EPRA International Journal of Environmental Economics, Commerce and Educational Management
Journal DOI: 10.36713/epra0414 |ISI I.F Value: 0.815|SJIF Impact Factor (2026): 8.752 ISSN: 2348 – 814X
Volume: 13 | Issue:8 | August 2026 -Peer Reviewed Journal

FINTECH AS AN ENABLER OF THE CIRCULAR ECONOMY: A SYSTEMATIC LITERATURE REVIEW USING THE TCCM FRAMEWORK

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ABSTRACT
The transition from a linear to a circular economic model is essential for achieving sustainable development, yet it is often hindered by financial, technological, and organizational barriers. Financial technology (FinTech) has emerged as a transformative force with the potential to overcome these challenges by enhancing access to finance, improving transparency, and supporting green and circular investments. This study conducts a systematic literature review to examine the role of FinTech in enabling circular economy practices, applying the Theory–Context–Characteristics–Methodology (TCCM) framework. Following PRISMA guidelines, 15 peer-reviewed articles published between 2021 and 2025 were selected from major academic databases. The findings reveal that FinTech positively contributes to circular economy development, particularly when supported by strong institutional quality and digital infrastructure, while state fragility weakens its impact. The study reveals that FinTech can act as a critical enabler of circular economy transitions when aligned with supportive institutional environments and firm-level strategic capabilities.
KEY WORDS: *Fintech, Circular Economy, Sustainability, TCCM*

The dominant global economic model remains largely linear, following a "take–make–use–dispose" logic that drives resource depletion, waste generation, and environmental degradation. In contrast, the circular economy seeks to design out waste and pollution, keep materials and products in use for as long as possible, and regenerate natural systems, positioning circular business models as a cornerstone of sustainable development (Agrawal et al., 2023; Kumar et al., 2024). Yet, the transition to circularity is often constrained by technological, organizational, and especially financial barriers, including high upfront investment costs, uncertain revenue streams, and difficulties in valuing circular assets (Ma et al., 2025).

At the same time, financial technology (fintech) has emerged as a disruptive force reshaping how financial services are produced and delivered, using tools such as mobile platforms, artificial intelligence, big data analytics, blockchain, and crowdfunding (Chueca Vergara & Ferruz Agudo, 2021; Pizzi et al., 2021). Fintech is increasingly recognized as an enabler of green and circular finance by lowering transaction costs, improving risk assessment, and channelling capital toward environmentally sustainable projects (Chueca Vergara & Ferruz Agudo, 2021; Kumar et al., 2024). Recent systematic reviews highlight financial innovation—including fintech, green bonds, and specialized circular-economy funds—as a powerful driver of circular economy adoption, embedding environmental, social, and governance (ESG) and circular principles into financial decision-making (Agrawal et al., 2023; Kumar et al., 2024). FinTech can act as a catalyst for achieving sustainable development. (Hasan et al., 2024)
The transition to a circular business model requires changes in different business management models and strategies, and fintech can play a critical role in this transition by promoting sustainability in companies (Kuik et al., 2023).

Research Objectives

- To identify dominant theoretical frameworks applied to explain the role of Fintech and Circular Economy
- To examine the geographical regions where Fintech for Circular Economy is used
- To investigate the specific characteristics of fintech adoption on circularity
- To evaluate methodologies employed in Circular Economy-Fintech research.

SYSTEMATIC LITERATURE REVIEW METHODOLOGY

2.1 PRISMA Guidelines

This systematic review adheres to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) format, resulting in a structured and transparent research procedure. The PRISMA approach is divided into four critical phases: identification, screening, eligibility, and inclusion.

Identification
The first phase included a thorough search of numerous academic databases, including ScienceDirect, Emerald Insight, Springer, and Taylor & Francis. The search phrase "Fintech Adoption" AND "Circular Economy" yielded an initial total of 500 articles. These publications covered a variety of fields important to the subject.

Screening
During the screening process, Duplicate entries were eliminated, and articles written in non-English or before 2021 and after 2025 were excluded. Only peer-reviewed, relevant studies made it to the eligibility stage.

Eligibility
The eligibility phase included a thorough review of the remaining research. Articles were evaluated based on their methodological rigor, alignment with study aims, and contribution to understanding the relevance of Fintech Adoption on Circular Economy practices. Studies that lacked empirical evidence, did not concentrate on Circular economy, or were deemed irrelevant to the research topic were eliminated. Following a thorough review, 15 articles were declared appropriate for inclusion.

Inclusion
In the final step, 15 articles were chosen because they gave detailed insights into Fintech Adoption and Circular Economy practices. These publications serve as the foundation for this systematic review, providing useful insights into the acceptance, deployment, and effect of Fintech Adoption on Circular Economy.

2.2 Data Collection
A comprehensive literature search was conducted across ScienceDirect, Emerald Insight, Springer, and Taylor & Francis, following Tranfield et al. (2003), Fink (2009), and PRISMA guidelines. Using the search term ("Fintech Adoption" AND "Circular Economy"), 219 publications were retrieved from ScienceDirect, 115 from Emerald Insight, 97 from Springer, and 69 from Taylor & Francis. After applying inclusion criteria (2021-2025, relevant fields, business-focused journals, and English language), 15 papers were selected for the systematic review, providing a strong foundation for evaluating Fintech's impact on Circular Economy.

3. 1 TCCM Framework Analysis
3.1 Theory (T)
Several economic, institutional, technological, and sustainability-oriented theories have been applied in FinTech and circular economy research to explain how digital financial innovations influence sustainable practices, resource efficiency, and circular business model adoption.

Theory	Description	Application
Institutional Therory	Explains how organizations' structures, practices, and behaviors are shaped by formal rules, social norms, and cultural beliefs in their institutional environment.	Analyzing the interplay between financial technologies and institutional quality in driving Circular Economy (CE) adoption, particularly exploring the role of institutions in shaping CE's adaptive capacity through socioeconomic, demographic, and environmental factors.
Human Capital Theory	States that investments in education, training, and skills enhance individuals' productivity and economic value.	Investments in digital literacy, data analytics, and FinTech capabilities enable firms to improve resource efficiency, track circular flows, and innovate sustainable financial solutions that support recycling, reuse, and responsible consumption.
Practice-Based View (PBV)	It focuses on easily adoptable practices that, when implemented well, can lead to efficiency, competitiveness, and better outcomes.	When firms consistently use FinTech practices—such as digital payments, blockchain tracking, green financing platforms, and data-driven monitoring—they improve transparency, resource efficiency, and scalability of circular economy activities, leading to better sustainability outcomes.
Ecological Modernization Theory (EMT)	It believes that modern technologies and market mechanisms can reduce environmental harm while improving efficiency and competitiveness.	FinTech acts as an enabling tool that aligns environmental goals with economic incentives, accelerating the transition to a circular economy.

Circular Economy Theory	Using resources wisely by keeping products, materials, and energy in use for as long as possible. Instead of the "take–make–waste" approach, it focuses on reducing waste through reuse, repair, recycling, and regeneration.	FinTech tools like digital payments, green financing platforms, blockchain tracking, and data analytics make it easier to fund circular projects, monitor material flows, and reward sustainable business and consumer behavior, thereby accelerating circular economy practices.
Digital Innovation Theory	It focuses on using digital tools to rethink and improve existing processes rather than just automating them.	Fintech innovations help businesses measure environmental impact, support circular business models, and make sustainability financially attractive and scalable.
Industrial Structure Upgrading Theory	The theory emphasizes improving efficiency, innovation, and sustainability by moving toward advanced, cleaner, and more productive industrial structures.	FinTech supports industrial upgrading by improving access to green finance, enabling digital monitoring of resources, supporting circular business models, thereby reducing waste, enhancing resource efficiency, and promoting sustainable industrial development.
Spatial Spillover Theory	Progress in one place can "spill over" and create positive effects beyond its boundaries.	spillovers accelerate circular economy practices across regions, leading to wider improvements in resource efficiency, environmental performance, and sustainable development.
Resource-Based View,	It's not just *what* a firm does, but *what it has and how well it uses it* that makes it successful.	digital capabilities, data management, partnerships, and innovation capacity—enable firms to use FinTech tools to support circular activities.

Findings from theoretical Approach

The findings indicate that FinTech adoption significantly facilitates the transition toward a circular economy**,** with its effectiveness shaped by institutional, organizational, and technological conditions. Strong institutional quality enhances the ability of FinTech innovations to support circular practices by providing regulatory support, governance stability, and sustainability-oriented norms. The results also show that human capital and digital skills are essential for translating FinTech investments into improved resource efficiency, monitoring of circular flows, and the development of sustainable financial solutions. Consistent use of FinTech practices—such as digital payments, blockchain-based traceability, and green financing platforms—improves transparency, scalability, and operational efficiency of circular economy activities. The findings further reveal that FinTech aligns environmental goals with economic incentives, supporting ecological modernization without undermining competitiveness. Evidence also suggests that FinTech-driven digital innovation enables firms to redesign processes and scale circular business models rather than merely automate existing ones. Additionally, FinTech contributes to industrial upgrading and generates positive spatial spillover effects, promoting cleaner production structures and wider diffusion of circular practices across regions. Overall, firms with strong digital resources and dynamic capabilities are better able to sense opportunities, seize them through strategic investments, and reconfigure operations to achieve sustained circular economy outcomes in rapidly changing environments.

3.2 Context (C)

The context of studies predominantly focuses on:

Construct	Definition	Impact on Fintech and Circular Economy
Financial Technology (FinTech)	FinTech refers to the use of digital technologies in financial services	FinTech has a positive and significant effect on circular economy development.
Circular Economy (CE)	The Circular Economy represents an economic system focused on reducing resource extraction, minimizing waste, increasing recycling and reuse, and promoting sustainable production and consumption patterns.	CE is positively influenced by FinTech, subject to institutional conditions.
Institutional Quality	Institutional Quality refers to the effectiveness of formal institutions and governance system	High institutional quality strengthens the positive impact of FinTech on the circular economy
State Fragility	State Fragility reflects a country's weak governance capacity	High state fragility weakens or reduces the positive impact of FinTech on circular economy outcomes.

Green Innovation Practices	This includes both product innovation and process innovation aimed at reducing environmental harm.	Supports sustainable growth through innovation
Digital Technology Innovation	Digital Technology Innovation refers to the development and application of advanced digital technologies, such as:Big data, Artificial intelligence (AI), Blockchain, Internet of Things (IoT) and Digital platforms	Digital technology innovation positively drives circular economy development
Digitalization	Digitalization refers to the integration of digital technologies into economic and industrial activities	Digitalization positively contributes to environmental sustainability
Sustainable Environmental Goals	This construct represents the outcome variable,measured through:environmental quality and emissions reduction	It reflects the achievement of long-term environmental sustainability, aligned with Vision 2030 goals.
Sustainable Finance/Green Finance	refers to financial activities that support:Environmentally friendly projects, Renewable energy, Resource-efficient technologies and Circular business models	Green finance directly supports CE investments
Digital Innovation and Technological Infrastructure	It captures the technological foundation enabling FinTech solutions.	Acts as a facilitator and accelerator of FinTech–CE integration.

Findings on Key Constructs

The findings indicate that **Financial Technology (FinTech)** plays a significant role in advancing the **circular economy** by improving financial efficiency, transparency, and access to funding for sustainable activities. The positive impact of FinTech on circular economy development is **strongly conditioned by institutional quality**, where effective governance and regulatory systems enhance the translation of digital finance into circular outcomes. In contrast, **state fragility weakens this relationship**, as political instability and weak institutions hinder FinTech adoption and limit its contribution to circular economy practices. The results further show that **green innovation practices**, including eco-friendly product and process innovations, serve as critical mechanisms through which digital finance supports sustainable growth. Additionally, **digital technology innovation and digitalization** significantly promote environmental sustainability by enabling data-driven resource management, waste reduction, and cleaner production systems. **Sustainable or green finance** emerges as a key channel connecting FinTech with circular economy investments by directing financial flows toward environmentally responsible projects. Overall, the achievement of **sustainable environmental goals**, such as emissions reduction and improved environmental quality, is accelerated when FinTech, digital infrastructure, innovation, and supportive institutional frameworks operate in a complementary manner.

3.3 Characteristics (C)

FinTech-driven financial systems integrate multiple digital, institutional, and sustainability-oriented mechanisms to support circular economy development and promote sustainable economic practices.

Feature	Description	Impact on Circular Economy
Financial Technology (FinTech)	FinTech represents the adoption of digital financial technologies such as mobile banking, digital payments, online financial platforms, and technology-enabled financial inclusion at the country level.	FinTech improves access to finance, reduces transaction costs, enhances transparency, and facilitates funding for environmentally sustainable and circular economic activities, thereby positively influencing circular economy development.
Circular Economy (CE)	The circular economy reflects an economic system focused on reducing resource extraction, minimizing waste generation, increasing recycling and reuse, and promoting sustainable production and consumption patterns.	Circular economy outcomes improve as FinTech-enabled financial systems support green investments, sustainable production models, and resource-efficient economic activities.

Institutional Quality	Institutional quality captures the effectiveness of governance structures, including regulatory quality, rule of law, government effectiveness, political stability, and control of corruption.	High institutional quality strengthens the positive effect of FinTech on the circular economy by ensuring effective regulation, trust in digital finance, and enforcement of environmental and financial policies.
Sustainable Business Practices	Sustainable business practices refer to firm-level strategies and operations that integrate environmental, social, and economic considerations, including resource efficiency, waste minimization, and responsible production and consumption.	These practices operationalize circular economy principles within firms, enabling the practical implementation of CE through finance-supported investments and process improvements.
Financial Systems and Market Structures	Financial markets, banking systems, investors, and policy frameworks play a predominat role in shaping access to sustainable finance and influencing corporate sustainability behavior.	Well-functioning financial systems enhance the availability and effectiveness of sustainable finance, improving firms' capacity to invest in circular economy initiatives.
Firm-Level Decision-Making	The study emphasizes managerial and strategic decision-making regarding sustainability investments, risk assessment, and long-term value creation.	Strategic financial decisions aligned with sustainability goals encourage firms to integrate circular economy principles into core business models.

Finding on Characteristics

The findings show that **Financial Technology (FinTech)** plays an important role in supporting the circular economy by improving access to finance, reducing costs, and increasing transparency for sustainable activities. **FinTech-enabled financial systems** help promote green investments and resource-efficient production, which strengthens circular economy outcomes. The study also highlights that **strong institutional quality** is essential, as effective governance and regulations increase trust in digital finance and enhance its positive impact on circular economy development. At the firm level, **sustainable business practices** translate financial support into real circular actions such as waste reduction, recycling, and efficient resource use. In addition, **well-functioning financial systems and market structures** improve the availability of sustainable finance, allowing firms to invest more confidently in circular initiatives. The results further indicate that **managerial and strategic decision-making** plays a key role in embedding circular economy principles into core business models. Overall, the study concludes that finance acts as a critical enabler of the circular economy when supported by strong institutions, effective markets, and sustainability-oriented firm strategies.

3.4 Methodology (M)

The reviewed studies employ diverse research methods to examine the role of FinTech and financial mechanisms in promoting circular economy and sustainable development outcomes.

Methodology	Description	Frequency in Literature
Econometric / Quantitative Secondary Data Analysis	Uses panel data, time-series data, or cross-country/firm-level datasets with econometric techniques (e.g., regression, GMM, DID) to examine causal or associative relationships between FinTech, finance, digitalization, and circular economy outcomes.	Very High
Survey-Based Empirical Research	Uses questionnaire data collected from managers, SMEs, or organizations and applies SEM/PLS-SEM or regression to test behavioral and practice-based relationships.	Low
Case Study / Qualitative Analysis	Employs qualitative data, interviews, document analysis, or firm/bank cases to explore how finance and circular economy practices are implemented in real organizational contexts.	Moderate
Systematic Literature Review (SLR)	Uses structured review protocols (PRISMA, Scopus/WoS filtering) to synthesize existing knowledge, identify themes, gaps, and future research directions.	Low
Bibliometric Analysis	Applies citation, co-citation, keyword, and network analysis to map the intellectual structure and evolution of FinTech–green finance research.	Low
Conceptual / Theoretical	Develops frameworks, theoretical models, or research agendas without primary data, often integrating multiple theories	high

3.5 Findings on Research Methodologies

The review shows that most studies on FinTech and the circular economy mainly use **econometric and quantitative secondary data methods**, making this the most common approach in the literature. These studies focus largely on country-level or firm-level data to examine how FinTech, finance, and digitalization influence circular economy outcomes. **Conceptual and theoretical papers** are also widely used, indicating that the field is still developing its core frameworks and research directions. In contrast, **survey-based empirical studies** are limited, showing a lack of evidence from managers, SMEs, and practitioners. **Case study and qualitative research** appear at a moderate level, providing valuable real-world insights but remaining underrepresented. Overall, **systematic reviews and bibliometric analyses** are relatively rare, suggesting opportunities for more structured knowledge synthesis in future research.

Conclusion

This systematic literature review examined the growing body of research on the role of FinTech in enabling circular economy practices using the TCCM framework. The findings confirm that FinTech acts as a critical enabler of circular economy development by improving access to finance, reducing transaction costs, enhancing transparency, and supporting green and sustainable investments. The effectiveness of FinTech in promoting circularity is strongly shaped by contextual factors, particularly institutional quality and state capacity, which either strengthen or weaken its impact. The review highlights that digital innovation, green finance, and sustainable business practices serve as key mechanisms linking FinTech adoption to circular economy outcomes. At the firm level, strategic decision-making and sustainability-oriented management practices play an essential role in translating financial innovation into tangible circular actions. The theoretical analysis reveals a diverse but fragmented application of institutional, resource-based, digital innovation, and ecological modernization perspectives. Methodologically, the literature is dominated by econometric and secondary data studies, while survey-based, qualitative, and SME-focused research remains limited. Overall, the review demonstrates that FinTech can significantly accelerate the transition toward a circular economy when supported by strong institutions, digital infrastructure, and organizational capabilities. By synthesizing theories, contexts, characteristics, and methods, this study provides a comprehensive understanding of FinTech's role in advancing sustainable and circular development.

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