Performance (SOP), while CPI operates as the main pathway that translates both antecedents into operational outcomes. This argument differs from earlier studies that generally use broad mediators such as knowledge management, innovation capability, organizational culture, service innovation, and competitive advantage. CPI is more specific because it explains concrete operational changes, such as waste reduction, energy efficiency, material reuse, process redesign, and continuous improvement. In addition, the study by (Djojo Diharjo et al., 2026) indicates that

green innovation capability can explain the relationship between TQM and sustainability performance, but the present review develops this insight further by focusing specifically on circular process innovation as an operations-management mechanism.

Based on these gaps, the research questions are: RQ1: How has the literature on TQM, GQIC, CPI, and SOP developed in previous studies? RQ2: What research gaps remain open in the literature, and what opportunities exist for developing an integrated conceptual model? RQ3: How does CPI mediate the relationship between quality management, green intelligence capabilities, and sustainable operational performance? Methodologically, this article follows the logic of systematic review research, which emphasizes transparent search procedures, explicit inclusion and exclusion criteria, structured data extraction, and thematic synthesis (Page et al., 2021; Tranfield et al., 2003). Therefore, this review is expected to provide a stronger and more comprehensive basis for future empirical research on quality management, green intelligence, circular process innovation, and sustainable operations.

2. RESEARCH METHOD

This study uses a Systematic Literature Review (SLR) approach guided by PRISMA 2020 to identify, screen, evaluate, and synthesize studies related to TQM Practices, Green Quality Intelligence Capabilities, Circular Process Innovation, and Sustainable Operational Performance. The SLR method was selected because it provides a transparent and replicable procedure for mapping research trends, identifying gaps, and formulating future research directions in management studies (Tranfield et al., 2003; Page et al., 2021).

The literature search was conducted using the Scopus database because it indexes reputable peer-reviewed journals and is widely used in management and business review studies. The search covered publications from 2016 to 2026 in order to capture the recent development of TQM, Quality 4.0, digital transformation, green capability, circular economy, and sustainability performance. The main search string used was: TITLE-ABS-KEY (("Total Quality Management" OR "TQM practices" OR "quality management practices" OR "Quality 4.0") AND ("sustainability performance" OR "sustainable operational performance" OR "green performance" OR "environmental performance") AND ("green capability" OR "green innovation" OR "green intelligence" OR "circular economy" OR "circular process innovation" OR "process innovation" OR "Industry 4.0" OR "digital transformation")).

The inclusion criteria were: (1) articles discussing TQM or quality management practices as a main concept; (2) articles related to green capability, green innovation, circular economy, process innovation, operational performance, or sustainability performance; (3) publications between 2016 and 2026; (4) journal articles or review articles in the Business, Management, and Accounting area; (5) articles written in English; and (6) articles with accessible full text. The exclusion criteria were: (1) papers that only briefly mentioned TQM; (2) articles not related to performance, sustainability, innovation, or circular economy; (3) editorials, book chapters, proceedings, and conference abstracts; and (4) articles lacking sufficient methodological information.

The screening followed four stages. In the identification stage, 412 records were obtained from Scopus. After removing 38 records for reasons such as irrelevance to the

subject area and incomplete metadata, 374 records were screened. At the title and abstract screening stage, 292 records were excluded. A total of 82 reports were then sought for retrieval, of which 5 could not be retrieved. The eligibility stage assessed 77 full-text reports, and 50 reports were excluded because they did not directly discuss TQM practices, were not related to green capability, circular innovation, or sustainable performance, or were not suitable with the SLR criteria. Finally, 27 articles were included in the review.

Data were extracted using a structured review matrix. The extraction items included author and year, article title, research objective, country or industrial context, theory used, research method, analytical technique, TQM dimensions, antecedent variables, mediating variables, moderating variables, outcome variables, key findings, limitations, and future research agenda. This matrix helped ensure that the review captured not only publication trends but also the conceptual relationships among variables.

Quality appraisal was conducted to strengthen the reliability of the review. Each article was assessed using five criteria: relevance to the research questions, clarity of theoretical foundation, transparency of research method, clarity of findings, and contribution to the TQM-sustainability-circular economy discussion. Articles that met most of these criteria were retained for thematic synthesis. The final synthesis used descriptive analysis to summarize publication trends and thematic analysis to identify the roles of TQM, GQIC, CPI, and SOP in the literature.

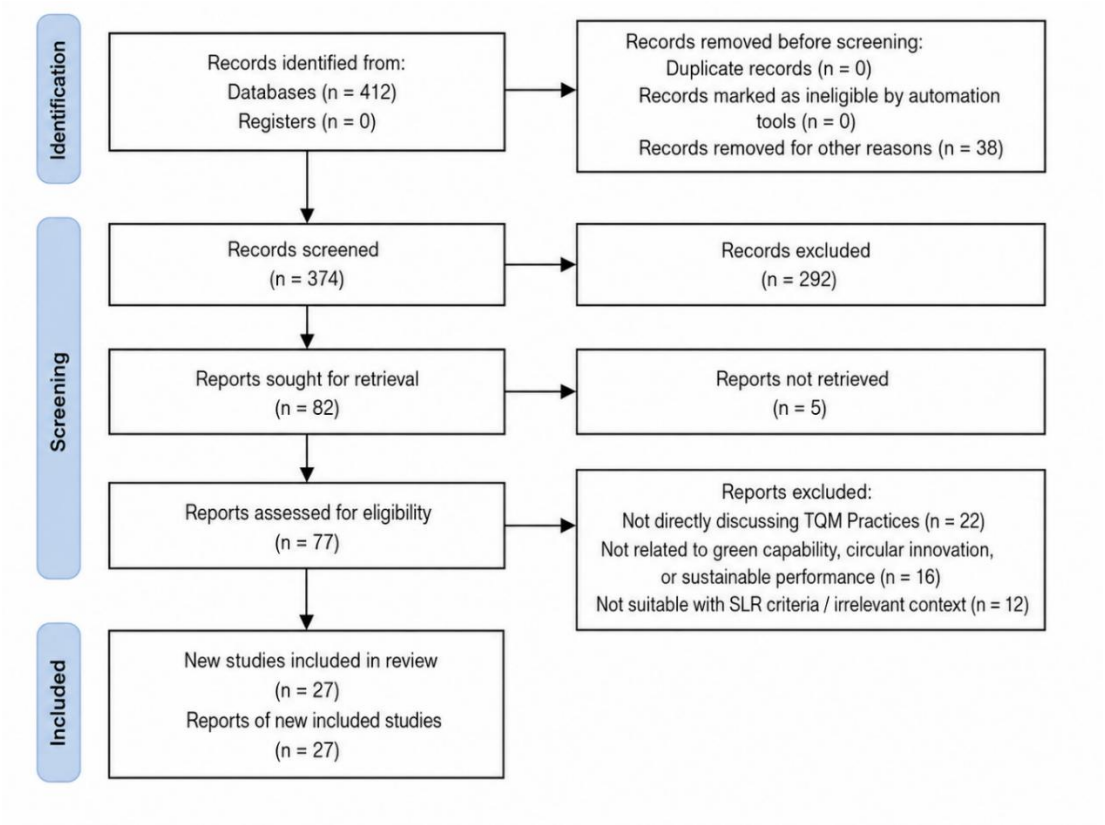

Figure 1. PRISMA Flow Diagram

3. RESULTS AND DISCUSSION

3.1 Literature Mapping

The mapping of 27 reviewed articles shows that TQM literature is moving from conventional quality control toward sustainability-oriented quality management. Earlier studies focused on quality assurance, customer satisfaction, efficiency, critical success factors, and the separation between soft and hard TQM. Recent articles increasingly connect TQM with Industry 4.0, green innovation, circular economy, environmental performance, and sustainable operations (Aichouni et al., 2024; Albloushi et al., 2023; Ghazo, 2025; Saha et al., 2022). The reviewed literature also shows that quantitative survey methods and SEM-based analysis are dominant, although review-based and conceptual studies have begun to increase, especially in research that integrates quality management, digital transformation, and sustainability.

Table 1. Main Mapping Result

Theme	Main mapping result	Implication
Publication trend	2016-2020 articles mainly discuss TQM, quality culture, process management, and organizational performance.	TQM was still treated mainly as an internal quality system.
Digital transformation	2021-2026 articles increasingly connect TQM with Industry 4.0, Quality 4.0, big data analytics, and IT capability.	Quality management is increasingly data-driven.
Green and circular orientation	Recent articles link TQM with green innovation, environmental performance, green supply chain management, and circular economy.	TQM is increasingly positioned as a sustainability enabler.
Mediation mechanisms	Common mediators include knowledge management, organizational culture, innovation capability, service innovation, and competitive advantage.	There is room for a more specific process-based mediator.
Research opportunity	Few studies explicitly discuss GQIC and CPI together.	An integrated TQM-GQIC-CPI-SOP model can extend the literature.

Source: *Data Processed, 2026*

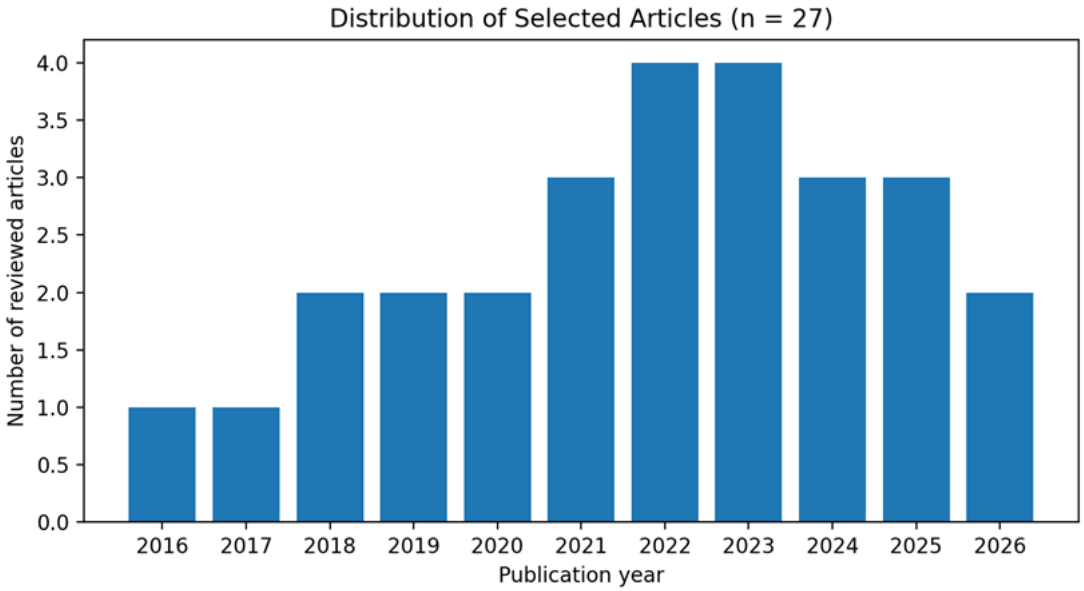

Figure 2. Publication Distribution of Selected Articles

Table 2. Reviewed Literature and Its Contribution to the Conceptual Model

Author(s)	Main Focus	Context/Method	Contribution to This Review
Antony et al. (2002)	TQM critical success factors	Quality management implementation	Supports the identification of core TQM dimensions.
Rahman & Bullock (2005)	Soft and hard TQM	Empirical TQM-performance study	Provides the basis for distinguishing soft TQM and hard TQM.
Sadikoglu & Olcay (2014)	TQM practices and performance barriers	Organizational performance	Shows the diversity of TQM dimensions and performance outcomes.

Honarpour et al. (2012)	Knowledge management, TQM, and innovation	Conceptual/empirical innovation literature	Explains knowledge management as a general mechanism in TQM studies.
Yusr (2016)	TQM and innovation capability	Innovation performance	Supports innovation capability as a common mediator in TQM research.
AlShehail et al. (2022)	TQM and sustainability through service innovation	Public service sector	Shows that service innovation can mediate TQM and sustainability.
Saha et al. (2022)	Industry 4.0, TQM, and sustainability	Digital transformation and sustainability	Connects Industry 4.0 technologies, TQM, and sustainability performance.
Du & Wang (2022)	Green absorptive capacity and process innovation	Green innovation/environmental performance	Supports the knowledge foundation for GQIC.
Nohra et al. (2022)	Circular economy and process innovation	Systematic review	Supports CPI as process-level circular innovation.

Albloushi et al. (2023)	TQM, green innovation, and corporate sustainability	Corporate sustainability	Shows TQM can influence sustainability through green mechanisms.
Aichouni et al. (2024)	TQM and Industry 4.0 for sustainability	Systematic literature review	Supports the need to integrate TQM, digitalization, and sustainability.
Al-Kahtani & Al-Mekhlafi (2024)	TQM, organizational innovation, and competitive advantage	Organizational performance	Explains competitive advantage as a general mediator.
Al Koliby et al. (2025)	Big data analytics, green learning, TQM, and sustainability	Manufacturing SMEs	Supports the link between data capability, green learning, TQM, and sustainability.
Bouzaabia & Ben Salem (2025)	TQM and green performance through green innovation	Green performance	Supports green innovation as a pathway between TQM and performance.
Dam Thi Thuy & Phan Chi Anh (2025)	Industry 4.0 IT applications and hard TQM	Hotel industry	Shows digital tools operate through hard TQM practices.

Ghazo (2025)	EFQM, TQM, and circular economy	Business excellence/circular economy	Supports the integration of quality management and circular economy principles.
Li et al. (2025)	Green intellectual capital and sustainability	Corporate sustainability	Supports GQIC through green knowledge and intellectual capital.
Masudin et al. (2025)	TQM, GSCM, competitive advantage, and sustainability	Indonesian SMEs	Shows sustainability performance requires TQM, green supply chain, and competitive advantage.
Rashid et al. (2025)	TQM, green supply chain practices, and environmental performance	Developing economy/manufacturing	Shows the relevance of TQM to environmental performance.
Salem et al. (2025)	Green dynamic capabilities and environmental performance	Environmental management	Supports GQIC as a dynamic green capability.
Bukari et al. (2026)	Knowledge management and TQM for project delivery	Construction industry	Reinforces knowledge management as an existing

			TQM mechanism.
de Araujo et al. (2026)	Circular economy and green process innovation	Corporate sustainability	Supports CPI as a mechanism for sustainable performance.
Djojo Diharjo et al. (2026)	Green innovation capability, TQM, and sustainability performance	Corporate sustainability	Supports the mediating role of green innovation capability.
Xu et al. (2026)	TQM, organizational culture, and innovation capability	Manufacturing firms	Supports indirect effects of TQM through internal capabilities.
Husnaini & Tjahjadi (2020)	Quality management, innovation, and sustainable performance	Manufacturing firms	Supports the link between quality management, innovation, and sustainability.
Page et al. (2021)	PRISMA 2020 statement	Systematic review reporting guideline	Guides the transparent reporting of identification, screening, eligibility, and inclusion.
Tranfield et al. (2003)	Systematic review methodology	Evidence-informed management research	Provides the methodological foundation for

	in management		management SLR.

Source: *Data Processed, 2026*

Table 2 demonstrates that the reviewed literature contains both classical foundations and recent sustainability-oriented developments. The classical studies clarify the dimensions of TQM, while the more recent studies show the movement toward digital quality, green capability, circular economy, and sustainable performance. Therefore, the proposed model is not built from a limited set of studies, but from the full body of references synthesized in this review.

3.2 Dominant TQM Dimensions and Related Variables

The reviewed articles consistently distinguish between soft TQM and hard TQM. Soft TQM emphasizes people, leadership, culture, communication, training, and organizational learning, while hard TQM emphasizes process control, standardization, measurement, quality tools, data management, and continuous improvement (Antony et al., 2002; Rahman & Bullock, 2005). Both dimensions are important for sustainability, but they operate in different ways. Soft TQM builds the organizational climate for change, whereas hard TQM provides the technical routines needed to improve processes. The synthesis further shows that TQM outcomes often depend on supporting mechanisms, including knowledge management, innovation capability, service innovation, organizational culture, and competitive advantage (Ali AlShehail et al., 2022; Al-Kahtani & Saif Al-Mekhlafi, 2024; Honarpour et al., 2012; Xu et al., 2026; Yusr, 2016).

Table 3. Dominant dimensions/variables Literature component

Literature component	Dominant dimensions/variables	Relevance to this review
Soft TQM	Top management commitment, leadership, employee involvement, training, customer focus, quality culture	Builds commitment, learning, and readiness for sustainability-oriented change.
Hard TQM	Process management, statistical control, quality tools, continuous improvement, data-	Provides operational routines for efficiency, defect reduction, process redesign, and

	based decision making, information management	resource optimization.
Green capability	Green absorptive capacity, green knowledge, green organizational learning, green dynamic capability	Supports the development of GQIC as a capability to use environmental quality information.
Circular innovation	Green process innovation, eco-design, recycling, material reuse, process redesign, waste reduction	Supports CPI as a specific process-based mediator.
Performance outcomes	Operational performance, sustainability performance, environmental performance, green performance, competitive advantage	Shows that SOP is multidimensional and includes efficiency, flexibility, quality, resource efficiency, and environmental outcomes.

Source: *Data Processed, 2026*

3.3 Research Gaps

The synthesis identifies three main gaps. First, the relationship between TQM and performance is often tested directly, even though several studies show that TQM requires internal mechanisms to generate performance improvement (Honarpour et al., 2012; Yusr, 2016; Xu et al., 2026). Second, the integration of TQM, digital quality information, green intelligence, and circular economy is still fragmented, although Industry 4.0, big data analytics, green learning, and green capability have become increasingly relevant in quality management research (Aichouni et al., 2024; Al Koliby et al., 2025; Dam Thi & Thanh, 2023; Saha et al., 2022). Third, prior mediators are mostly general and do not fully explain process-level transformation in sustainable operations. Circular economy and green process

innovation studies therefore create an opportunity to position CPI as a more specific mediation mechanism (Nohra et al., 2022; de Araujo et al., 2026; Ghazo, 2025). These gaps justify the development of a model that positions TQM and GQIC as antecedents, CPI as the mediator, and SOP as the outcome.

Table 4. Gap, Evidence, and Opportunity

Gap area	Evidence from synthesis	Opportunity
Direct TQM-performance relationship	Many studies test direct effects of TQM on organizational or sustainability performance.	A mediation mechanism is needed to explain how TQM becomes sustainable operational performance.
Fragmented integration	Digital transformation, green capability, circular economy, and TQM are often studied separately.	A more integrated conceptual framework is needed.
General mediators	Knowledge management, innovation capability, organizational culture, and competitive advantage remain dominant.	CPI is proposed as a more specific process-level mediator.
Limited GQIC discussion	Green knowledge and green capability are discussed, but green quality intelligence is not yet clearly conceptualized.	GQIC can explain how quality-related environmental information is converted into operational decisions.

Source: *Data Processed, 2026*

3.4 Proposed Conceptual Model and Propositions

Based on the synthesis, this review proposes an integrated conceptual model. TQM Practices and GQIC are positioned as antecedent variables, CPI is positioned as the mediating variable, and SOP is positioned as the dependent variable. The model emphasizes that sustainable operational performance is not produced only through quality management routines, but through the ability to convert quality and green intelligence into circular process changes. TQM supplies the quality culture and process discipline, while GQIC supplies green information-processing capability derived from environmental knowledge, green absorptive capacity, green intellectual capital, and green dynamic capabilities (Du & Wang, 2022; Li et al., 2025; Salem et al., 2025). CPI then translates these capabilities into waste reduction, resource efficiency, material reuse, process redesign, and energy-saving operations (Nohra et al., 2022; de Araujo et al., 2026).

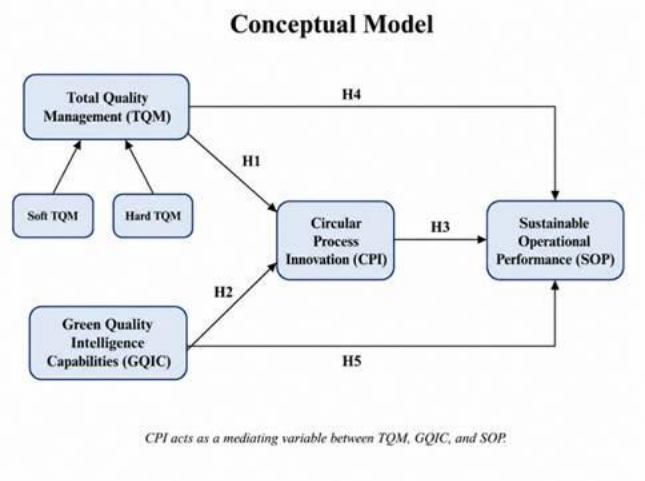

Figure 3. Proposed Conceptual Model

Table 5. Proposition

Proposition	Statement
P1	TQM Practices positively influence Circular Process Innovation.
P2	Green Quality Intelligence Capabilities positively influence Circular Process Innovation.
P3	Circular Process Innovation positively influences Sustainable Operational Performance.

P4	TQM Practices positively influence Sustainable Operational Performance.
P5	Green Quality Intelligence Capabilities positively influence Sustainable Operational Performance.
P6	Circular Process Innovation mediates the relationship between TQM Practices and Sustainable Operational Performance.
P7	Circular Process Innovation mediates the relationship between Green Quality Intelligence Capabilities and Sustainable Operational Performance.

Source: *Data Processed, 2026*

DISCUSSION

Position of Green Quality Intelligence Capabilities

The position of GQIC in the proposed model is as a strategic green information capability. GQIC complements TQM because TQM provides quality routines, while GQIC provides environmental intelligence for decision making. Organizations may have strong quality practices, but without green intelligence they may fail to identify environmental risks, resource inefficiencies, regulatory changes, and green customer expectations. Therefore, GQIC strengthens the sustainability orientation of TQM by ensuring that quality decisions are informed by environmental and circular economy considerations. This argument is consistent with studies showing the importance of green absorptive capacity, green intellectual capital, and green dynamic capabilities in supporting green innovation and environmental performance (Du & Wang, 2022; Li et al., 2025; Salem et al., 2025).

Position of Circular Process Innovation

CPI is positioned as the main mediation pathway. This position is important because TQM and GQIC do not automatically result in sustainable performance. They need to be translated into tangible operational changes, such as redesigning process flows, reducing waste, reusing materials, improving energy efficiency, and applying continuous improvement to circular practices. CPI is therefore more specific than general innovation capability because it directly addresses process-level transformation in operations management. This argument extends previous findings on green innovation, process innovation, and corporate sustainability by emphasizing the circular dimension of operational processes (Bouzaabia & Ben Salem, 2025; Djojo Diharjo et al., 2026; Nohra et al., 2022; de Araujo et al., 2026).

Theoretical and Practical Contributions

Theoretically, this review extends TQM literature by linking quality management with green intelligence, circular economy, and sustainable operations in one framework. It also clarifies the distinction between general mediators and a process-specific mediator. Practically, the findings suggest that organizations should not only strengthen soft and hard TQM, but also develop green quality data systems, environmental learning routines, and circular process redesign capabilities. This is relevant for SMEs, manufacturing firms, hospitality organizations, public services, and supply chain actors because sustainable performance is increasingly shaped by the interaction among quality routines, digital information, green capability, and circular process innovation (AlShehail et al., 2022; Dam Thi Thuy & Phan Chi Anh, 2025; Masudin et al., 2025; Rashid et al., 2025; Al Koliby et al., 2025). The proposed propositions can guide future empirical research using SEM-PLS, fsQCA, or mixed methods in manufacturing, services, and SMEs.

4. CONCLUSION

This study reviewed the development of TQM literature in relation to GQIC, CPI, and SOP. Using a PRISMA-based SLR procedure, 27 articles published between 2016 and 2026 were included in the final synthesis, while foundational methodological and classical TQM studies were also used to strengthen the conceptual and methodological basis of the review. The results show that TQM research has shifted from traditional quality control toward sustainability-oriented quality management, digital quality management, green intelligence, and circular process innovation.

The main contribution of this study is the development of an integrated conceptual model that positions TQM Practices and GQIC as antecedents, CPI as the mediating variable, and SOP as the outcome. CPI is proposed as a key pathway because it explains how quality management and green intelligence are converted into practical operational changes that reduce waste, improve resource efficiency, support material reuse, and strengthen sustainable operational performance.

This study has several limitations. First, it relies on the Scopus database, so relevant articles from other databases may not be fully captured. Second, the review focuses on literature related to TQM, green capability, circular innovation, and sustainable performance, which may exclude broader sustainability studies. Third, the concepts of GQIC and CPI remain emerging and require empirical validation. Future research should test the proposed model using quantitative methods such as SEM-PLS, compare the effects of soft and hard TQM, examine possible moderators such as digital readiness and green organizational culture, and apply the model in different sectors and countries.

REFERENCES

Aichouni, A. B. E., Silva, C., & Ferreira, L. M. D. F. (2024). A Systematic Literature Review of the Integration of Total Quality Management and Industry 4.0: Enhancing Sustainability Performance Through Dynamic Capabilities. *Sustainability*, *16*(20), 9108. https://doi.org/10.3390/su16209108

Al Koliby, I. S., Al-Swidi, A. K., Al-Hakimi, M. A., Mehat, N. A. B., Gelaidan, H. M., & Al-Hattami, H. M. (2025). From data to green innovation: The role of green organizational learning capability and total quality management. *Sustainable Futures*, *10*, 101191. https://doi.org/10.1016/j.sftr.2025.101191

Albloushi, B., Alharmoodi, A., Jabeen, F., Mehmood, K., & Farouk, S. (2023). Total quality management practices and corporate sustainable development in manufacturing companies: the mediating role of green innovation. *Management Research Review*, *46*(1), 20–45. https://doi.org/10.1108/MRR-03-2021-0194

Ali AlShehail, O., Khan, M., & Ajmal, M. (2022). Total quality management and sustainability in the public service sector: the mediating effect of service innovation. *Benchmarking: An International Journal*, *29*(2), 382–410. https://doi.org/10.1108/BIJ-08-2020-0449

Al-Kahtani, S. M., & Saif Al-Mekhlafi, A.-W. A.-G. (2024). The mediating role of competitive advantage in the relationship between total quality management, entrepreneurial orientation, organizational innovation, and organizational performance. *Uncertain Supply Chain Management*, *12*(4), 2183–2196. https://doi.org/10.5267/j.uscm.2024.6.012

Antony, J., Leung, K., Knowles, G., & Gosh, S. (2002). Critical success factors of TQM implementation in Hong Kong industries. *International Journal of Quality & Reliability Management*, *19*(5), 551–566. https://doi.org/10.1108/02656710210427520

Bouzaabia, K., & Ben Salem, A. (2025). The impact of TQM on green performance: the mediating role of green innovation. *International Journal of Quality & Reliability Management*, *42*(9), 2587–2604. https://doi.org/10.1108/IJQRM-09-2024-0326

BUKARI, C., Kheni, N. A., Isaac Boateng, I., Owusu-Ansah, C. M., & Simpson, K. B. (2026). Integrating Knowledge Management with Total Quality Management to Enhance Construction Project Delivery in Ghana. *Construction Economics and Building*, *26*(1). https://doi.org/10.5130/d04bqm28

Dam Thi, T., & Thanh, H. N. (2023). Impact of TQM practices on business performance of three-star hotels and above in Vietnam: The role of innovation performance. *International Journal of Management Studies and Social Science Research*, *05*(02), 300–312. https://doi.org/10.56293/IJMSSSR.2022.4600

de Araujo, A. R., de Almeida Guerra, R. M., Junior, D. L., Kneipp, J. M., & Carvalho, L. M. C. (2026). Circular and Sustainable Business Model Innovation: Formulating an Integrated Concept Through A Systematic Literature Review. *Circular Economy and Sustainability*, *6*(2), 82. https://doi.org/10.1007/s43615-026-00817-2

Djojo Diharjo, Risa Watti, & Nurul Azizah. (2026). The Role of Green Innovation Capabilities on The Relationship Between Total Quality Management And Sustainability Performance of Small And Medium Manufacturing Industry In Surabaya. *Al-Kharaj: Journal of Islamic Economic and Business*, 8–1.

Du, Y., & Wang, H. (2022). Green Innovation Sustainability: How Green Market Orientation and Absorptive Capacity Matter? *Sustainability*, *14*(13), 8192. https://doi.org/10.3390/su14138192

Ghazo, M. M. (2025). Evolution and Integration: Navigating the Path to Business Excellence through the European Foundation for Quality Management Model and Circular Economy Principles. *Quality - Access to Success*, *26*(206), 1–6. https://doi.org/10.47750/QAS/26.206.01

Honarpour, A., Jusoh, A., & Md Nor, K. (2012). Knowledge Management,Total Quality Management and Innovation: A New Look. *Journal of Technology Management & Innovation*, *7*(3), 22–31. https://doi.org/10.4067/S0718-27242012000300003

Husnaini, W., & Tjahjadi, B. (2020). QUALITY MANAGEMENT, GREEN INNOVATION AND FIRM VALUE: EVIDENCE FROM INDONESIA. *International Journal of Energy Economics and Policy*, *11*(1), 255–262. https://doi.org/10.32479/ijeep.10282

Li, L., Hsu, C., Mao, J., & Zhang, W. (2022). Contextualising digital innovation in today's China: Local practices and global contributions. *Information Systems Journal*, *32*(3), 623–629. https://doi.org/10.1111/isj.12379

Masudin, I., Barraq, R. F., Zulfikarijah, F., Nasyiah, T., Restuputri, D. P., Trireksani, T., & Djajadikerta, H. G. (2025). Examining sustainable performance using SEM-FsQCA: The role of TQM, green SCM, and competitive advantage in small and medium enterprises (SMEs). *Sustainable Futures*, *9*, 100635. https://doi.org/10.1016/j.sftr.2025.100635

Nohra, P., Rejeb, H. Ben, & Venkateswaran, S. (2022). *Impact of automation during innovative remanufacturing processes in circular economy: a state of the art*.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*, n71. https://doi.org/10.1136/bmj.n71

Rahman, S., & Bullock, P. (2005). Soft TQM, hard TQM, and organisational performance relationships: an empirical investigation. *Omega*, *33*(1), 73–83. https://doi.org/10.1016/j.omega.2004.03.008

Rashid, A., Rasheed, R., & Amirah, N. A. (2025). Synergizing TQM, JIT, and Green Supply Chain Practices: Strategic Insights for Enhanced Environmental Performance. *Logistics*, *9*(1), 18. https://doi.org/10.3390/logistics9010018

Sadikoglu, E., & Olcay, H. (2014). The Effects of Total Quality Management Practices on Performance and the Reasons of and the Barriers to TQM Practices in Turkey. *Advances in Decision Sciences*, *2014*, 1–17. https://doi.org/10.1155/2014/537605

Saha, P., Talapatra, S., Belal, H. M., & Jackson, V. (2022). Unleashing the Potential of the TQM and Industry 4.0 to Achieve Sustainability Performance in the Context of a Developing Country. *Global Journal of Flexible Systems Management*, *23*(4), 495–513. https://doi.org/10.1007/s40171-022-00316-x

Salem, I. E., Fathy, E. A., Fouad, A. M., Elbaz, A. M., & Abdien, M. K. (2025). Navigating green innovation via absorptive capacity and the path to sustainable performance in

hotels. *Journal of Hospitality and Tourism Insights*, *8*(6), 2140–2161. https://doi.org/10.1108/JHTI-07-2024-0687

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review. *British Journal of Management*, *14*(3), 207–222. https://doi.org/10.1111/1467-8551.00375

Xu, C., Ruanggoon, J., & Thavorn, J. (2026). Total quality management and organizational performance in the manufacturing industry: integrating contingency theory and the resource-based view. *Cogent Business & Management*, *13*(1). https://doi.org/10.1080/23311975.2026.2635755

Yusr, M. M. (2016). Innovation capability and its role in enhancing the relationship between TQM practices and innovation performance. *Journal of Open Innovation: Technology, Market, and Complexity*, *2*(1), 1–15. https://doi.org/10.1186/s40852-016-0031-2