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Circular economy and innovation: a thematic analysis of innovation drivers, business models and sustainable value creation

Economia circular e inovação: uma análise temática dos motores de inovação, modelos de negócios e criação de valor sustentável

Economía circular e innovación: un análisis temático de los motores de innovación, modelos de negocio y creación de valor sostenible

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ABSTRACT: As organizations shift from linear production and use to a Circular Economy, they face the challenge of becoming sustainable in the long run. This study therefore explores the relationship between the Circular Economy and innovation. We conducted a thematic analysis of foundational and current literature and supplemented it with a bibliometric mapping. The thematic analysis resulted in four major themes: 1) The Circular Economy as a platform for sustainable value creation, 2) Innovation as a driver for circular change, 3) Digital technologies as circular business models' catalysts, and 4) Governance and ecosystem collaboration as implementation facilitators. The findings indicate that circular transitions require not only resource-efficient and waste-reducing measures, but also innovation, digitalization, stakeholder cooperation, and adaptive governance. The study contributes to the existing body of knowledge by integrating the themes of Circular Economy, innovation ecosystems, and sustainable value creation.

Keywords: circular economy*;* innovation ecosystems*;* sustainable value creation*;* digital transformation*;* thematic analysis.

1 INTRODUCTION

As global pressure on natural resources*;* environmental degradation*;* and waste continues to intensify*;* the search for an alternative economic model that can sustain economic development and improve the quality of human life on Earth is becoming more critical (Ellen

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MacArthur Foundation; 2013; Ellen MacArthur Foundation; 2016; European Commission; 2019). The traditional; linear economic model (extraction; production; consumption; disposal) of 'take; make; use; dispose' of products is increasingly seen to generate excessive use of resources and large amounts of waste throughout its life cycle; while undermining natural capital (Ellen MacArthur Foundation; 2013; Hawken *et al.;* 1999; Wijkman & Skanberg; 2016).

They focused on improving resource use by creating services that enabled extended product use and boosting product durability and resource use overall. This was designed to increase resource productivity. The authors' idea has been further developed in Stahel (2006; 2010) within the context of the so-called Performance Economy.

As the concept of the Circular Economy has gained ground in recent years; it has also attracted the attention of international organizations and research bodies. Reports by the European Environment Agency (EEA); for example; highlight the many benefits that moving from a linear to a more circular economy can bring to the environment; society; and the economy (European Environment Agency; 2016; European Environment Agency; 2018). In a report; the World Bank Group (2018) highlighted how adopting a more Circular Economy business model can help companies and countries create new growth opportunities.

The Ellen MacArthur Foundation developed a framework to illustrate the structure of the circular economy in relation to technical and biological cycles in the Frameworks for Circular Economy Studies report (2013) and the circular economy system diagram (2016). Researchers and practitioners in various industries; including manufacturing; construction; waste management; and resource recovery; have increasingly adopted this framework (MacArthur & McKinsey; 2015; Ellen MacArthur Foundation; 2013; Ellen MacArthur Foundation; 2016).

However; organizations attempting to make the Circular Economy work face a broad set of problems. These relate to technical; managerial; financial; institutional and cultural problems that prevent a transition to Circular Business Models and which; in particular; affect the construction sector; due to problems of procurement; of coordination between stakeholders; of material recovery and of waste management (Ahmed *et al.;* 2024; Ahmed *et al.;* 2026; Alotaibi *et al.;* 2024). Whereas in several industries Circular Economy business models are being successfully implemented; the same does not yet apply to the construction sector where; in addition to the above-mentioned problems of procurement; of coordination between stakeholders; of material recovery and of waste management; further barriers to adoption need to be removed (Alazmi *et al.;* 2025; Bellini *et al.;* 2024; Durmisevic; 2019).

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Consequently, implementing Circular Economy practices requires innovation in new technologies, organizational and business models, and collaboration to shift production and consumption systems toward Circular Economy models that create value while maintaining competitiveness in fast-changing environments. Innovation has become a major driver for the circular transformation (Alhamad *et al.,* 2025; Ahmed *et al.,* 2024; Dias *et al.,* 2026; Ahmed *et al.,* 2026).

A growing number of studies examine the circular economy and technology (Ceric, 2021; Cheng *et al.,* 2021; Marović *et al.,* 2026; Yu *et al.,* 2026). Digital technologies such as blockchain, AI, advanced data analytics, and digital construction platforms can increase transparency and traceability along supply chains and promote information sharing among stakeholders to use resources more efficiently (Arm *et al.,* 2017; Ceric, 2021; Marović *et al.,* 2026). Digital technologies can also support all stages of the asset lifecycle, reduce waste, promote material reuse, and support sustainable governance of construction projects (Bellini *et al.,* 2024; Marović *et al.,* 2026; Wang *et al.,* 2026).

Growing sustainability challenges have added another layer of complexity and increased interest in studying innovation ecosystems and collaborative governance structures that enable the Circular Economy transition. The transition to circular systems involves a wide array of actors, such as governments, companies, research organizations, associations, and non-profit organizations. Consequently, understanding the emergence and diffusion of circular innovation within industries and sectors requires a sustainability ecosystem perspective that considers the combinations of institutional, organizational, financial, and social constellations of actors and their interactions (Dias *et al.,* 2026; European Commission, 2019). Furthermore, this new stream of research recognizes that firm-level innovation is not sufficient to bring about change within the complex systems of today and, therefore, attention has increasingly focused on the various types of innovation support institutions, knowledge exchange mechanisms, multi-stakeholder collaborative networks and, more generally, on the various governance mechanisms needed to support systemic change (Dias *et al.,* 2026).

The relationship between Circular Economy and sustainable value creation is an increasingly discussed topic among researchers. Circular Economy models are seen as having the potential to use resources more efficiently, reduce costs, and create value while reducing negative environmental impacts. Therefore, sustainability extends beyond environmental sustainability to include economic and social sustainability.

Research on the Circular Economy, innovation, digitalization, governance, and sustainability is often split into separate, independent research areas. Although an ever-

increasing number of studies are available; much remains to be done to develop a more integrated framework analyzing how innovation in general can support Circular Economy transitions and; even more; how this in turn can lead to sustainability and value creation in organizations and in society at large (Ahmed *et al.;* 2026; Dias *et al.;* 2026; Marović *et al.;* 2026). The synthesis of existing research therefore promises insight into patterns; themes; and research avenues.

This research investigates the relationship between Circular Economy; innovation; digitalization; governance; and sustainable value creation; and identifies the main topics and emerging themes in this stream of research. By answering the main research question – How does innovation support the implementation of Circular Economy systems to generate sustainable value creation? – this research has three objectives. Firstly; the dominant themes of Circular Economy and innovation in existing literature will be identified. Second; the roles of digitalization and governance in enabling the Circular Economy will be explored. Third; the study will investigate how innovation supports the Circular Economy in creating sustainable value across organizational; industrial; and societal contexts.

The study pursues three objectives. First; it aims to identify and present the main themes in Circular Economy research associated with innovation. Second; the study examines the role of digitalization and governance in circularity transitions. Finally; it reflects on how these transitions generate value for organizations; industries; and society as a whole.

2 THEORETICAL FRAMEWORK

2.1 Circular Economy: Origins; Evolution; and Foundational Principles

As mentioned previously; the theoretical background of the Circular Economy dates back centuries; when people began to worry about conserving natural resources; increasing resource productivity; and generating more wealth without depleting them. The term Circular Economy has only been used in recent years; but many individuals described its fundamental principles long ago; including Von Carlowitz (2022); Giarini (1980); and Stahel (1982; 1997; 2006; 2010).

As noted above; Von Carlowitz (2022) pioneered the sustainable use of renewable natural resources over the centuries. This approach even anticipates today's sustainability criteria for intergenerational use of natural resources and their long-term preservation. Hardin

(1968; p. 1241/1242) criticizes the model of industrialized economic growth and the ecologically destructive consequences of human actions on environmental resources.

Much of this criticism; along with earlier thoughts on the sustainability of human development; targeted conventional growth models. Several scholars; including Hawken *et al*. (1999) and Schumacher (1973); focused on increasing resource productivity; extending product use; and keeping consumption within environmental limits. Their main challenge was to present an alternative vision of sustainable economic development that did not rely on the same growth model as before. Instead; it increased resource efficiency; extended product lifespans; and encouraged consumption within the Earth's environmental limits.

Later; Walter R. Stahel and Orio Giarini developed another important approach to the Circular Economy in several publications (Giarini; 1980; Giarini & Stahel; 1989; Stahel; 1982; Stahel; 1997). Their ideas; developed in the 1970s and 1980s; address sustainable economic development in the context of material use. A main challenge is the traditional relationship between economic development and material throughput; which needs to change in the context of the Circular Economy. In this sense; the concept of the Performance Economy (Stahel; 2006; Stahel; 2010); developed by Walter R. Stahel; is highly relevant.

The Performance Economy; as developed by Walter R. Stahel within the framework of productivity-intensive reuse and maintenance of products; components; and materials; aims to create an economy that keeps products; components; and materials at their highest utility and value throughout their entire life cycle. By extending the lifetime of products; their components; and materials through maintenance; repair; refurbishment; remanufacturing; or by providing services instead of selling products; the circular economy reduces the extraction of natural resources while creating employment and economic activity (Lund; 1996; Stahel; 2010; Steinhilper; 1998).

The Ellen MacArthur Foundation further developed the concept of the Circular Economy into a comprehensive framework for restorative and regenerative economies (Ellen MacArthur Foundation; 2013; 2016). The Circular Economy aims to keep products; materials; and components at their highest utility and value for as long as possible. It achieves this through biological and technical cycles designed to avoid waste and increase resource productivity. The framework distinguishes between biological materials that can return safely to nature and technical materials that must remain in continuous cycles of reuse; repair; remanufacturing; and recycling.

This framework quickly gained worldwide recognition and inspired policies in several jurisdictions to promote the Circular Economy; support innovation for sustainable growth; and

reduce waste in the European economy (European Commission; 2015; 2019). As stated previously; the European Environment Agency (EEA) highlighted material efficiency and the decoupling of economic growth from environmental degradation through the implementation of the Circular Economy (European Environment Agency; 2016; 2018).

Recently; the Circular Economy has been linked to economic competitiveness; sustainability; and long-term value. This is supported by a growing body of research from organizations globally that highlight how circular practices can reduce costs; secure resources; and drive innovation while delivering sustainability outcomes (MacArthur & McKinsey; 2015; World Bank Group; 2018; Wijkman & Skanberg; 2016). As such; Circular Economy is now viewed through a multi-dimensional lens that incorporates economic; technological; organizational and governance aspects within sustainability outcomes.

2.2 Innovation as a Driver of Circular Transformation

While the Circular Economy provides a conceptual framework for sustainable use of resources; its implementation depends on innovation. It faces obstacles such as limited technology; inadequate infrastructure and business models; shifts in corporate culture and regulatory frameworks; and the need to coordinate involved stakeholders (Ahmed *et al.;* 2024; Ahmed *et al.;* 2026; Alotaibi *et al.;* 2024). Innovation thus becomes a multi-layered process of technological; organizational; managerial; and institutional change that organizations aiming to transition to circular business models must translate into practice (Bellini *et al.;* 2024).

The emerging body of research identifies innovation as a multidimensional phenomenon that extends beyond traditional organizational confines. Accordingly; researchers consider a range of technological; managerial; organizational; and institutional changes that collectively seek to redesign products; services; and business models; as well as interorganizational relationships within and between industries. The resulting value propositions are characterized by new forms of ownership and a range of material and product-sharing mechanisms; supported by reverse logistics functions designed to maximize the material value within products throughout their lifecycle (Bellini *et al.;* 2024; Ellen MacArthur Foundation; 2013; MacArthur & McKinsey; 2015).

Innovation is needed to tackle some of the operational challenges of circular construction. As a major material user and waste generator; the construction sector is a key area for Circular Economy innovation. Procurement strategies; project governance; and collaborative practices within construction projects for Circular Economy implementation are

currently gaining considerable attention (Bellini *et al.;* 2024; Ahmed *et al.;* 2026; Ahmed *et al.;* 2024).

The innovation ecosystem is important for the transition to the Circular Economy and supports research*;* technology*;* and problem-solving within and across organizations (Dias *et al.;* 2026). The Circular Economy framework is typically implemented within and between organizations across different institutional levels; therefore*;* governance*;* collaboration*;* and all stakeholders are key to successful implementation.

2.3 Digital Transformation and Technological Enablers of Circular Economy

Recent Recent developments in digital technologies support Circular Economy implementation in various ways. By improving resource visibility*;* supporting decision-making*;* enabling better cooperation*;* and enabling more efficient use of products and materials throughout their entire lifecycle*;* digital transformation plays a significant role in implementing the Circular Economy (Ceric*;* 2021; Cheng *et al.;* 2021; Marović *et al.;* 2026).

Among the technologies related to the implementation of Circular Economy concepts*;* blockchain is currently gaining the most interest from researchers*;* due to its potential in increasing transparency*;* enabling the tracking of goods*;* and promoting trust within complex networks (Ceric*;* 2021; Cheng *et al.;* 2021; Yu *et al.;* 2026). Accurately managing information on product origin*;* material composition*;* and past ownership and use throughout a product's life cycle is a major barrier to implementing Circular Economy concepts (Ceric*;* 2021; Cheng *et al.;* 2021).

The same is true for the other technologies. For example*;* Artificial Intelligence (AI) can be used for predictive maintenance or to optimize resource use. There is also AI that can predict failures of plants and equipment*;* and that can be used in improved material recovery processes. In sum*;* AI can be highly valuable in improving how organizations operate to extend product life and improve resource use (Marović *et al.;* 2026; Van Tam*;* 2026).

Building Information Modeling (BIM) and other digital construction technologies support sustainable construction practices by enabling effective design*;* construction*;* and operation of a building across its entire life cycle. By facilitating information sharing among stakeholders*;* these technologies can also support decision-making on more resource-efficient buildings*;* material reuse*;* and reduced construction waste (Cheng *et al.;* 2021). Digital construction technologies can also address challenges in the construction sector by managing

information in a fragmented environment and handling a complex network of stakeholders (Marović *et al.;* 2026).

Together*;* these technologies have led to the creation of data-driven systems for the Circular Economy that can greatly increase transparency and reduce uncertainty. Digital Transformation is increasingly seen as an important element in implementing the Circular Economy strategy.

2.4 Sustainable Value Creation in Circular Systems

Research on value creation in the context of the Circular Economy and innovation is extensive across various research areas. Traditionally*;* value is viewed through the monetary lens of organizations' financial performance. In contrast*;* the Circular Economy creates value across three dimensions: economic*;* environmental*;* and social (Ellen MacArthur Foundation*;* 2013; Hawken *et al.;* 1999; Wijkman & Skanberg*;* 2016).

Economic value can be created in several ways. Firstly*;* by improving a company's resource productivity – i.e.*;* how it uses resources to make goods and services – to deliver cost savings in terms of reduced inputs. Secondly*;* by minimizing waste at every stage of a product's life cycle to reduce disposal costs and help mitigate any negative environmental impacts that waste may have. Finally*;* it enables companies to be more resilient in the face of resource scarcity and market volatility*;* and to create new sources of revenue (MacArthur & McKinsey*;* 2015; World Bank Group*;* 2018).

When implementing Circular Economy strategies*;* environmental value can be created through reduced material and energy use and lower pollutant emissions. Products*;* components*;* and materials can be kept in use for as long as possible*;* reducing waste generation throughout the life cycle (Arm *et al.;* 2017; European Commission*;* 2019; European Environment Agency*;* 2016).

Social value can be generated through activities that enable repair*;* refurbishment*;* remanufacturing and recycling of products and materials. Such activities create employment*;* support local economies and help create more inclusive economies (Lund*;* 1996). Circular Economy activities also create knowledge sharing*;* capacity building and stakeholder engagement platforms through collaborative innovation ecosystems (Dias *et al.;* 2026).

Together*;* these three dimensions show that sustainable value creation in circular construction is the aim of successful transformation towards the Circular Economy. To achieve this*;* integrating the Circular Economy*;* innovation*;* digital technologies*;* and appropriate

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governance mechanisms is required. Thus; sustainable value creation supports economic; environmental; and social goals of companies (Alhamad *et al.;* 2025; Dias *et al.;* 2026; Wang *et al.;* 2026). The following sections will examine this relationship through thematic analysis.

3 METHODS

This research aims to explore the role of innovation in implementing Circular Economy systems and processes for sustainable value creation. To synthesize knowledge and generate concepts around complex issues across diverse and fragmented areas of research; qualitative thematic analysis was selected as the most suitable methodology; following Sauders *et al.* (2009). Thematic analysis is particularly suited for these reasons; as it allows the systematic identification; analysis; and interpretation of repeated patterns within data; while integrating diverse theoretical perspectives (Strauss & Corbin; 1998).

This study followed an interpretive literature-based research design (Ahmed *et al.;* 2026). In line with the research questions; the selected references serve as evidence for this study. The corpus of analysis was deliberately selected from existing foundational and contemporary literature on Circular Economy; innovation; governance; sustainability; digital transformation; and project management (Ahmed *et al.;* 2024; Ahmed *et al.;* 2026; Alhamad *et al.;* 2025; Dias *et al.;* 2026; Marović *et al.;* 2026). The foundational references cover the historical and theoretical background of Circular Economy (Von Carlowitz; 2022; Ellen MacArthur Foundation; 2013; Ellen MacArthur Foundation; 2016; European Commission; 2019).

The references selected for the study's corpus of analysis meet one or more of the following criteria: they are seminal in the development of sustainability concepts including Circular Economy as a platform (Giarini; 1980; Giarini & Stahel; 1989; Hardin; 1968; Stahel; 2010; Stahel; 2019); they offer empirical and/or conceptual studies on topics including innovation in circular implementation and in sustainable project management (Ahmed *et al.;;* 2024; Ahmed *et al.;;* 2026; Alhamad *et al.;;* 2025; Bellini *et al.;;* 2024); and; they discuss digital technologies; governance and innovation ecosystems for sustainable change (Ceric; 2021; Cheng *et al.;;* 2021; Dias *et al.;;* 2026; Marović *et al.;;* 2026).

As with coding; the stages of thematic analysis are also iterative. Thus; for instance; initial categories may merge as more data are analyzed; while categories that initially seemed separate may become increasingly distinct as more material is reviewed (Strauss & Corbin; 1998).

4 DISCUSSION AND RESULTS

Thematic analysis of the Circular Economy reveals that innovation is necessary not only to address waste-management challenges and improve resource efficiency but also to drive systemic change and a new way of doing things. Therefore*;* four dominant themes emerged that describe the Circular Economy and how innovation in four different ways can support its goals: (1) The Circular Economy is a platform for creating sustainable value*;* (2) Innovation drives the Circular Economy's transformation*;* (3) Digital technologies are enabling the Circular Economy*;* and (4) Governance and Ecosystems' collaboration facilitates and supports the Circular Economy's transition to sustainability.

The four dominant themes that emerged in the above analysis are interconnected; therefore*;* it is inappropriate to study the Circular Economy as only an environmental matter or only an operational matter. A successful transition to the Circular Economy requires integrated changes in technologies*;* organizational and institutional practices*;* and value creation processes (Bellini *et al.;* 2024; Dias *et al.;* 2026; European Commission*;* 2019).

4.1 Theme One: Circular Economy as a Platform for Sustainable Value Creation

The first theme highlighted by the literature analysis is the role of the Circular Economy as a platform for generating sustainable value. The Circular Economy differs from traditional linear economy models based on resource extraction and disposal by preserving material value and delivering economic*;* environmental*;* and social value throughout the product's multiple life cycles (Ellen MacArthur Foundation*;* 2013; 2016; MacArthur & McKinsey*;* 2015).

In addition to the positive effects of reducing waste and resource consumption*;* extending product life cycles and recovering materials are also important factors in value creation in CE. Reducing the use of virgin materials can improve economic resilience by reducing exposure to fluctuations in raw material prices and the risk of shortages (Wijkman & Skanberg*;* 2016; World Bank Group*;* 2018). From a business perspective*;* reducing the mass of waste disposed of can also have a positive economic effect (Arm *et al.;* 2017; European Environment Agency*;* 2016; 2018).

The ideas behind the concept of Circular Economy as a system for preserving value can be linked to Walter R. Stahel's concepts*;* notably the framework for the Performance Economy put forth by Giarini & Stahel (1989) and later developed by Stahel (2006*;* 2010). The core principles of Stahel's concepts*;* such as the notion of maximizing utility and value as opposed

to throughput; have also been explored by other authors; namely Lund (1996); Stahel (1997); and Steinhilper (1998).

Another important issue related to sustainable value creation is that of transition from product-centered value creation to system-centered value creation. In its reports (Ellen MacArthur Foundation; 2013; Ellen MacArthur Foundation; 2016); the Ellen MacArthur Foundation describes a Circular Economy model based on closed biological and technical cycles; where value is continuously created and recovered across the product life cycle by circulating resources instead of extracting new ones.

Environmental benefits include reduced waste; reduced raw-material consumption; increased resource productivity; and potentially reduced carbon emissions during production. Social benefits of sustainable value creation can include jobs in sectors such as remanufacturing; repair; recycling; and maintenance. In addition; creating new competencies and knowledge in sustainable production systems is important for fostering innovation (Wijkman & Skanberg; 2016). As Lund (1996) stated; new competencies will be needed to manage closed-loop production systems; and Stahel (1997) and Steinhilper (1998) emphasized developing new products; services; and business models for the transition to a more sustainable economy.

Sustainable value creation within the Circular Economy can have environmental; economic; and social effects. In fact; its implementation can create value in terms of higher efficiency; in terms of resource preservation; and in terms of innovations and ways of collaboration with customers and users; which are considered in sustainability debates (Alhamad *et al.;* 2025; MacArthur & McKinsey; 2015; Wang *et al.;* 2026).

4.2 Theme Two: Innovation as a Driver of Circular Transformation

Innovation is needed to implement the Circular Economy through the development of business models; products; and services. However; all of these must be developed through innovation; thus; innovation is a precondition for the Circular Economy. Innovation becomes a means to achieve a Circular Economy.

Another recurring theme is business model innovation. Because the Circular Economy is transforming how value is created; delivered; and captured across the phases of a product's life cycle; organizations need to develop new business models. These Circular Business Models differ from traditional product-based business models since they accommodate forms of usage; such as sharing; leasing; product as-a-service; refurbishing and recycling (Dias *et al.;* 2026;

Ahmed *et al.;* 2026; Ellen MacArthur Foundation*;* 2013; Ellen MacArthur Foundation*;* 2016; MacArthur & McKinsey*;* 2015).

In the construction environment*;* innovations in implementing the Circular Economy are linked to a company's procurement strategies*;* project governance*;* and collaboration with other stakeholders. In research into Circular Economy in the construction sector*;* the procurement strategies of companies and the way in which projects are governed are seen as crucial in terms of determining the degree to which companies are encouraged to adopt circular practices and how resources are allocated throughout the life cycle of a project (Ahmed *et al.;* 2024; Ahmed *et al.;* 2026).

A key insight in the current body of knowledge on the circular economy is the role of so-called innovation ecosystems*;* which enable firms to implement circular economy practices by going beyond an individual organization's resources and boundaries. Governments*;* universities*;* knowledge providers*;* construction companies*;* professional organizations and even non-profit organizations work in innovation ecosystems to generate and disseminate circular economy-related innovations through*;* for example*;* joint knowledge production*;* experiential learning and collective action (Dias *et al.;* 2026).

Organizational capabilities*;* considered key to circular innovation success*;* include*;* inter alia*;* knowledge management*;* strategic leadership*;* adaptive culture*;* and a learning environment (Alhamad *et al.;* 2025; Dias *et al.;* 2026). Thus*;* innovation in the context of the Circular Economy encompasses multiple aspects and becomes an organizational capability required for sustainable change management.

4.3 Theme Three: Digital Technologies as Enablers of Circular Systems

Several studies have investigated the potential of different technologies*;* such as Blockchain*;* which has been described as a powerful means of reducing information asymmetry and improving trust among stakeholders within and across supply chains (Ceric*;* 2021; Cheng *et al.;* 2021). This potential is especially relevant for Circular Economy scenarios*;* since successful recycling of resources requires knowledge of material composition*;* previous usage history*;* and opportunities for reuse and suitable end-of-life scenarios.

Innovations such as artificial intelligence could improve efficiency and support sustainable decision-making to achieve Circular Economy objectives. Digitalization can therefore support the adoption of complex forms of circularity by reducing uncertainty and enabling better co-ordination between individuals.

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An important observation is that; in addition to operational tools; digital technologies function as enabling infrastructures for innovation and learning in organizations. Digital transformation and the Circular Economy are becoming increasingly interlinked as two strategic challenges that need to be tackled in combination. The findings from Ceric (2021); Wang *et al*. (2026) and Yu *et al*. (2026) provide a rich basis for elaborating on this theme in more detail in the following section.

4.4 Theme Four: Governance and Ecosystem Collaboration

Governance and Ecosystems of Circular Business Models for Construction. This theme focuses on the role of governance and the ecosystems needed to implement the Circular Economy. Although there is growing interest in the Circular Economy; the majority of publications focus on the 'closed loops of materials and the technological innovations that will make these possible. However; as noted; implementing Circular Economy concepts in practice also requires new forms of governance and construction innovation ecosystems (Dias *et al.;* 2026).

Multiple stakeholders with different interests and means are needed for the Circular Economy transition. Hence; governance to facilitate cooperation; mitigate conflicts of interest; and harmonize the goals of individual stakeholders within a large network of actors becomes even more important (Bellini *et al.;* 2024; Dias *et al.;* 2026). An innovation ecosystem is another relevant concept to assess governance for CE implementation. An innovation ecosystem comprises organizations; entities; and structures that facilitate knowledge sharing; joint solution creation; and resource exchange among members (Dias *et al.;* 2026). Innovation ecosystems are also highly relevant to implementing CE strategies that cut across organizations.

Additionally; in line with earlier arguments; policies play an important role in enabling innovation in the Circular Economy by way of support through different policy instruments; i.e.; waste management directives; sustainability policies; strategies; and other tools as advocated by the European Commission (2015) and European Commission (2019) and supported by EU policies of relevance as pointed out by the European Union (2012).

Regulation; in terms of enabling a Circular Economy; should be considered an enabler in creating an environment that promotes knowledge sharing; stakeholder engagement; accountability; and alignment of strategy and actions to support the implementation of circular initiatives (Alhamad *et al.;* 2025; Bellini *et al.;* 2024; Dias *et al.;* 2026).

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4.5 Synthesis of Findings

The key findings of the analysis were interlinked and presented in reverse order to the analysis above. They reinforced the principal arguments for a framework for sustainable value creation through the Circular Economy. The interlinkages identified between the Circular Economy; innovation; digital technologies; and governance are presented in the framework box below (Alhamad *et al.;* 2025; Dias *et al.;* 2026; Wang *et al.;* 2026).

Sustainable value creation in a Circular Economy therefore takes the form of integrated systems and structures that combine an organization's innovation capability; the latest technologies; and the relevant Circular Economy and Governance structures. The following section explores this in more detail; setting out the findings from the above analysis and discussing them in the context of key theoretical debates in the mainstream academic literature on sustainability (Alhamad *et al.;* 2025; Dias *et al.;* 2026; Ellen MacArthur Foundation; 2016). The findings are summarized in Table 1; as follows:

Table 1 - Synthesis of Main Themes and Findings

Theme	Core Finding	Key References
Circular Economy as a Platform for Sustainable Value Creation	Circular Economy generates economic; environmental; and social value through resource efficiency; waste reduction; product life extension; and value retention mechanisms.	Arm *et al*. (2017); Ellen MacArthur Foundation (2013; 2016); Giarini and Stahel (1989); MacArthur and McKinsey (2015); Stahel (2010).
Innovation as a Driver of Circular Transformation	Innovation enables the implementation of circular principles by supporting new business models; organizational capabilities; and sustainable project management practices.	Ahmed *et al*. (2024; 2026); Alhamad *et al*. (2025); Bellini *et al*. (2024); Dias *et al*. (2026).
Digital Technologies as Enablers of Circular Systems	Technologies such as blockchain; artificial intelligence; BIM; and digital platforms improve transparency; traceability; resource optimization; and lifecycle management.	Ceric (2021); Cheng *et al*. (2021); Marović *et al*. (2026); Van Tam (2026); Yu *et al*. (2026).
Governance and Ecosystem Collaboration	Circular transitions require governance mechanisms; stakeholder engagement; innovation ecosystems; and supportive institutional frameworks.	Bellini *et al*. (2024); Dias *et al*. (2026); European Commission (2015; 2019); Wang *et al*. (2026).

Source: Developed by the authors based on the thematic analysis of the selected literature (Ahmed *et al.;* 2024; Ahmed *et al.;* 2026; Alhamad *et al.;* 2025; Bellini *et al.;* 2024; Ceric; 2021; Cheng *et al.;* 2021; Dias *et al.;* 2026; Ellen MacArthur Foundation; 2013; 2016; European Commission; 2015; 2019; Giarini & Stahel; 1989; Marović *et al.;* 2026; Stahel; 2010; Van Tam; 2026; Wang *et al.;* 2026; Yu *et al.;* 2026).

The thematic analysis suggests that sustainable value creation should not be treated as an independent theme but as an emergent outcome arising from interactions among Circular Economy practices; innovation capabilities; digital technologies; and governance mechanisms. Collectively; these four themes form an integrated framework through which organizations can

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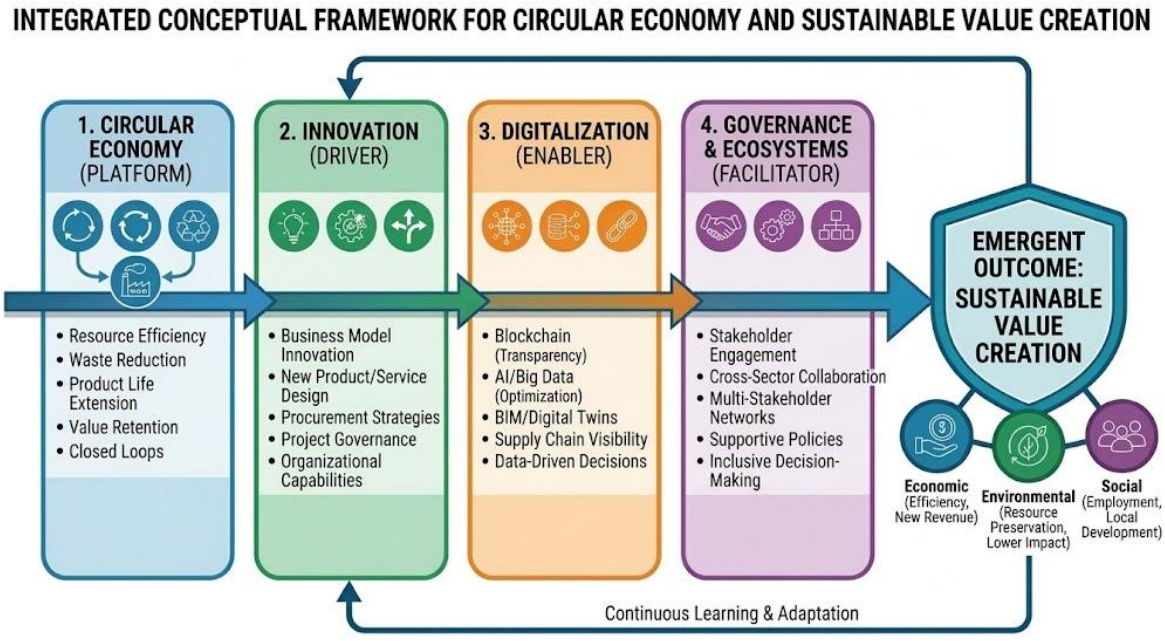
pursue economic competitiveness; environmental sustainability; and social value simultaneously (Alhamad *et al.;* 2025; Dias *et al.;* 2026; Wang *et al.;* 2026).

The thematic analysis of the existing literature; presented in Figure 1; indicates that Circular Economy implementation is driven not by a single factor but by the interplay of four key themes: innovation; digitalization; governance; and ecosystem. Innovation is the key change driver; while digitalization forms the underlying backbone of change; governance; and the ecosystem for stakeholder engagement and coordination; respectively. Thus; these four interlinked themes generate sustainable value for all stakeholders' economic; environmental; and social needs and goals. (Ahmed *et al.;* 2024; Ahmed *et al.;* 2026; Alhamad *et al.;* 2025; Ceric; 2021; Cheng *et al.;* 2021; Dias *et al.;* 2026; Ellen MacArthur Foundation; 2013; Ellen MacArthur Foundation; 2016; Wang *et al.;* 2026; Yu *et al.;* 2026).

Figure 1 - Integrated Framework of Circular Economy; Innovation; Digitalization and Governance.



Source: Developed by the authors based on the thematic analysis of the literature.

5 DISCUSSION AND RESEARCH IMPLICATIONS

The research findings highlight that the Circular Economy is more than a waste management approach or a resource-efficiency framework; it is a broader system change influenced by a wide range of factors; including innovation; digitalization; governance structures; and collaboration across ecosystems. The implications of Circular Economy for sustainable value creation correspond to the assertions of Walter R. Stahel about the need for a

transformation towards a Performance Economy that focuses on value preservation; product longevity; and increased resource productivity through design for recovery and reuse and sharing (Giarini & Stahel; 1989; Stahel; 2006; Stahel; 2010).

One of the most important findings in the above analysis is the central role of innovation in enabling a shift towards a Circular Economy. The literature to date on CE has often focused on material flows and waste reduction; whereas innovation is what translates sustainability objectives into reality. The analysis above found that sustainability can be translated into reality through different types of innovation.

Furthermore; the findings have implications for the emerging body of knowledge regarding innovation ecosystems that support the circular transition towards CE. This body of knowledge recognizes that sustainability challenges are best solved by more than one company and therefore require the involvement of various stakeholders; including governments; companies; universities; technology providers; and civil society organizations (Dias *et al.;* 2026). CE therefore requires not only a set of technologies but also institutional arrangements that enable companies and other organizations to collaborate and coordinate their actions to generate knowledge; share resources; and solve problems collectively.

An additional contribution of the study relates to the trends in the convergence between Circular Economy and digitalization. The technology enablers of the Circular Economy studied here are blockchain; AI; and BIM. These technologies and others are becoming part of integrated systems for the Circular Economy that reduce uncertainty and enable better decision-making across organizational boundaries (Ceric; 2021; Cheng *et al.;* 2021; Marović *et al.;* 2026; Yu *et al.;* 2026).

The main lessons for managers relate to developing innovation capacities and a learning organization. In this regard; generating new value; developing knowledge; experimenting; learning from failure; and building specific skills to address circular challenges are crucial for long-term innovation (Carvalho *et al.;* 2026).

However; the study also identifies relevant governance implications for successfully implementing Circular Economy initiatives. Thus; sustainable value creation within the Circular Economy framework requires strategic orientation and effective alignment of sustainability goals and decision-making structures within organizations. Effective governance that integrates organizations' environmental; social; and economic objectives can foster the commitment needed to develop and implement circular innovations (Lopes & Dias; 2026a). Diverse decision-making environments and inclusive governance structures can improve the

quality of strategic decisions that enable organizations to identify and seize opportunities for sustainable innovations and circular business models (Lopes & Dias; 2026b).

Further; the study reveals implications for innovation; entrepreneurship and the innovation systems within countries and industries. Significant opportunities exist for new ventures; service-dominant logic; and collaborative platforms that can combine the interests of clients and suppliers within the Circular Economy. Therefore; entrepreneurs identify opportunities created by resource constraints; digitalization of production systems; and changes in consumer behavior; and thus facilitate the diffusion of circular innovations within industries (Dias *et al.;* 2026).

In summary; the sustainable value creation for organizations; i.e.; competitiveness; sustainability; and value; is achieved through four interconnected dimensions: (1) circular use of resources; (2) innovation; (3) digitalization; and (4) effective governance. Together; these four dimensions form the basis of contemporary circular systems and help organizations create sustainable value in today's complex environment (Alhamad *et al.;* 2025; Dias *et al.;* 2026; Wang *et al.;* 2026).

6 FINAL CONSIDERATIONS

Drawing on both foundational and contemporary sources in thematic analysis; the current study established that Circular Economy transformations depend on a variety of factors; including a company's innovation capacity; digital technologies; a governing system; and a variety of ecosystems. The Circular Economy moves beyond waste and resource efficiency to provide a systematic approach to sustainable value creation with economic; ecological;; and social benefits (Ahmed *et al.;* 2024; Alhamad *et al.;* 2025; Ellen MacArthur Foundation; 2013; Ellen MacArthur Foundation; 2016). The findings reveal four interconnected themes that together describe the current state of circular implementation: a Circular Economy that creates sustainable value; innovation that drives transformation to a Circular Economy; digital technologies that enable the creation of a Circular Economy; and a system of governance and the collaboration of different ecosystems to enable sustainable change. Together; these themes describe an implementation approach that relies on combining companies' innovation capacities; technologies that enable process digitalization; and the ways of working of organizations and stakeholders; as well as institutions. An integrated perspective is proposed whereby innovation functions as the engine of the transformation towards a Circular Economy; digital technologies as infrastructure to enable it; the system of governance as a means to

coordinate it and; ultimately; the creation of sustainable value as its outcome (Ceric; 2021; Cheng *et al.;* 2021; Dias *et al.;* 2026; Marović *et al.;* 2026; Wang *et al.;* 2026).

7 FUTURE RESEARCH

Future research should explore the complex relationships among the circular economy; innovation ecosystems; governance; and digitalization. The literature on innovation for circular transitions is growing; but crucial organization-level questions remain unanswered; especially regarding the innovation capabilities required for circular business models across industries (Ahmed *et al.;* 2024; Ahmed *et al.;* 2026; Dias *et al.;* 2026). Longitudinal studies could analyze how companies' circular innovation capabilities develop over time and their impact on resilience; competitiveness; and sustainable value creation. Also; the implementation potential of current and future technologies such as artificial intelligence; blockchain; and digital twins for traceability of resources; for lifecycle management; and for decision-making in circular systems should be analyzed in more detail (Ceric; 2021; Cheng *et al.;* 2021; Marović *et al.;* 2026; Van Tam; 2026; Yu *et al.;* 2026). More research is needed on governance; board decisions; diversity; and entrepreneurial ecosystems that foster circular innovation and sustainability-oriented transitions (Dias *et al.;* 2026; Lopes & Dias; 2026a; Lopes & Dias; 2026b). Comparative studies across countries; industries; and institutions can help better understand the contextual factors that support or hinder the implementation of Circular Economy initiatives and their contribution to the SDGs (Alhamad *et al.;* 2025; European Commission; 2019; Wang *et al.;* 2026).

8 ARTIFICIAL INTELLIGENCE DISCLOSURE

The authors disclose that artificial intelligence (AI) tools were used solely as support instruments during the preparation of this manuscript. Figure 1 was built with the support of **Google Gemini**. Additionally; **Microsoft Copilot** was utilized as an auxiliary tool to facilitate literature organization and brainstorming. **Grammarly** was used for language refinement and the structuring of ideas throughout the writing process. The authors used AI technologies only for editorial and organizational assistance; they did not replace the authors' intellectual contributions at any stage of the research. The authors take full responsibility for the manuscript's accuracy; integrity; interpretation; and originality. All analyses; conclusions;

arguments; and scholarly contributions presented in this article are the sole work of the authors; who retain complete authorship and accountability for the final published content.

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