Shah, S., Garud, A., Anagal, V., Karve, S., Siriwardena, M. and Manewa, A., 2025. Investigating business models for circular economy integration in construction sector. In: Waidyasekara, K.G.A.S., Jayasena, H.S., Wimalaratne, P.L.I. and Tennakoon, G.A. (eds). *Proceedings of the 13th World Construction Symposium*, 15-16 August 2025, Sri Lanka. pp. 923-933. DOI: https://doi.org/10.31705/WCS.2025.69. Available from: https://ciobwcs.com/papers/

INVESTIGATING BUSINESS MODELS FOR CIRCULAR ECONOMY INTEGRATION IN CONSTRUCTION SECTOR

S. Shah[1], A. Garud[2], V. Anagal[3], S. Karve[4], M. Siriwardena[5] and A. Manewa[6]

ABSTRACT

The growing disparities between the demand and finite resources within the construction section, contribute to market volatility and environmental degradation. The linear business is currently being predominantly employed, which escalates the construction and demolition waste. Unsustainable practices come into play with the take, make, dispose method and pressure the existing resources. In contrast, circular business models advocate for a closed-loop approach, and newer business opportunities with a new and evolving stream of market. The paper investigates the application of circular economy Business model, which can act as a mould for the construction industry. A systematic study of the aspects of CE, which are regulatory and economic difficulties, barriers, innovations, impact on the environment and society, is carried out. The research examines business models for reuse and recycling, and the current demolition waste management. Established data is studied to understand the trends, and variables in the business models. According to this study, despite the economic and environmental benefits of circular business models, there are barriers to implementing them due to factors such as high cost, undeveloped markets, and regulatory restrictions.

Keywords: *Business Model; Circular Economy; Demolition Waste; System Dynamics; Systematic Literature Review.*

1. INTRODUCTION

Land, with its limited availability in the urban areas has resulted in vast brownfield development thereby increasing the amount of construction and demolition waste. Such waste if not managed at the source in time would compromise the Land resource itself, thus, the environment, as it often gets dumped. The construction industry has always been resource-intensive and with more and more brownfield developments the construction industry requires immediate attention and focus on adoption of circular economy (CE) policies to optimize resource use and mitigate damages to the environment (Bestul & Gruis, 2024). Adoption of circular economy in the construction industry is not new, and the research community has already addressed "sustainability", "energy efficiency", "life cycle assessment", "renewable energy", and "recycling" themes (Norouzi et al., 2021).

[1] Student, Dr. B.N. College of Architecture, India, a21176.shaguns@bnca.ac.in
[2] Assistant Professor, Dr. B.N. College of Architecture, India, amruta.garud@bnca.ac.in
[3] Associate Professor, Dr. B.N. College of Architecture, Pune, India, vaishali.anagal@bnca.ac.in
[4] Professor, Dr. B.N. College of Architecture, India, sujata.karve@bnca.ac.in
[5] Senior Lecturer, Liverpool John Moores University, Liverpool, UK, M.L.Siriwardena@ljmu.ac.uk
[6] Senior Lecturer, Liverpool John Moores University, Liverpool, UK, R.M.Manewa@ljmu.ac.uk

However, very few studies were found discussing the scope of CE in businesses in the construction industry.

The "take-make-dispose" attitude present in traditional linear economic models causes waste and resource overexploitation. By contrast, CE focuses on sustainable design approaches, as well as recycling and recovery through reuse (Ossio et al., 2023). (Illankoon & Vithanage, 2023) Circular business models (CBMs) integrate social, economic, and environmental dimensions into business processes and, therefore, can offer practical solutions to reducing waste generation and improving sustainable materials management within the construction industry (Illankoon & Vithanage, 2023). Despite growing awareness, the transition of CE in construction remains limited due to various barriers including, inadequate policy enforcement, fragmented supply chain and lack of technological integration. The paper employs a systematic literature review and aims to identify key themes essential for integrating CE in Business models, followed by development of a system dynamics model to understand interconnection between various aspects of circular business models in the construction industry.

2. METHODOLOGY

This study employs a systematic literature review (SLR) providing an overview of the existing research on circular economy in the built environment and various business models. The goal of systematic literature reviews (SRs) is to synthesize scientific knowledge in a transparent and reproducible way to address a particular research issue by evaluating the quality of all available evidence on a topic (Lame, 2019).

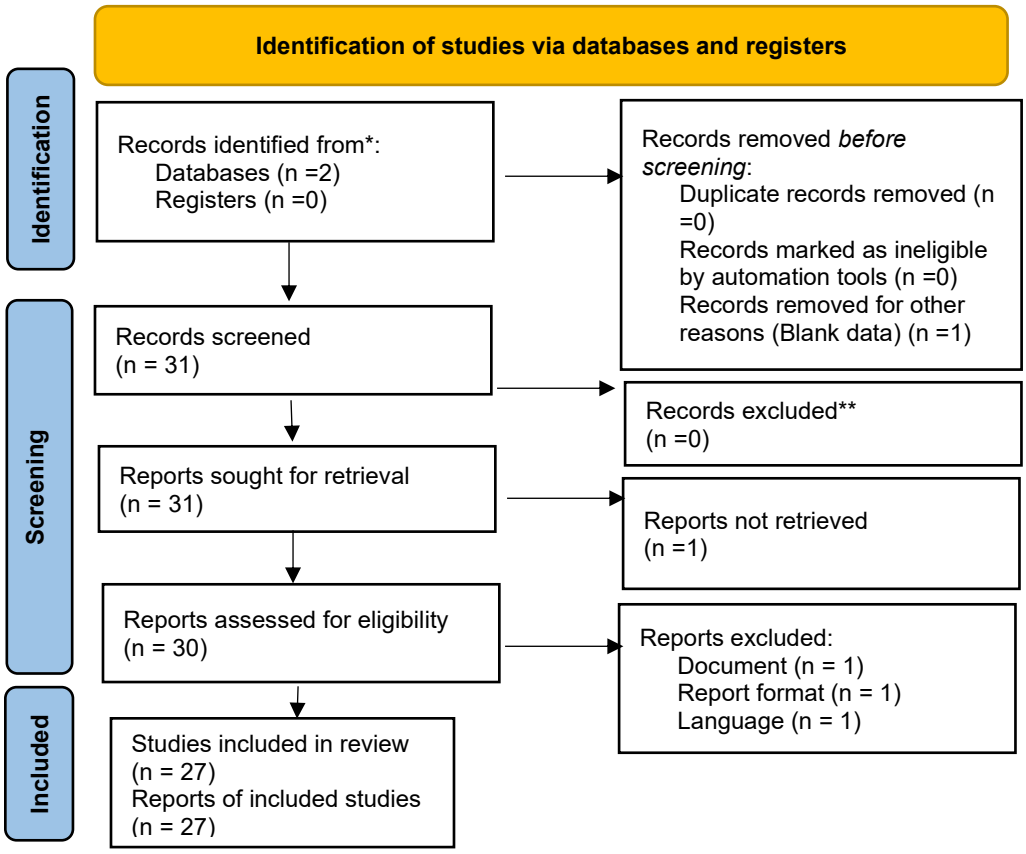

Figure 1: PRISMA 2020 reporting methodology

The Preferred Reporting Item for systematic reviews (PRISMA) approach was employed to review the literature. Due to the limited accessibility to databases, only two databases namely Scopus and JSTOR were used. The initial search query with the keywords (TITLE-ABS-KEY (circular AND economy) AND TITLE-ABS-KEY (demolition AND waste) AND TITLE-ABS-KEY (business AND model)) returned 28 papers from Scopus and 4 papers from Jstor, with the same keywords for both the databases. Papers were filtered on three levels; *first- articles in English were selected*; *second-* articles which are peer reviewed; *third-* relevant data provided in the articles were considered for which the PRISMA statement is presented in Figure 1. In case of unavailability of the full papers, the literature was excluded from the framework. Only literature from articles and documents in addition to the papers were retained.

3. RESULTS AND DISCUSSION

An economic understanding of a business falls under broad three pillars namely- value proposition, value delivery and value capture. This research presents discussion on the business models based on these three pillars by broadly classifying the identified parameters from the systematic literature review as discussed below.

3.1 VALUE PROPOSITION

A business model is built upon a value or business proposition. This type of proposal tackles an issue, an existing need, often undefined requirements. It consists of an ingenious and instantly recognisable mix of products and/or services that meet the needs of a user or customer both directly and indirectly. A proposition may identify potential stakeholders or suggest a target audience. A value's ability to generate an appropriate argument increases with its degree of accuracy (Jonker & Faber, 2021). The value proposition is influenced by various aspects, including, the type of model adopted, social and environmental aspects.

3.1.1 Business Models for Construction and Demolition Waste

Bestul & Gruis (2024) suggest that there are at least six types of organizations that enhance CE in the construction industry namely- deconstruction firms, upcyclers, component specific suppliers, reuse platforms, material resellers, and reuse consulting offices. These above-mentioned models work because they extend product life cycles and networks that resource recovery by-products facilitate. In addition to maintaining material loops, other construction circular business models include waste valorisation, renewable resource adoption, provision of services instead of ownership, and self-sufficiency (Bestul & Gruis, 2024).

Another strategic tool for embedding circularity to large-scale infrastructural projects is the public-private partnership – PPPs. Several of the PPP models, such as design-build-finance-operate (DBFO) and build-own-operate-transfer (BOOT), focus on the redistribution of ownership and responsibility in material management as one of their key defining attributes. Circular PPP infrastructures instead encourage circular behaviour such as sharing, renting, and buyback options rather than contracting the entire liability to life cycle end users (Akomea-Frimpong et al., 2024).

3.1.2 The Impacts of Circular Business Models on the Environment and Society

Circular construction business models enable a variety of sustainability goals, including conservation of resources, reduction in waste, and carbon footprint reduction (Al-Raqeb et al., 2023). The environmental benefits of circular practices have been widely evaluated through life cycle assessments (LCA), which indicate that recycling and material reuse minimize embodied carbon (Ossio et al., 2023). Moreover, circular building models generate new economic opportunities by encouraging the creation of jobs in deconstruction, material recovery, and reverse logistics (Munaro et al., 2020). In addition to employment creation, CE has social benefits through fostering the development of urban circularity initiatives that transform cities into sustainable systems (Dasgupta et al.,2016).

3.2 VALUE CAPTURE

Securing profits from the value given is known as "value capture," and these gains can then be reinvested as input to assist the upcoming transformation efforts (Chen & Thapa, 2025). These can be deviated due to logistical, technical, regulatory, economic, and many such barriers discussed below.

3.2.1 Regulatory and Economic Difficulties

The combination of Circular Economy (CE) and construction and demolition industry is disruptive, and its active usage is prevented due to financial setbacks. It is known that business models that support a circular economy are especially dismantled due to high infrastructure investments in processing, shipment, and storage (Bestul & Gruis, 2024). The competitive stand for recycled items is affine in cross economy regions because of the Intra economic differences in market values, which makes profit for recyclers rather impossible. In addition, the profitability of recycling construction and demolition waste is influenced by the prices charged on secondary material markets, the cost of tipping fees at landfills, and the cost of waste processing (Cho et al., 2022).

Regulations affect profoundly the strategies used in creating new circular construction techniques. Measures such as landfill taxes, sorting laws, and procurement of recycled materials can shift the market towards circularity which in turn can make policies more beneficial (Nußholz et al., 2019). Denmark and other countries have demonstrated that selective demolition accompanied by strong regulatory frameworks enables the development of circular value chains (Christensen et al., 2022). Moreover, steps can be taken towards more advanced sustainability in construction by adding circular concepts to public purchasing policies (Dasgupta et al.,2016).

Investments in new technologies have a positive impact on CE in the building industry. The applications of AI facilitates circularity through RL (reverse logistics), waste predicting, and material selection optimization (Oluleye et al., 2023). In addition, BIM has been increasingly used for integrating CE into construction projects through the provision of digital material passports, monitoring of material flows, and analyzing demolition planning for resource recovery (Kuzminykh et al., 2024). In addition, it is also recognized that efficient waste and material cut strategic targets can be export through the use of prefabrication and modular building techniques (Kit, 2022).

3.2.2 Barriers to the Adoption of the Circular Economy

In spite of the numerous advantages CE principles bring, the construction sector encounters a number of barriers to their implementation. These include organisational, technical, regulatory, as well as economic challenges. Material recovery capacity is constrained by technical problems, including a lack of effective on-site sorting facilities and lack of formalised waste categorisation systems (Ratnasabapathy et al., 2021). Also, market systems that are dominated by few large, powerful firms detract from circular practice incentives by creating resistance towards change (Nußholz et al., 2019). Incentivising waste collection and recovery, and incorporating the reuse of higher value material in construction and demolition waste are a few public policies that help companies address barriers.

Construction firms' reluctance to incorporate secondary materials due to concerns about certification standards and quality assurance is among the significant barriers to circular business model formation. A trustworthy certification framework for recycled material can facilitate increased use of CE practices and developing trust among the industry stakeholders (Nußholz et al., 2019).

3.3 VALUE DELIVERY

Value delivery guarantees that the intended audience receives the promised value in an effective and efficient manner (Chen & Thapa, 2025). Policies play a key role in defining this process and ensures smooth and effective implementation.

3.3.1 Policy Recommendations and Future Directions

Policy measures need to prioritize regulatory incentives, financing, and stakeholder engagement in ensuring that regulatory incentives, financing, and stakeholder engagement are provided top priority to overcome existing challenges and accelerate CE adoption. Imposing stricter landfill bans on non-treated construction and demolition waste, establishing centralized material donation banks, and enforcing circular procurement policies are some means through which governments can encourage CE adoption (Kit, 2022). Investment in environmentally friendly building processes can further be promoted through monetary instruments such as green loans, subsidies on recycling technology, and tax relief to circular businesses (Al-Raqeb et al., 2023).Education and awareness programs are also essential for fostering a circular culture. Architects, engineers, contractors, and other professionals in the field need specialized education in material recovery techniques, business model creativity, and circular design principles (Illankoon & Vithanage, 2023). In addition, research and development efforts to address current technological and financial limitations can be driven by collaboration between academics, business, and policymakers (Kit, 2022). Figure 2 presents the keyword occurrence on the topic, providing the connections between each keyword. Keywords such as circular economy, construction and demolition waste, waste management, and business models hold high strength of network.

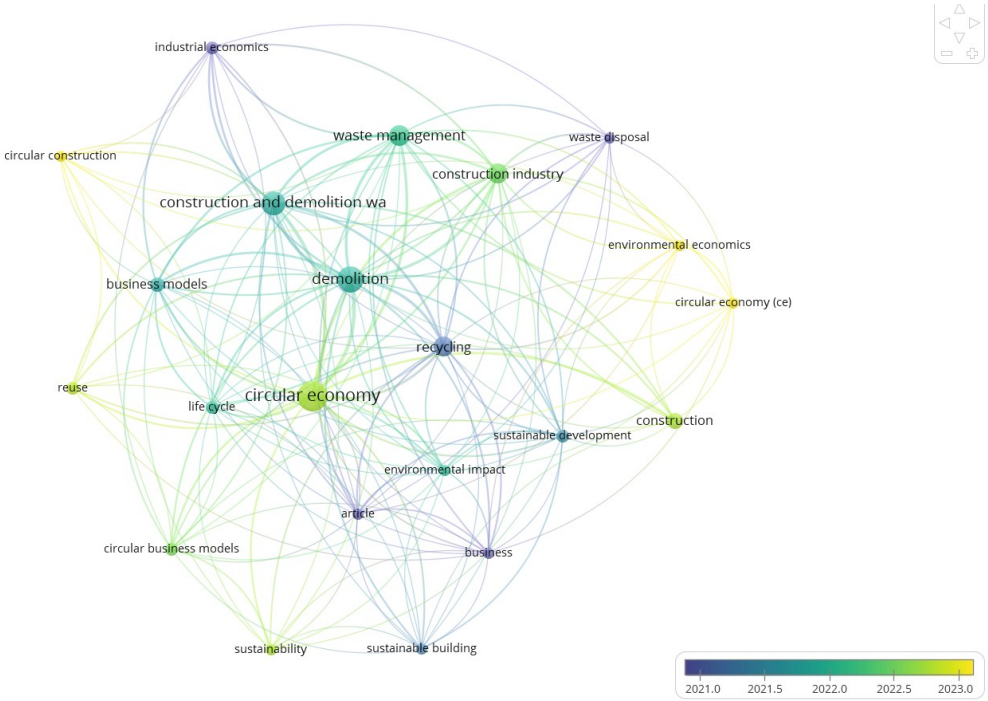

Figure 2: Keyword co-occurrence temporal visualization in VOSviewer

Topics such as recycling, waste disposal and business models are discussed mainly in 2021-2022. This trend reflects a period when research was focused on waste handling and emerging business innovations, aimed at reducing construction related environmental impacts. Keywords such as circular economy, environmental economics, circular construction are terms used post 2022. In contrast, this shift suggests maturing research, that is moving from operational waste management strategies to more systemic and policy driven frameworks. The evolution of newer terms also suggests the long-term sustainability goals. Overall, the keywords underscore a shift from reactive to proactive waste management approach, and economically informed circular practices.

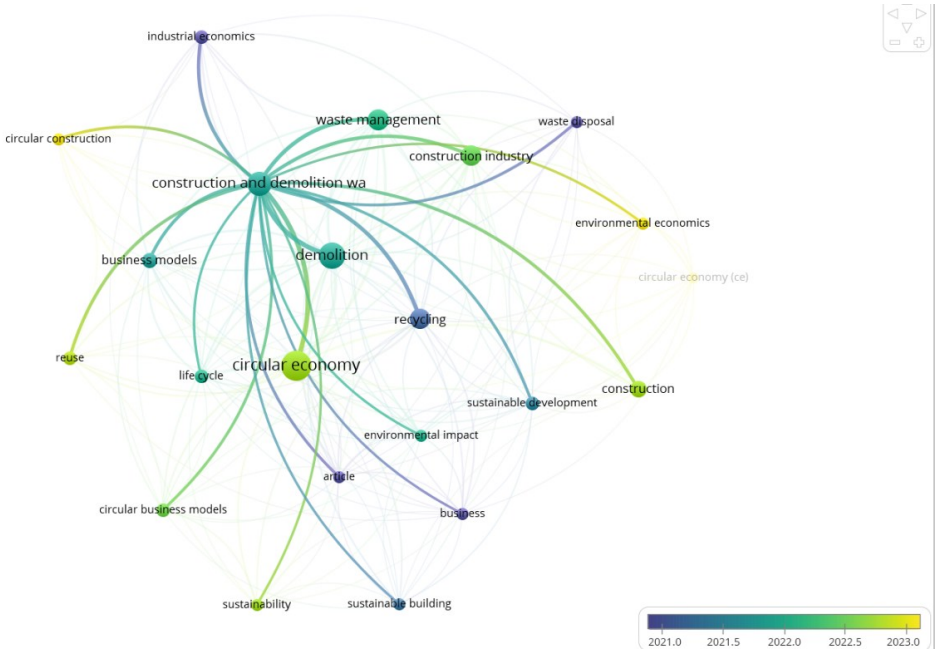

Figure 3: 'Construction and demolition waste' keyword's temporal association with other keywords

Figure 3 shows the connection of the keyword construction and demolition waste to the other keywords. Topics such as circular construction and environmental economics in accordance with construction and demolition waste came up during 2023. Sustainable development and recycling were the topics in relation to it before 2021. This highlights the shift from managing construction and demolition waste after it is generated, to designing it holistically.

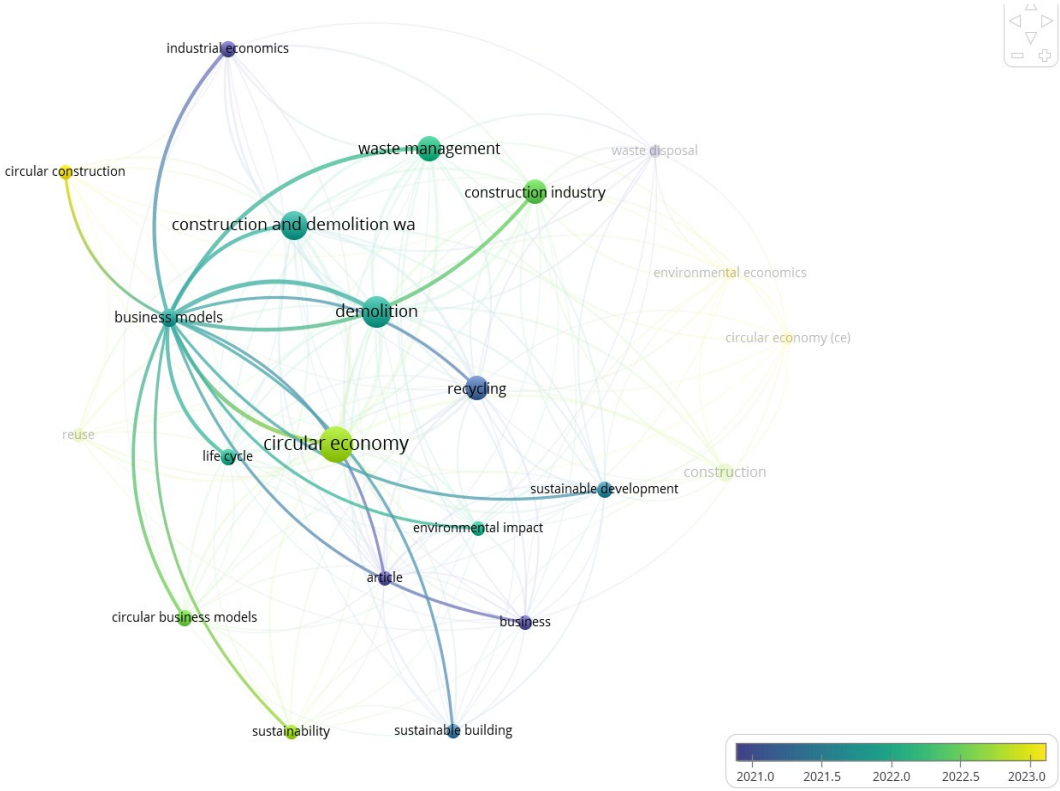

Figure 4: 'Business model' keyword's temporal association with other keywords

Figure 4 shows the connection between business models and other keywords. Recycling was the term used in 2021. Circular economy with respect to business models came up around 2022, whereas circular construction emerged in 2023. This shows the gradual specification of terms and their understanding.

4. UNDERSTANDING BUSINESS MODELS THROUGH SYSTEM DYNAMICS LENS

System dynamics (SD), created by Jay Forrester (1971), provides practical tools for understanding those large, complex management problems. SD is being developed. It is a well-known method based on system thinking for understanding, studying, visualizing, and assessing complex dynamic feedback networks. It is necessary to construct "causal loop diagrams" or "stock and flow diagrams" in order to generate a system dynamics model for applications. The construction and demolition waste management model is an abstract and conceptual model that emphasizes particular elements and theories regarding their interactions. The dynamics of the model are determined by the feedback loops in the causal diagram. A causal loop diagram for this model can be found in Figure 5. Each

arrow illustrates the relationship between two elements. Theories about these influences are based on reviews of the literature (Zhao et al., 2011).

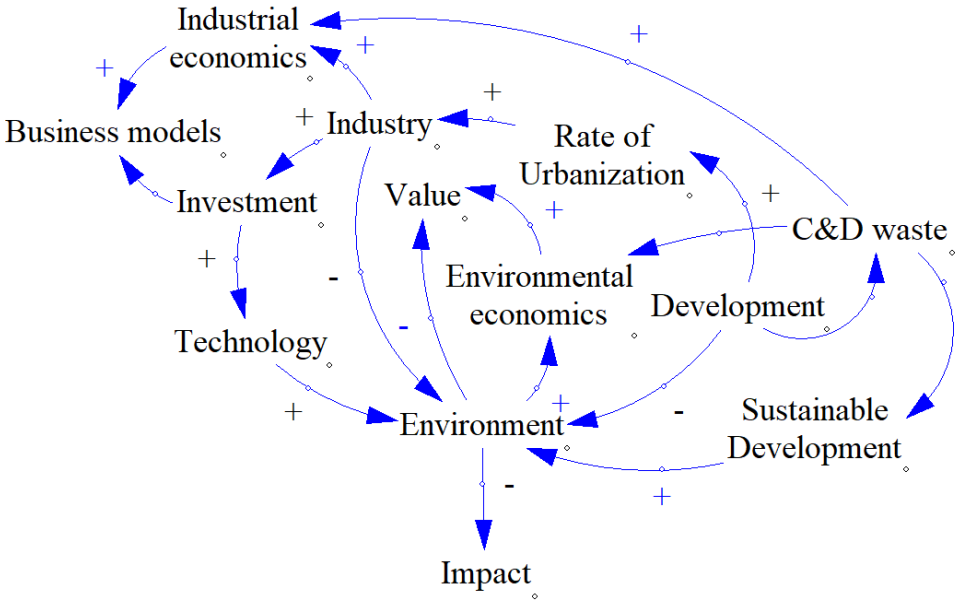

Figure 5: System dynamics model in Vensim summarizing circular business model opportunities

The causal loop diagram. showcases the dynamic relation between the aspects which affects the overall loop. One perspective holds that urbanization aids in the modernization of industrial structures. However, there is a counterargument that urbanization might negatively impact industrial transformation and upgrading. Urbanization frequently leads to rapid population growth and increased economic activity, which can exacerbate environmental pollution and lead to excessive resource use (Wan et al., 2024). Rapid urbanization encourages innovation. A study asserts positive correlation between technological innovation, industrialization, and urbanization. According to it, industrialization and technological development are the main drivers of urbanization and are essential to its progress (Shang et al., 2018). Global infrastructure investment has fundamentally changed as a result of the current stage of the technological revolution and the quick speed of industrial change (Du et al., 2022). A study claims that digital investment enables IT innovation (Nwankpa & Merhout, 2020). The Porter Hypothesis offers a theoretical framework for investigating the previously mentioned question regarding the relationship between environmental performance and technological innovation (Wu et al., 2024). In the current global economic downturn, abundant natural resources don't seem to support economic growth. Given the remarkable environmental degradation taking place on a global scale, turning the "natural resource curse" into the "natural resource blessing" is one of the most significant new issues confronting nations worldwide (Liu et al., 2024). Various impacts have been made on the nature due to rapid industrialization(Choi et al., 2020). The rapid growth of the industry and the economy has been accompanied by environmental degradation (Sehrawat et al., 2015). As the competitive environment evolves, the business model which describes how a company creates, delivers, and gathers value should be reinforced over time and modified either completely or partially to reflect the new conditions (Salfore et al., 2023). Studies assist in finding sustainable and profitable solutions to the global issues we confront, sustainable business models are critical to reaching the SDGs. Thus, while guaranteeing

profitability, sustainable business models can specify sustainable value-creation methods. Accelerating progress towards the SDGs requires sustainable business model innovation, or the process of creating and implementing new sustainable business models, since it can open up new avenues for companies to contribute to a more sustainable future (Gazzola et al., 2024).

5. CONCLUSION

In the construction and demolition sector, the transition towards a circular economy requires a multifaceted approach that involves innovative business models, supportive legal systems, and technology advancements. For closing material loops and minimizing waste generation, circular business models such as material resellers, reuse platforms, and deconstruction businesses, are crucial. However, market transformation strategies, policy shifts, and financial incentives are necessary to overcome economic and technical challenges. The construction sector can optimize resource utilization and facilitate circularity through the use of AI, BIM, and prefabrication procedures. Furthermore, sustainable building practices can be accelerated by legislative measures such as landfill charges, mandated material certification, and green procurement initiatives. Ultimately, systemic collaboration between governments, business, and consumers is required to make circular business models work within the building sector.

Despite the contributions of this paper, several limitations should be acknowledged. The selection of papers was limited to English language, which may have excluded relevant research data. The review was based on data searched from Scopus and Jstor, which while were comprehensive, may have missed pertinent studies from other sources including grey literature and non-English publications, future research could broaden the review's geographic and cultural breadth. It would also be helpful to conduct empirical studies examining the real-world effects of circular construction and demolition business models, and the interdependency of the process on their functioning. Comparing policy frameworks in various places could also help us better understand how regulatory environments impact adoption. A more thorough grasp of the field might be possible with future studies looking at the connection between social business and sustainability.

6. REFERENCES

Akomea-Frimpong, I., Jin, X., Osei Kyei, R., Tetteh, P. A., Tumpa, R. J., Ofori, J. N. A., & Pariafsai, F. (2024). A review of circular economy models and success factors on public-private partnership infrastructure development. *Built Environment Project and Asset Management, 14*(1), 109-126. https://doi.org/10.1108/BEPAM-01-2023-0014

Al-Raqeb, H., Ghaffar, S. H., Al-Kheetan, M. J., & Chougan, M. (2023). Understanding the challenges of construction demolition waste management towards circular construction: Kuwait Stakeholder's perspective. *Cleaner Waste Systems, 4,* 100075. https://doi.org/10.1016/j.clwas.2023.100075

Bestul, B., & Gruis, V. (2024). Six business model types for circular building component reuse actors. *Sustainability, 16*(13), 5425. https://doi.org/10.3390/su16135425

Neve, H. H., Wandahl, S., Kaeseler, S. M., & Tandrup, A. (2017). Integrating IPD and exploring potentials. In P. W. Chan & C. J. Neilson (Eds.), *Proceedings of the 33rd Annual ARCOM Conference* (pp. 154–163). Association of Researchers in Construction Management. https://www.researchgate.net/publication/362381380_Association_of_Researchers_in_Construction_Management

Chen, X., & Thapa, D. (2025). Clarifying the business model construct: A theory-driven integrative literature review through ecosystems and open systems perspectives. *Review of Managerial Science, 2025,* 1-34. https://doi.org/10.1007/s11846-025-00917-7

Cho, N., El Asmar, M., & Aldaaja, M. (2022). An analysis of the impact of the circular economy application on construction and demolition waste in the United States of America. *Sustainability, 14*(16), 1034. https://doi.org/10.3390/su141610034

Choi, R. Y., Kim, H. T., Yang, J. W., & Kim, J. G. (2020). Ecological impact of fast industrialization inferred from a sediment core in Seocheon, West Coast of Korean Peninsula. *Journal of Ecology and Environment*, *44*(1) 24. https://doi.org/10.1186/s41610-020-00165-8

Christensen, T. B., Johansen, M. R., Buchard, M. V., & Glarborg, C. N. (2022). Closing the material loops for construction and demolition waste: The circular economy on the island Bornholm, Denmark. *Resources, Conservation and Recycling Advances*, *15*, 200104 https://doi.org/10.1016/j.rcradv.2022.200104

Du, X., Zhang, H., & Han, Y. (2022). How does new infrastructure investment affect economic growth quality? Empirical evidence from China. *Sustainability, 14*(6), 3511. https://doi.org/10.3390/su14063511

Dasgupta, D., Espagne, E., Hourcade, J. C., Minzer, I., Nafo, S., Perissin-Fabert, B., ... & Sirkis, A. (2016). *Did the Paris Agreement Plant the Seeds of a Climate Consistent International Financial Regime?* Fondazione Eni Enrico Mattei (FEEM). https://doi.org/10.22004/ag.econ.243151

Gazzola, P., Drago, C., Pavione, E., & Pignoni, N. (2024). Sustainable business models: An empirical analysis of environmental sustainability in leading manufacturing companies. *Sustainability, 16*(19), 8282. https://doi.org/10.3390/su16198282

Illankoon, C., & Vithanage, S. C. (2023). Closing the loop in the construction industry: A systematic literature review on the development of circular economy. *Journal of Building Engineering, 76*, 107362. https://doi.org/10.1016/j.jobe.2023.107362

Jonker, J., & Faber, N. (2021). *The value proposition. In organizing for sustainability: A Guide to Developing New Business Models*. Springer International Publishing. https://doi.org/10.1007/978-3-030-78157-6_5

Kuzminykh, A., Granja, J., Parente, M., & Azenha, M. (2024). Promoting circularity of construction materials through demolition digitalisation at the preparation stage: Information requirements and open BIM-based technological implementation. *Advanced Engineering Informatics*, *62*, 102755. https://doi.org/10.1016/j.aei.2024.102755

Lame, G. (2019). Systematic literature reviews: An introduction. In G. Cascini, K. Otto, & T. Martinec (Eds.), *Proceedings of the Design Society: International Conference on Engineering Design* (1, pp 1633–1642). Cambridge University Press. https://doi.org/10.1017/dsi.2019.169

Liu, Y., Huang, J., Xu, J., & Xiong, S. (2024). Natural resource dependence and sustainable development policy: Insights from city-level analysis. *Resources Policy*, *91,* 104928. https://doi.org/10.1016/j.resourpol.2024.104928

Munaro, M. R., Tavares, S. F., & Bragança, L. (2020). Towards circular and more sustainable buildings: A systematic literature review on the circular economy in the built environment. *Journal of Cleaner Production*, *260*, 121134. https://doi.org/10.1016/j.jclepro.2020.121134

Norouzi, M., Chàfer, M., Cabeza, L. F., Jiménez, L., & Boer, D. (2021). Circular economy in the building and construction sector: A scientific evolution analysis. *Journal of Building Engineering*, *44*, 102704. https://doi.org/10.1016/j.jobe.2021.102704

Nußholz, J. L. K., Nygaard Rasmussen, F., & Milios, L. (2019). Circular building materials: Carbon saving potential and the role of business model innovation and public policy. *Resources, Conservation and Recycling*, *141*, 308–316. https://doi.org/10.1016/j.resconrec.2018.10.036

Nwankpa, J. K., & Merhout, J. W. (2020). Exploring the effect of digital investment on IT innovation. *Sustainability, 12*(18), 7374. https://doi.org/10.3390/SU12187374

Oluleye, B. I., Chan, D. W. M., & Antwi-Afari, P. (2023). Adopting artificial intelligence for enhancing the implementation of systemic circularity in the construction industry: A critical review. *Sustainable Production and Consumption*, *35*, 509–524. https://doi.org/10.1016/j.spc.2022.12.002

Ossio, F., Salinas, C., & Hernández, H. (2023). Circular economy in the built environment: A systematic literature review and definition of the circular construction concept. *Journal of Cleaner Production*, *414,* 137738. https://doi.org/10.1016/j.jclepro.2023.137738

Ratnasabapathy, S., Alashwal, A., & Perera, S. (2021). Exploring the barriers for implementing waste trading practices in the construction industry in Australia. *Built Environment Project and Asset Management*, *11*(4), 559–576. https://doi.org/10.1108/BEPAM-04-2020-0077

Salfore, N., Ensermu, M., & Kinde, Z. (2023). Business model innovation and firm performance: Evidence from manufacturing SMEs. *Heliyon*, *9*(6), e16384. https://doi.org/10.1016/j.heliyon.2023.e16384

Sehrawat, M., Giri, A. K., & Mohapatra, G. (2015). The impact of financial development, economic growth and energy consumption on environmental degradation: Evidence from India. *Management of Environmental Quality: An International Journal*, *26*(5), 666–682. https://doi.org/10.1108/MEQ-05-2014-0063

Shang, J., Wang, Z., Li, L., Chen, Y., & Li, P. (2018). A study on the correlation between technology innovation and the new-type urbanization in Shaanxi Province. *Technological Forecasting and Social Change*, *135*, 266–273. https://doi.org/10.1016/j.techfore.2018.04.029

Kit, K. T. (2022). Transformation of linear economy to circular economy in Hong Kong building and construction industry. *International Journal of Economics and Management Engineering, 16*(10), 583-587. Retrieved from *https://www.researchgate.net/profile/Tk-Kwok/publication/364350682_Transformation_of_Linear_Economy_to_Circular_Economy_in_Hong_Kong_Building_and_Construction_Industry/links/634e3de596e83c26eb32c438/Transformation-of-Linear-Economy-to-Circular-Economy-in-Hong-Kong-Building-and-Construction-Industry.pdf*

Wan, J., Wang, Q., & Miao, S. (2024). The impact of urbanization on industrial transformation and upgrading: Evidence from early 20th century China. *Sustainability, 16*(11), 4720. https://doi.org/10.3390/su16114720

Wu, Y., Zhang, M., & Wang, Z. (2024). Technological innovation and environmental performance: Evidence from China. *Industrial Management and Data Systems*, *124*(5), 1746–1768. https://doi.org/10.1108/IMDS-11-2023-0804

Zhao, W., Ren, H., & Rotter, V. S. (2011). A system dynamics model for evaluating the alternative of type in construction and demolition waste recycling center: The case of Chongqing, China. *Resources, Conservation and Recycling*, *55*(11), 933–944. https://doi.org/10.1016/j.resconrec.2011.04.011