From Data To Circular Wisdom: Integrating Digital Strategy, Institutional Theory, And Circular Business Model Innovation For Sustainable Value Creation

Dr. Alejandro Martínez

Department of Management and Information Systems, Autonomous University
of Madrid, Spain

Abstract: The transition toward a circular economy has emerged as one of the most significant transformations in contemporary economic, organizational, and technological thought. This transition challenges dominant linear models of value creation and compels firms to reconceptualize how resources, data, and institutional pressures interact in shaping sustainable business practices. Drawing strictly on the provided scholarly references, this article develops an integrative and theoretically grounded examination of circular business model innovation by synthesizing insights from systems theory, institutional theory, digital business strategy, and big data analytics. Anchored conceptually in the data–information–knowledge–wisdom hierarchy, the study argues that circular business models represent not merely operational redesigns but epistemic shifts in how organizations understand value, responsibility, and performance. The article adopts a qualitative, conceptual research methodology grounded in extensive interpretive analysis of the existing literature, enabling a deep exploration of the interdependencies between digital capabilities, organizational evolution, inter-organizational collaboration, and institutional environments. The findings reveal that circular business model innovation is best understood as a dynamic, multi-level process shaped by technological infrastructures, strategic alignment, regulatory and normative pressures, and evolving consumer practices. Furthermore, the analysis demonstrates that digital technologies and big data analytics act as critical enablers of circular strategies by enhancing transparency, coordination, and learning across organizational ecosystems. The discussion elaborates on theoretical contributions to circular economy scholarship, highlights limitations inherent in current research trajectories, and outlines future research directions emphasizing systemic integration, longitudinal analysis, and cross-regional institutional comparison. By advancing a holistic and deeply elaborated framework, this article contributes to the maturation of circular economy research and offers a robust foundation for scholars and practitioners seeking to align sustainability ambitions with digital and strategic transformation.

Keywords: Circular economy, circular business models, digital strategy, institutional theory, big data analytics, sustainability, value creation.

INTRODUCTION

The increasing ecological strain associated with linear models of production and consumption has intensified scholarly and managerial interest in alternative economic paradigms capable of reconciling growth with environmental limits. The circular economy has gained prominence as a response to these challenges, offering a systemic vision in which resource loops are closed, waste is minimized, and value is regenerated across product life cycles (Ellen MacArthur Foundation, 2013; Geissdoerfer et al., 2020). Unlike incremental efficiency improvements, circularity requires fundamental rethinking of how organizations design products, structure business models, leverage digital technologies, and engage with institutional environments. This shift represents not only a material transformation but also a cognitive and strategic one, challenging deeply entrenched assumptions about value creation, ownership, and competition.

Early conceptual foundations for understanding such transformations can be traced to systems thinking and organizational theory. Ackoff's hierarchy from data to wisdom provides a particularly useful epistemological lens, emphasizing that sustainable decision-making emerges only when raw data is contextualized, interpreted, and integrated into coherent systems of meaning (Ackoff, 1989). When applied to circular economy initiatives, this hierarchy suggests that data generated through digital technologies and analytics must be translated into actionable knowledge and strategic wisdom to enable circular value creation. This insight resonates strongly with contemporary research on big data analytics capabilities and their alignment with business strategy as a driver of firm performance (Akter et al., 2016; Chen et al., 2015).

At the same time, circular economy transitions do not occur in a vacuum. Institutional theory highlights the powerful role of regulatory frameworks, normative expectations, and cultural-cognitive structures in shaping organizational behavior (Aldrich, 1999; Arranz & Arroyabe, 2023). Firms pursuing circular business models must navigate complex institutional landscapes characterized by evolving policies, stakeholder pressures, and consumer practices. This is particularly evident in regions such as the European Union, where consumption policies and sustainability regulations actively shape circular innovation trajectories (Arranz & Arroyabe, 2023; Bocken & Coffay, 2024).

Despite a rapidly growing body of literature on circular business models, several gaps remain. Much existing research focuses on typologies, archetypes, or isolated case studies, often neglecting the deeper theoretical integration of digital strategy, institutional dynamics, and organizational learning processes (Bocken et al., 2014; Geissdoerfer et al., 2020). Furthermore, while digital technologies are frequently acknowledged as enablers of circularity, their role is often treated instrumentally rather than as constitutive of new forms of value creation and governance (Bharadwaj et al., 2013; Bressanelli et al., 2018). There is a need for more comprehensive theoretical elaboration that connects these strands into a coherent explanatory framework.

This article addresses these gaps by developing an extensive, integrative analysis of circular business model innovation grounded strictly in the provided references. It seeks to answer a central research question: how do digital capabilities, institutional contexts, and organizational evolution interact to shape the emergence and performance of circular business models? By adopting a conceptual research design and drawing on diverse but interconnected theoretical perspectives, the study aims to advance understanding of circular economy transitions as complex, multi-level processes rather than discrete managerial choices.

METHODOLOGY

The methodological approach adopted in this study is qualitative, conceptual, and interpretive in nature. Rather than relying on empirical data collection or statistical analysis, the research systematically engages with the provided body of literature to construct a theoretically rich and internally coherent argument. Such an approach is particularly appropriate given the exploratory and integrative aims of the study, as well as the complex and evolving nature of circular economy research (Boons & Bocken, 2018; Geissdoerfer et al., 2020).

The first step in the methodological process involved a comprehensive thematic analysis of the references, identifying recurring concepts, theoretical frameworks, and empirical insights related to circular business models, digital strategy, and institutional dynamics. Key themes included value creation and capture, business model innovation, digitalization, inter-organizational collaboration, and institutional pressures. These themes were not treated as discrete categories but as interrelated dimensions of a broader socio-technical system.

In the second step, the study employed abductive reasoning to iteratively refine theoretical connections between themes. For instance, insights from big data analytics literature were linked to circular business model research to explore how digital capabilities enable resource tracking, predictive maintenance, and performance measurement in usage-focused models (Akter et al., 2016; Bressanelli et al., 2018). Similarly, institutional theory was used to contextualize strategic choices within regulatory and cultural environments, highlighting the co-evolution of firms and institutions (Aldrich, 1999; Alpsahin Cullen, 2023).

The third step involved synthesizing these insights into an integrative narrative structured around the data–information–knowledge–wisdom hierarchy. This framework provided a unifying logic for understanding how digital technologies generate data, how analytics transform data into information and knowledge, and how strategic and institutional alignment enables organizations to act wisely in pursuing circularity (Ackoff, 1989; Bharadwaj et al., 2013).

Throughout the methodological process, particular care was taken to adhere strictly to the provided references and to avoid introducing external sources or empirical claims. The goal was not to summarize existing studies but to elaborate their theoretical implications in depth, exploring tensions,

complementarities, and unanswered questions. This rigorous and reflexive approach enhances the credibility and originality of the analysis while remaining firmly grounded in established scholarship.

RESULTS

The conceptual analysis yields several interrelated findings that deepen understanding of circular business model innovation as a systemic and dynamic phenomenon. First, the results highlight that circular business models are fundamentally knowledge-intensive configurations that depend on the continuous generation, interpretation, and application of data across organizational boundaries. Digital technologies such as sensors, platforms, and analytics systems enable firms to monitor product usage, material flows, and environmental impacts, thereby providing the informational foundation for circular strategies (Bressanelli et al., 2018; Dahmani et al., 2021).

Second, the findings demonstrate that alignment between digital capabilities and business strategy is a critical determinant of circular performance. Firms that integrate digital business strategy into their core value proposition are better positioned to experiment with innovative circular models, such as product-as-a-service or sharing-based configurations (Bharadwaj et al., 2013; Akter et al., 2016). This alignment facilitates not only operational efficiency but also strategic flexibility, enabling organizations to adapt to evolving market and institutional conditions.

Third, the analysis reveals that institutional contexts play a constitutive role in shaping circular innovation trajectories. Regulatory frameworks, consumption policies, and societal norms influence both the incentives for circular practices and the legitimacy of novel business models (Arranz & Arroyabe, 2023; Alpsahin Cullen, 2023). In the European context, policy-driven demand for sustainability has created fertile ground for experimentation with circular models, while also imposing compliance pressures that shape design and implementation choices.

Fourth, the results underscore the importance of inter-organizational collaboration and ecosystem thinking. Circular value creation often transcends firm boundaries, requiring coordination among suppliers, customers, waste management actors, and digital service providers (Aid et al., 2017; Brown, 2019). These collaborative arrangements enable resource sharing, risk distribution, and collective learning, but they also introduce governance challenges related to data ownership, trust, and power asymmetries.

Finally, the findings suggest that circular business model innovation is an evolutionary process characterized by experimentation, learning, and adaptation. Firms rarely transition directly from linear to fully circular models; instead, they engage in iterative experimentation within broader ecologies of business models (Bocken et al., 2019; Boons, 2009). Digital technologies and analytics capabilities enhance this evolutionary process by providing feedback loops that inform strategic decision-making and continuous improvement.

DISCUSSION

The results of this study invite a deeper theoretical discussion of circular business model innovation as an integrative phenomenon situated at the intersection of digital transformation, institutional change, and organizational evolution. One of the central theoretical contributions lies in reconceptualizing circularity not merely as a set of design or operational practices but as a form of organizational wisdom in the Ackoffian sense. From this perspective, circular business models represent the culmination of data-driven learning processes that enable firms to act responsibly and strategically within complex socio-ecological systems (Ackoff, 1989).

This interpretation challenges more instrumental views of digitalization that focus narrowly on efficiency gains or cost reduction. While such benefits are undoubtedly important, the deeper value of digital technologies in circular contexts lies in their capacity to enhance sensemaking, coordination, and long-term strategic alignment (Bharadwaj et al., 2013; Chen et al., 2015). Big data analytics, for example, not only supports predictive maintenance or optimized logistics but also informs strategic choices about product longevity, service design, and customer engagement.

Institutional theory further enriches this discussion by highlighting the co-evolutionary relationship between firms and their environments. Circular business models both respond to and shape institutional pressures, contributing to gradual shifts in norms, regulations, and market expectations (Aldrich, 1999; Arranz & Arroyabe, 2023). This dynamic underscores the importance of policy coherence and stakeholder engagement in supporting circular transitions, as well as the risks of institutional misalignment that can hinder innovation.

Despite these contributions, several limitations must be acknowledged. The conceptual nature of the study, while enabling deep theoretical elaboration, limits its ability to make empirical generalizations. Additionally, the reliance on existing literature may reflect prevailing biases in the field, such as a focus on European contexts or large organizations. Future research could address these limitations by conducting longitudinal empirical studies, exploring under-researched regions, and examining small and medium-sized enterprises.

Future research directions also include deeper investigation of consumer behavior and cultural dynamics in circular contexts (Chun et al., 2022), as well as the integration of circular principles into sector-specific domains such as construction and manufacturing (Kanther, 2025; de Kwant et al., 2021). Moreover, as digital technologies continue to evolve, scholars should examine emerging issues related to data governance, ethics, and power relations within circular ecosystems.

CONCLUSION

This article has developed an extensive and integrative analysis of circular business model innovation grounded strictly in the provided scholarly references. By synthesizing insights from systems thinking,

digital strategy, institutional theory, and circular economy research, the study offers a holistic understanding of circularity as a knowledge-intensive and evolutionary process. The findings emphasize that successful circular transitions depend on the alignment of digital capabilities, strategic intent, and institutional contexts, as well as on collaborative ecosystem arrangements.

Theoretical contributions include the application of the data–information–knowledge–wisdom hierarchy to circular business models, highlighting the epistemic dimensions of sustainability-oriented innovation. Practically, the analysis underscores the importance for managers and policymakers of fostering digital infrastructures, supportive institutions, and collaborative networks that enable continuous learning and adaptation.

As global sustainability challenges intensify, the need for robust theoretical frameworks capable of guiding circular transformation becomes ever more urgent. By providing a deeply elaborated and conceptually integrated perspective, this article contributes to the ongoing maturation of circular economy scholarship and lays a foundation for future empirical and theoretical advancements.

REFERENCES

1. Ackoff, R. (1989). From data to wisdom. Journal of Applied Systems Analysis, 16, 3–9.
2. Aid, G., Eklund, M., Anderberg, S., & Baas, L. (2017). Expanding roles for the Swedish waste management sector in inter-organizational resource management. Resources, Conservation and Recycling, 124, 85–97.
3. Akter, S., Wamba, S. F., Gunasekaran, A., Dubey, R., & Childe, S. J. (2016). How to improve firm performance using big data analytics capability and business strategy alignment? International Journal of Production Economics, 182, 113–131.
4. Al-Debei, M. M., & Avison, D. (2010). Developing a unified framework of the business model concept. European Journal of Information Systems, 19(3), 359–376.
5. Alcayaga, A., Wiener, M., & Hansen, E. G. (2019). Towards a framework of smart-circular systems: An integrative literature review. Journal of Cleaner Production, 221, 622–634.
6. Aldrich, H. (1999). Organizations evolving. Sage Publications.
7. Alpsahin Cullen, U. (2023). Exploring a circular business model: insights from the institutional theory perspective and the business model lens. International Journal of Entrepreneurship and Innovation, 24(1), 58–69.
8. Arranz, C. F. A., & Arroyabe, M. F. (2023). Institutional theory and circular economy business models: the case of the European Union and the role of consumption policies. Journal of Environmental Management, 340, 117906.
9. Bharadwaj, A., Sawy, O., Pavlou, P., & Venkatraman, N. (2013). Digital business strategy: toward a next generation of insights. MIS Quarterly, 37(2), 471–482.
10. Bocken, N., de Pauw, I., Bakker, C., & van der Grinten, B. (2016). Product design and business model strategies for a circular economy. Journal of Industrial and Production Engineering, 33(5), 308–320.

11. Bocken, N., Short, S. W., Rana, P., & Evans, S. (2014). A literature and practice review to develop sustainable business model archetypes. Journal of Cleaner Production, 65, 42–56.

12. Bocken, N., Boons, F., & Baldassarre, B. (2019). Sustainable business model experimentation by understanding ecologies of business models. Journal of Cleaner Production, 208, 1498–1512.

13. Bocken, N., & Coffay, M. (2024). Circular business model innovation in the U.S. – an institutional perspective. Proceedings of the 9th International Conference on New Business Models.

14. Bocken, N., & Konietzko, J. (2022). Circular business model innovation in consumer-facing corporations. Technological Forecasting and Social Change, 185, 12207.

15. Boons, F. (2009). Creating ecological value: An evolutionary approach to business strategies and the natural environment. Edward Elgar Publishing.

16. Boons, F., & Bocken, N. (2018). Towards a sharing economy – innovating ecologies of business models. Technological Forecasting and Social Change, 137, 40–52.

17. Bressanelli, G., Adrodegari, F., Perona, M., & Saccani, N. (2018). Exploring how usage-focused business models enable circular economy through digital technologies. Sustainability, 10(3).

18. Brown, P. (2019). Why do companies pursue collaborative circular oriented innovation? Sustainability, 11(3).

19. Buhl, H., Röglinger, M., Moser, F., & Heidemann, J. (2013). Big data. Business & Information Systems Engineering, 5(2), 65–69.

20. Chen, D., Preston, D., & Swink, M. (2015). How the use of big data analytics affects value creation in supply chain management. Journal of Management Information Systems, 32(4), 4–39.

21. Chun, Y.-Y., Matsumoto, M., Chinen, K., Endo, H., Gan, S.-S., & Tahara, K. (2022). What will lead Asian consumers into circular consumption? Sustainable Production and Consumption, 33, 158–167.

22. Kanther, S. D. (2025). Integrating circular business models in construction: A framework for design and planning to enhance sustainability. International Journal of Sustainability and Innovation in Engineering, 3, 26–33.

23. Dahmani, N., Benhida, K., Belhadi, A., Kamble, S., Elfezazi, S., & Jauhar, S. K. (2021). Smart circular product design strategies towards eco-effective production systems. Journal of Cleaner Production, 320, 128847.

24. D'Amato, D., Droste, N., Allen, B., Kettunen, M., Korhonen, J., Lähtinen, K., Leskinen, P., Matthies, B., & Toppinen, A. (2017). Green, circular, bioeconomy: A comparative analysis of sustainability avenues. Journal of Cleaner Production, 168, 716–734.

25. de Kwant, C., Rahi, A., & Laurenti, R. (2021). The role of product design in circular business models. Sustainable Production and Consumption, 27, 1728–1742.

26. de Mattos, C., & de Albuquerque, T. (2018). Enabling factors and strategies for the transition toward a circular economy. Sustainability, 10(12).

27. Ellen MacArthur Foundation. (2013). Towards the circular economy Vol. 1: An economic and business rationale for an accelerated transition.

28. Geissdoerfer, M., Pieroni, M. P. P., Pigosso, D. C. A., & Soufani, K. (2020). Circular business models: A review. Journal of Cleaner Production, 277, 123741.

29. Osterwalder, A., & Pigneur, Y. (2010). Business model generation: A handbook for visionaries, game changers, and challengers. Wiley.