

Adoption Barriers to Circular Business Models in Small- and Medium-Sized Enterprises: A Financial Perspective

Paula Salonen¹, Marina Weck¹, Sariseelia Sore², and
Hanna van der Steen¹

¹Häme University of Applied Sciences, Finland

²LAB University of Applied Sciences, Finland

ABSTRACT

The construction sector is a significant consumer of natural resources and a major contributor to global carbon emissions, making it a critical sector in the transition toward the adoption of circular economy (CE) principles. Small- and medium-sized enterprises (SMEs) are central to this transition, given their prevalence and influence within the sector. However, they often face substantial financial barriers when implementing circular business models (CBMs). Thus, this study investigated the financial barriers to implementing CBMs, with a focus on their variations across distinct CBM types. The empirical investigation was conducted in two distinct phases. The first phase comprised 11 semi-structured interviews with representatives from Finnish SMEs, large enterprises, and public sector organizations. The second phase employed an online inquiry to gather more targeted insights from eight participating SMEs. The data were analyzed using a codebook-based thematic analysis guided by a conceptual framework linking financial barriers to circular business models. The preliminary findings highlighted the interconnected nature of financial and nonfinancial barriers, showing that financial constraints are closely linked to market dynamics, knowledge gaps, infrastructure limitations, regulatory challenges, and risk-related concerns, ultimately amplifying strategic and operational difficulties for SMEs. The identified barriers were most pronounced for “circular inputs,” “product life extension,” and “resource recovery” business models, whereas no distinct financial obstacles were found for “product as a service” and “sharing platforms,” although limited investment capacity and persistent skepticism toward their economic viability remained evident. This study underscores the critical role of CBM-related knowledge, sector-specific context, and targeted support measures in mitigating financial constraints and fostering the adoption of CE practices.

Keywords: Circular business model (CBM), Adoption barrier, Financial perspective, Construction sector SMEs

INTRODUCTION

The construction sector is among the world’s largest consumers of natural resources and accounts for a significant share of global greenhouse gas emissions, as the built environment is responsible for nearly 40% of total carbon emissions and uses half of all raw materials globally (United Nations

Environment Programme, 2024). Consequently, the industry generates more than one-third of the solid waste streams worldwide (Kabirifar et al., 2020). In this context, the transition to a circular economy (CE) is considered essential for mitigating the environmental impacts of construction activities (Ghisellini et al., 2016; Pomponi and Moncaster, 2017). Given that small- and medium-sized enterprises (SMEs) represent approximately 90% of businesses globally and 95% of firms in the European Union (World Bank, 2023; European Commission, 2025), they play a pivotal role in advancing circularity within the sector.

However, the adoption of circular business models (CBMs) among European SMEs remains limited, as many firms struggle to identify clear economic benefits and often perceive necessary additional investments as unprofitable (Rosa & de Oliveira Paula, 2023). Recent studies have emphasized that CBMs are crucial mechanisms for enabling this transition, noting that the nature and intensity of implementation barriers differ across CBMs (e.g., Vermunt et al., 2019; García-Quevedo et al., 2020). Previous research has highlighted the role of economic perspectives and financial barriers, with Masi et al. (2018) concluding that CE practices in firms are mostly motivated by economic factors and Rizos et al. (2021) recognizing that financial barriers are especially significant in influencing the adoption of CBMs. Despite the central role of SMEs and the increasing academic and policy interests in CBMs, empirical research on the financial barriers that SMEs encounter in adopting CBMs remains limited (Chakraborty et al., 2025). This is particularly evident in the lack of insight into the specific financial barriers associated with CBMs, underscoring the need for more systematic and context-sensitive research (Takacs et al., 2022).

The empirical findings discussed earlier indicate a significant research gap: While the role of SMEs and their adoption of CBMs in driving the CE is widely acknowledged, the financial barriers they face, particularly in the construction sector, remain insufficiently investigated. Thus, this study aimed to address this gap by addressing the following research questions:

1. What are the primary financial barriers that hinder SMEs from adopting CBMs?
2. How do financial barriers vary across CBMs?

To investigate these questions, the study conducted 11 semi-structured interviews with representatives from SMEs, large enterprises, and public sector organizations within the Finnish construction sector, complementing these with an online inquiry involving eight SMEs. The following section reviews previous research on barriers to CE adoption and their connection to CBMs. This section is followed by a description of the methodology used in the study, including the data collection and analysis procedures. The subsequent section presents and discusses the preliminary findings. The paper concludes by highlighting the limitations of the study and suggesting avenues for future research.

THEORETICAL BACKGROUND

Circular Business Models

CE can be described as a system that minimizes waste through processes that extend the life cycle of products and materials, thereby reducing the environmental impact of human activities (Ellen McArthur Foundation, n.d.). CBMs structure value creation and capture around resource efficiency by extending product lifetimes and closing material loops through interventions, such as repair, remanufacturing, and durable product design (Nußholz, 2017). This study used the framework proposed by Sitra and Deloitte (2022) that defines the following five distinct CBMs:

- **Circular inputs** emphasize recycled and bio-based materials, renewable energy, and efficient production, supported by durable modular designs that enable *reuse and remanufacturing*.
- **Sharing platforms** increases asset utilization by enabling exchange, renting, or sharing through digital platforms.
- **Product as a service** shifts value from ownership to access, encouraging durable and maintainable products through service-based models.
- **Product life extension** keeps products and components in use longer through repair, upgrades, resale, and remanufacturing.
- **Resource recovery** closes material loops through recycling, upcycling, and reintegrating secondary materials into production.

In their review of CE applications in the construction sector, Guerra et al. (2021) found that business models utilizing waste as a resource, recovering materials, or incorporating circular supplies, such as bio-based materials, were the most readily embraced by companies. By contrast, models based on sharing platforms and product-as-a-service approaches were less popular.

Barriers to the Adoption of CBMs

Previous research has presented several categorizations of the barriers that SMEs face in adopting CBMs (see, e.g., García-Quevedo et al., 2020; Purushothaman et al., 2025; Takacs et al., 2022). In their literature review, Assmann et al. (2023) introduced a slightly different perspective, aiming to define the determinant drivers and barriers of CE adoption in SMEs. They identified eight interrelated determinants influencing CE adoption in SMEs: culture, regulation, markets, strategy, business case, collaboration, operations, and knowledge.

In general, financial and economic factors have been consistently identified as significant barriers to the adoption of CE practices in SMEs across all sectors (Masi et al., 2018; Rizos et al., 2021). Research indicates that a lack of funding, high initial investment costs, and investor caution can hinder the implementation of CBMs (Ormazabal et al., 2018; Touratier-Muller et al., 2025; Purushothaman et al., 2025). Ormazabal et al. (2018) reported that many SMEs are not convinced of the economic benefits of CE, reducing their motivation to invest in environmentally friendly solutions. Even when some funding is available, obtaining financial support is often complex and

requires substantial investment from the firm, while investors may remain cautious about the viability of CE initiatives (Ormazabal et al., 2018).

Within the specific context of the construction industry, notable barriers to the adoption of CBMs include the absence of comprehensive CE policies and legislation, and substantial upfront investment costs. These factors significantly impede the transition toward CE practices across the sector. In addition, the fragmented supply chain in the sector, a conservative and noncollaborative mindset, and the overall lack of interest in adopting CE in the business also contribute to the slow adoption of CBMs in the sector (AlJaber et al., 2023).

In a multisectoral study, Vermunt et al. (2019) found that CBMs face distinct barriers. For example, product-as-a-service models are limited by organizational and financial challenges; resource recovery models, by supply chain and institutional constraints; and product life extension models, by market and quality issues. The authors also highlighted customer resistance and perceptions of low quality as major obstacles to CBM adoption and called for sector-specific research on the links between business models and barriers.

METHODOLOGY

This study applied an exploratory qualitative approach to investigate the financial barriers affecting the adoption of CBMs among SMEs in the construction sector. A qualitative design was chosen to capture nuanced, context-specific insights into a topic that remains underexplored in the existing literature (Edmondson & McManus, 2007).

Empirical data were collected in two distinct phases between August and October 2025. In the first phase, 11 semi-structured interviews were conducted with representatives from SMEs, large companies, and public sector organizations operating in the construction sector in the Häme region of Finland. The second phase focused exclusively on SMEs, employing a Webropol questionnaire with open-ended questions to gather more targeted insights from eight participating SMEs. While the study focused on the financial barriers that SMEs face in adopting CE practices, the inclusion of other stakeholders was intentional. In the construction sector, SMEs typically operate within broader ecosystems that involve public clients and larger firms, and their ability to adopt circular practices is shaped by supply chain relationships, institutional dynamics, and collaborative conditions beyond the firm level (Chen et al., 2025; Assmann et al., 2023).

Respondents were chosen using an elite selection approach (Harvey, 2011), targeting individuals with expertise in financial planning, investment decisions, and strategic development, which are areas directly relevant to understanding how economic considerations influence the adoption of CE principles. The interview data were analyzed using a codebook-style thematic analysis (Braun & Clarke, 2020), guided by a conceptual framework linking financial barriers to CBMs. Coding was structured around the five CBM categories defined by Sitra and Deloitte (2022): “circular inputs,” “sharing platforms,” “product as a service,” “product life extension,” and “resource

recovery.” This CBM framework enabled a systematic comparison of how financial challenges manifest across business models.

FINDINGS AND DISCUSSION

This section introduces the primary financial barriers that emerged from the collected data and further presents the variation of barriers across CBMs in Table 1. The framework for the determinants of CE adoption by Assmann et al. (2023) was loosely utilized in categorizing the barriers that emerged from the data to highlight the interrelatedness of financial barriers and other types of barriers.

Primary Financial Barriers

Market-Related Financial Barriers

Empirical evidence highlights market restrictions as a major financial barrier hindering SMEs in their transition toward adopting CBMs. The underlying causes of market restrictions appear to be multilayered, but for the SMEs, the situation is straightforward: No market, no profit. This aligns with Rosa and de Oliveira Paula’s (2023) observation that SMEs often perceive CBMs as unprofitable. Recurring themes related to the lack of market in the data included tight cost pressures and a highly price-sensitive market in the construction sector. Circular products or services struggle to compete with linear options because price is the most dominant customer preference. The data echoed the findings of Vermunt et al. (2019) as well, as respondents highlighted customer resistance to secondhand products and paying a higher price for them.

Knowledge-Related Financial Barriers

On the basis of the collected empirical data, efforts to develop new circular or low-carbon products or business models pose considerable barriers for SMEs. They often lack both in-house expertise and financial resources to hire external consultants, making these processes economically unfeasible to some SMEs. The scarcity of time and financial resources often present in SMEs further limit their ability to invest in costly training or innovation efforts. Knowledge is a well-known barrier to CBM adoption (Assmann et al., 2023), but previous research has drawn little attention to the financial barriers of acquiring CE knowledge.

Infrastructure and Operational Cost Barriers

Empirical findings indicate that circular solutions often require new operational processes and increased personnel resources. However, SMEs often face significant financial barriers that limit their ability to implement such changes. Investments in machinery that enable CBMs often remain too high for SMEs, or they are unable to derive actual cost benefits from them. Furthermore, some CBMs, such as the reuse of dismantled components, require storage capacity and infrastructure, which SMEs alone are unable to execute owing to financial constraints. In one case, the cost of recycling the material was significantly higher than using it for energy combustion, making it financially unviable for the SME. These findings provide practical examples of a lack of funding and high initial investment costs, which are known financial barriers to CBM adoption (Ormazabal et al., 2018; Touratier-Muller et al., 2025).

Regulation-Induced Financial Barriers

Many circular advancements, such as reusing materials or components, require regulatory processes. The findings of this study reveal that even initiating environmental license discussions can require significant upfront capital commitments. Regarding the reuse of building components, the verification process of the components is perceived to eliminate their cost advantage, as obtaining approval can be prohibitively expensive. In addition, the data present a case where the requirement of an environmental permit process eliminated customers’ interest to use a waste-based circular product, narrowing the market of the product significantly. This situation is recognized by Vermunt et al. (2019), who identified legislation that especially hindered CBMs based on waste recovery, and the findings of this study further highlight its financial implications.

Risk- and Uncertainty-Related Financial Barriers

On the basis of empirical evidence, SMEs often perceive circularity-related investments as too uncertain, particularly when the longevity of associated business opportunities cannot be guaranteed. For example, acquiring equipment for a one-off project may pose an unjustifiable financial risk. This uncertainty also hampers the reuse of building components, as the process is costly, and a single project is typically insufficient to justify the investment. Moreover, in public procurements, including circularity or sustainability criteria, SMEs have been observed to substantially inflate their bids to mitigate the risk of doing the work aligned with CE principles. These findings deepen the understanding of SMEs’ avoidance of high investments in CBMs that they deem unprofitable (Rosa & de Oliveira Paula, 2023), while linking the barrier closely to market-related barriers.

Financial Barriers Across Different CBMs

The identification of financial barriers was informed by explicit references to CBMs in the empirical data. These barriers are presented in Table 1, aligned with relevant CBM categories by Sitra & Deloitte (2022), namely “Circular Inputs,” “Product Life Extension,” and “Resource Recovery”, and supported by illustrative quotes that provide deeper insight into each barrier.

Table 1: Variation in financial barriers across CBMs.

CBM	Main Financial Barriers	Quote From the Data
Circular Inputs	Market related	“Customers do not want to pay more, and products with recycled material do cost more.”
	Knowledge related	“We would have to buy the carbon footprint service from a consultant. We don’t have that kind of expertise in-house.”
Product Life Extension	Market related	“The time is not ripe yet for acceptance of reused components.”

Continued

Table 1: Continued

CBM	Main Financial Barriers	Quote From the Data
Resource Recovery	Regulation induced	“Old products don’t automatically meet standards; the testing and certification process eliminates cost-efficiency.”
	Infrastructure and operational cost	“If we manage to dismantle something intact, where do we store and inspect it?”
	Risk and uncertainty related	“Circular procurement uncertainty leads to inflated bids to mitigate the risk.”
	Regulation induced	“Environmental permit processes are a big financial challenge, especially for small companies.”
	Infrastructure and operational cost	“Wood waste sent for energy production costs about €3 per ton, while recycling it costs about €63 per ton.”

The “Product as a service” business model was primarily mentioned through practical use experiences. As one respondent noted, *“Leasing is still quite new for us, and in many ways, it has served more as a way to avoid upfront investment rather than a real solution.”* By contrast, the “Sharing platforms” model was perceived as a promising avenue for advancing circularity across the sector. One participant emphasized, *“We already know how well recycling centers operate in general, but there should be one specifically for construction materials. A recycling center with an online marketplace linked to it. And if no one can make it work as a business, then it should be established with public support.”*

Although the statements do not explicitly reference financial barriers linked to specific CBMs, they nonetheless underscore important financial challenges, namely the inability to make substantial investments and skepticism regarding the economic viability of CBMs. Furthermore, an important notion from the collected data is the low level of knowledge about CBMs in the respondent group. CE was frequently understood only in terms of recycling, and firms often failed to identify circular practices within their own operations. This could indicate an inability to expand thinking to other CBMs and related financial barriers. Moreover, the occurrence of certain CBMs in the data may be explained by contextual factors, as Guerra et al. (2021) observed that CBMs based on waste as a resource, recovering materials, or using circular supplies are most frequently adopted by companies in the construction sector.

CONCLUSION

This paper examined the financial barriers faced by SMEs in adopting CBMs. Preliminary findings from the ongoing data analysis focused on financial barriers and revealed that these barriers extend beyond direct monetary limitations. They were broadly categorized to include market-related, knowledge-based, infrastructure and operational cost-related, regulatory,

and risk-associated factors, illustrating how financial considerations often underpin and intensify a wide range of other challenges. The findings also underscore that financial barriers are deeply intertwined with strategic choices, operational constraints, and innovation-related decisions.

The second part of the analysis examined how the identified barriers varied across CBM types. Financial barriers emerged for the *Circular inputs*, *Product life extension*, and *Resource recovery* business models, with market- and knowledge-related barriers dominating the first multiple barriers affecting the second, and regulation- and cost-related barriers limiting the third. The models, especially *Product-as-a-service* and *Sharing platform*, showed no distinct financial barriers, although responses regarding the use of these models still reflected limited investment capacity and skepticism about CBM viability. Overall, a narrow understanding of CE and sector-specific factors likely shapes both the observed distribution of CBMs and the financial challenges that SMEs face.

This paper has several limitations. The number of study participants was relatively small and sector specific, which may restrict the generalizability of the findings to other industries or contexts. The collected data relied on the respondents' subjective perceptions, many of whom demonstrated a limited understanding of CBMs, potentially affecting the identification of financial barriers. The categorization of barriers involved a degree of interpretive judgment, and the preliminary analysis findings might not have captured all relevant interactions or causal relationships. Finally, given the evolving nature of CBMs and market conditions, the observed barriers and their prevalence may change over time. Future research could extend this study to diverse industries and geographic contexts to distinguish between universally experienced barriers and those that are context specific. It could also investigate how SMEs' awareness of CBMs influences their recognition of barriers and adoption decisions while assessing which training or consultancy interventions most effectively enhance their capacity to evaluate and manage financial risks within the CBM framework.

ACKNOWLEDGMENT

This study was conducted within two projects that promote a circular economy in the real estate and construction (KIRA) sector for SMEs. The "KIVAKIRA – Circular Economy Driving Low-Carbon and Sustainable Real Estate and Construction Industry" project, co-funded by the EU via the Häme ELY Centre, develops and pilots a continuing education program on low-carbon and circular economy practices in the Kanta- and Päijät-Häme regions. The "Circular Economy Pilots – Advancing the Green Transition in the Real Estate and Construction Sector (CIRCULARPILOTS)" project, co-funded by the EU through the Regional Council of Häme, accelerates SMEs' transition to a carbon-neutral circular economy in Kanta-Häme by creating a replicable model for piloting circular solutions. The authors express their sincere gratitude to the managers of the 11 organizations who participated in the interviews and to the eight SMEs that responded to the online inquiry. Special thanks go to the faculty members and students of two

Finnish universities of applied sciences, HAMK and LAB, for their valuable assistance in the data collection.

REFERENCES

- AlJaber, A., Martinez-Vazquez, P., & Baniotopoulos, C. (2023). Barriers and enablers to the adoption of circular economy concept in the building sector: A systematic literature review. *Buildings*, 13(11), 2778. doi: 10.3390/buildings13112778.
- Assmann, I. R., Rosati, F., & Morioka, S. N. (2023). Determinants of circular business model adoption—A systematic literature review. *Business Strategy and the Environment*, 32(8), 6008–6028. <https://doi.org/10.1002/bse.3470>
- Braun, V., & Clarke, V. (2020). One size fits all? What counts as quality practice in (reflexive) thematic analysis? *Qualitative Research in Psychology*, 18(3), 328–352. <https://doi.org/10.1080/14780887.2020.1769238>
- Chakraborty, A., De, D., & Dey, P. K. (2025). Circular economy in small and medium-sized enterprises—Current trends, practical challenges and future research agenda. *Systems*, 13(3), 200. <https://www.mdpi.com/2079-8954/13/3/200>
- Chen, S., Eysers, D., Gosling, J., & Huang, Y. (2025). Supply chain risks for SMEs in construction projects: A structured literature review and research agenda. *The International Journal of Logistics Management*, 36(3), 747–774. <https://doi.org/10.1108/IJLM-12-2023-0548>
- Edmondson, A. C., & McManus, S. E. (2007). Methodological fit in management field research. *Academy of Management Review*, 32(4), 1155–1179. <https://doi.org/10.5465/amr.2007.26586086>
- Ellen MacArthur Foundation. (No date). The Circular Economy | Definition & Model Explained. <https://www.ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview> [Accessed 20 Oct. 2025].
- European Commission. (No date). Construction sector, Internal Market, Industry, Entrepreneurship and SMEs [Online]. https://single-market-economy.ec.europa.eu/sectors/construction_en (Accessed: 30 August 2025).
- García-Quevedo, J., Jové-Llopis, E., & Martínez-Ros, E. (2020). Barriers to the circular economy in European small- and medium-sized firms. *Business Strategy and the Environment*, 29, 2450–2464. doi: 10.1002/bse.2513.
- Ghisellini, P., Cialani, C., & Ulgiati, S. (2016). A review on circular economy: The expected transition to a balanced interplay of environmental and economic systems. *Journal of Cleaner Production*, 114, 11–32. doi: 10.1016/j.jclepro.2015.09.007.
- Guerra, B. C., Shahi, S., Mollaei, A., Skaf, N., Weber, O., Leite, F., & Haas, C. (2021). Circular economy applications in the construction industry: A global scan of trends and opportunities. *Journal of Cleaner Production*, 324, 129125. doi: 10.1016/j.jclepro.2021.129125.
- Harvey, W. S. (2011). Strategies for conducting elite interviews. *Qualitative Research*, 11(4), 431–441. <https://doi.org/10.1177/1468794111404329>
- Kabirifar, K., Mojtahedi, M., Wang, C., & Tam, V. W. Y. (2020). Construction and demolition waste management contributing factors coupled with reduce, reuse, and recycle strategies for effective waste management: A review. *Journal of Cleaner Production*, 263, 121265. doi: 10.1016/j.jclepro.2020.121265.
- Masi, D., Kumar, V., Garza-Reyes, J. A., & Godsell, J. (2018). Towards a more circular economy: Exploring the awareness, practices, and barriers from a focal

- firm perspective. *Production Planning & Control*, 29(6), 539–550. <https://doi.org/10.1080/09537287.2018.1449246>
- Nußholz, J. L. K. (2017). Circular business models: Defining a concept and framing an emerging research field. *Sustainability*, 9(10), 1810. doi: 10.3390/su9101810.
- Ormazabal, M., Prieto-Sandoval, V., Puga-Leal, R., & Jaca, C. (2018). Circular economy in Spanish SMEs: Challenges and opportunities. *Journal of Cleaner Production*, 185, 157–167. <https://doi.org/10.1016/j.jclepro.2018.03.031>.
- Pomponi, F., & Moncaster, A. (2017). Circular economy for the built environment: A research framework. *Journal of Cleaner Production*, 143, 710–718. doi: 10.1016/j.jclepro.2016.12.055.
- Purushothaman, R., Alamelu, R., & Sudha, M. (2025). Bridging the circular economy knowledge gap in SMEs: A systematic review of adoption barriers, implementation strategies, and theoretical insights. *Circular Economy and Sustainability*. <https://doi.org/10.1007/s43615-025-00680-7>.
- Rizos, V., Behrens, A., Kafyeke, T., Hirschnitz-Garbers, M., & Ioannou, A. (2021). Barriers and enablers for implementing circular economy business models in value chains. CEPS Research Report No. 2021/01. https://cdn.ceps.eu/wp-content/uploads/2021/10/RR2021-01_Barriers-and-enablers-for-implementing-circular-economy-business-models.pdf
- Rosa, B. O., & de Oliveira Paula, F. O. (2023). Circular economy adoption by European small and medium-sized enterprises: Influence on firm performance. *Revista de Gestão*, 25(3), 421–438. <https://rbgn.fecap.br/RBGN/article/view/4232>
- Sitra & Deloitte. (2022). Sustainable growth through circular business models—A guide for companies, Finnish Innovation Fund Sitra. <https://www.sitra.fi/wp/wp-content/uploads/2022/02/kestavaa-kasvua-kiertotalouden-liiketoimintamalleista-2-1.pdf> [Accessed 23 October 2025].
- Takacs, F., Brunner, D., & Frankenberger, K. (2022) Barriers to a circular economy in small- and medium-sized enterprises and their integration in a sustainable strategic management framework. *Journal of Cleaner Production*, 362, 132227. <https://doi.org/10.1016/j.jclepro.2022.132227>
- Touratier-Muller, N., Koporcic, N., Markovic, S., & Damjanović, V. (2025). Drivers and barriers to the adoption of circular business models in small- and medium- sized enterprises: A comparison study between developed and developing economies. *Business Strategy and the Environment*. Advance online publication. <https://doi.org/10.1002/bse.70098>
- United Nations Environment Programme. (2024). Global status report for buildings and construction: Towards a zero-emission, efficient and resilient buildings and construction sector. Nairobi: UNEP. <https://www.unep.org/resources/report/global-status-report-buildings-and-construction>
- Vermunt, D. A., Negro, S. O., Verweij, P. A., Kuppens, D. V., & Hekkert, M. P. (2019). Exploring barriers to implementing different circular business models. *Journal of Cleaner Production*, 222, 891–902. doi: 10.1016/j.jclepro.2019.03.052.
- World Bank. (2023). Small and Medium Enterprises (SMEs) Finance. <https://www.worldbank.org/en/topic/smefinance>