

# Deliberate steps towards a circular business model

A strategic roadmapping tool

**Deanna Han<sup>1,\*,+</sup>, Nancy Bocken<sup>1</sup>, Marc Dijk<sup>1</sup>,**

<sup>1</sup>Maastricht Sustainability Institute, School of Business and Economics, Maastricht University, Tapijn 11 Building D, P.O. Box 616, 6200 MD Maastricht, The Netherlands;

\*[d.han@maastrichtuniversity.nl](mailto:d.han@maastrichtuniversity.nl)

## Extended abstract

The circular economy (CE) is increasingly seen as an alternative paradigm to the current linear approach to the production and consumption of resources. The dominant linear economy has long been found to be detrimental to the environment, leading to ever-increasing issues around climate change, biodiversity and resource strains (Bocken et al., 2016a; Geissdoerfer et al., 2017). The circular economy concept of slowing, closing, narrowing, and regenerating resource loops has been adopted by businesses to tackle these increasing sustainability issues (Bocken et al., 2016b; Konietzko et al., 2023). The transition to a circular economy requires transformation at the system level in terms of flows of material, energy, knowledge and value (Geissdoerfer et al., 2017; Kanda, 2023). Such a transition is disruptive by nature. It requires a shift to new circular models, transforms the status quo and changes the nature of collaboration and competition (Geels & Kemp, 2007). In addition, such systemic change requires multiple actors, such as businesses and non-governmental organisations, cities and municipalities, and citizens, to interact in a complex multi-actor setting (Aarikka-Stenroos et al., 2021).

However, despite the excitement from practitioners and researchers, the implementation of CBMs is limited in business practice because of the need to change the key building blocks of the business, as well as the lack of support from the different actors in ecosystem (Ritala et al., 2018). Barriers to implementation may arise from both within and outside the

firm. The lack of technical know-how, organizational competencies and company culture are examples of such internal barriers from within the firm's boundaries (Bianchini et al., 2021). Within the institutional context, market volatility and supply chain vulnerability are known examples of external barriers to CBM implementation (Bianchini et al., 2021). However, a supportive ecosystem can be crucial in helping businesses overcome these internal and external barriers during their transition towards circularity. Ecosystem could provide critical resources for that transition such as physical infrastructure, knowledge, finance (Stam & van de Ven, 2021; Pankov et al. 2019).

To provide structure and guidance to businesses during the CBM innovation process and overcome internal and external barriers, a wide range of methods and tools have been developed by scholars and practitioners in recent years to “operationalize” the circular economy concept (Bocken et al., 2019; Pieroni et al., 2019). Despite the emergence of a plethora of tools for CBM innovation in the last decade, research on tool development highlights that many of these tools are not used in practice, which may be due to the lack of transparency in the tool development process and limited testing with potential users of the tools (Bocken et al., 2019). The current arsenal of CBM tools comes in different forms (e.g., checklist, guidelines) for different innovation levels (i.e., product design, system-level transformation) and can be specific or generalisable to different contexts (e.g., business model canvas by Osterwalder and Pigneur, 2010). An evaluation of different CBM tools highlighted that most known tools to date are qualitative, with an overwhelming emphasis on the ideate and design phases (Bocken et al., 2019). Some exceptions include Mendoza et al. (2017) who created a backcasting eco-design tool that covers all three phases of CBM innovation: ideate and design, implement and test, evaluate and improve. Despite these few examples, there is a lack of tools that can encompass all CBM innovation phases and the unique challenges that may occur at each phase. Moreover, a tool that could also address the other aspect of CBM innovation — the internal ‘change management’—as well as novel collaborations towards circular business models and value chains, would be relevant (Bocken et al., 2019). However, some tools have focused on circular collaboration (e.g., Brown et al., 2021a, b) or organizational aspects of sustainable business model innovation (Coffay & Bocken, 2023).

To address these joint aspects, we propose a strategic roadmapping tool for CBM innovation that can articulate the immediate steps to realise CBM by mapping resource endowments from ecosystem actors. The idea of a roadmap has been around for two decades (Kerr & Phaal, 2014), although it has been used often in approaches that focus on technology and innovation development. Its use for a specific business model innovation context is rare (e.g., Frishammar & Parida, 2018). Furthermore, roadmapping is typically used as an ad-hoc tool for project management and strategic planning rather than an integral part of strategy-making and business model design (Hedman & Kalling, 2003). De Reuver et al. (2013) designed a roadmapping tool grounded in concepts from technology roadmapping and business management literature. Their tool is targeted at organisations

that wish to change their existing business model to a desired one. Although sustainability or circularity was not explicitly mentioned by De Reuver et al. (2013), this roadmapping tool may be applicable to any cases where radical changes are required in the business model. There are several potential merits of using a roadmapping tool for circular business model innovation (Frishammar & Parida., 2018; De Reuver et al., 2013). First, the roadmapping tool is a visual aid that can make explicit how operational actions and business model impacts are interrelated. Second, it can help identify and discuss trade-offs between strategic business model issues and operational activities. Third, the roadmapping tool is familiar to practitioners, similar to the widely used business model canvas (Osterwalder and Pigneur, 2010), but with the added value of considering the network of organizations that are involved in providing that service (De Reuver et al., 2013). The main research question addressed in this research is: *How can a circular business model innovation roadmapping tool help companies transition towards circularity?*

The *Circular Business Model Innovation Roadmapping Tool* (Figure 1) is developed by combining different elements from roadmapping, business model and circular economy literature, as well as some core business model elements relating to change domains. First, the roadmap is based on de Reuver et al. (2013)'s roadmap as the starting point. Second, the business model assessment elements *desirability, feasibility, viability, and circularity* are used as checkpoints (Baldassarre et al., 2020; Bocken et al., 2022). Third, concepts from the emerging circular ecosystem studies were added to include the perspectives of ecosystem actors and their resource endowments (Aarikka-Stenroos et al., 2021; Klofsten et al., 2024). Finally, the core business model change domains of **service, technology, organisation, and finance** are based on Bouwman et al. (2008)'s STOF model with service as the unit of analysis and consider the network of organizations that are involved in providing that service. The *service domain* is particularly useful as CBMs benefit more from a systematic lens. For example, product service systems (PSS) such as bike rental platforms would require a network of organisations (i.e., bike repair, logistics etc.) to deliver the full value of that service (Mont & Tukker, 2006). Regarding the *technology domain*, the STOF model also makes explicit the role of technology in developing circular business models (e.g., ICT services) (Bouwman et al., 2008). The *organization domain* deals with the resources and capabilities required to enable the service within an organization or partners (Tapscott et al., 2000). The emerging dynamic capabilities research for CBM can offer unique insights in this domain (i.e. Khan et al., 2020; Scarpellini et al., 2020). The *finance domain* specifies elements such as pricing and revenue models. The second layer in the roadmap involves the activities that need to be executed in order to realize the changes in the business model domains. A final element that is unique to this roadmap is the timescale of, current, near and far future. Contrary to the timescale of next 2 years, 5 year and 10 years, we usually observe in other roadmapping tools, the temporal dimension is kept deliberately vague. The concept of near and far futures was used here to articulate the varied level of risks, complexity and uncertainties (Augustine et al., 2019). The near future

is seen as the logical extension of present and past experiences. The perceived uncertainties remain low. When uncertainties and the level of predictability are high, the far future scenario is used. In a CBM context, 'near future' can mean changes in technologies, such as digitalisation. The far future is seen as a leap from the current experience, with imagination based on ideologies and desired identities (Augustine et al., 2019). An example of the far future for circular businesses would be to imagine a scenario where there is a paradigm shift in consumption behaviour where circularity is considered a dominant way to production and consumption. The transition to a circular business model must also adapt to the rapidly changing ecological, economic, and social context. How a stakeholder perceives risks and uncertainties cannot be predetermined within a set time range. Therefore, the concepts of near and distant future are a more appropriate term to describe temporality for the roadmapping tool.

It is vital that the roadmapping process can be digitalised to capture the social and cognitive characteristics derived from the use of workshops and the application of simple and visual tools that make roadmapping unique compared to other management approaches (Kerr and Phaal, 2015). The tool will be developed on the digital platform Miro, to remove the geographic constraints of physical workshops. Digitalisation can highlight the people-centric perspective of the roadmapping tool by allowing the circular business entrepreneurs and ecosystem actors to use the tool simultaneously (de Oliveira et al., 2022).

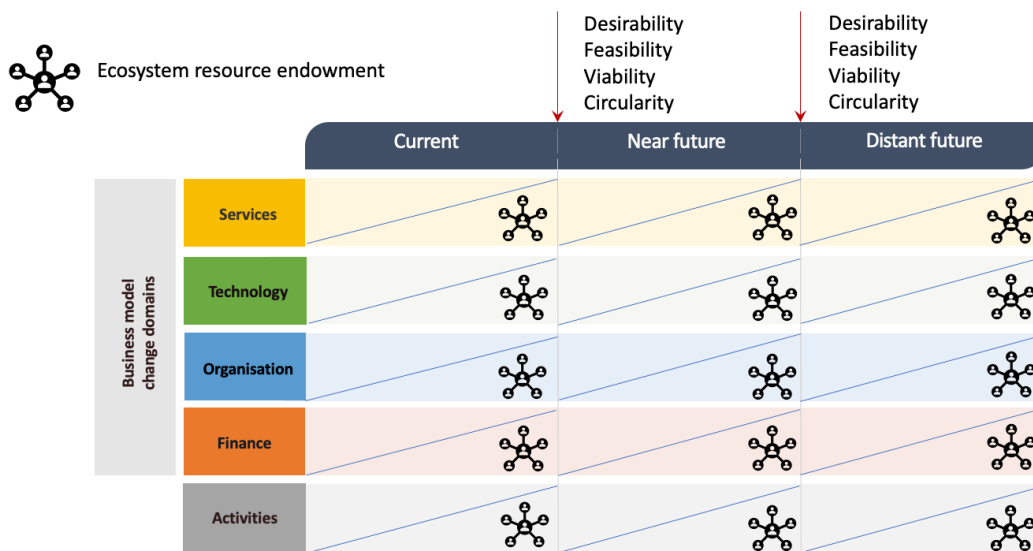


FIGURE 1: CIRCULAR BUSINESS MODEL INNOVATION ROADMAPPING TOOL (BASED ON DE REUVER ET AL., 2013).

The goal of the tool is to help companies make deliberate steps in changing their existing business model to a circular one by mapping their supportive ecosystem. The intended user groups include entrepreneurs, innovation managers, business managers, ecosystem actors and designers who want to implement CBM in their organisations. The tool should contain guidance on how it can be used, be adaptable to different contexts (Bocken et al., 2019), and be easy to use. We evaluate the Roadmapping tool based on the checklist for CBMI tool development (Bocken et al., 2019). To improve the Roadmapping tool, we plan to conduct workshops and disseminate post-workshop surveys and present a final Roadmap based on repetitive testing with intended user groups in different sectors, at different stages of their circularity journey.

The practical value of this tool is to help established firms transform their business models to incorporate circularity at a nascent stage. The goal of this work is to study *how* this circular transformation process takes place in practice. It should be particularly useful if an organization that still has to choose between different alternative CBMs (i.e., different circular strategies). The Roadmapping tool may help to identify overlapping paths, path dependencies and points of no return.

## Keywords

Circular business model, sustainable business model, tools, roadmapping, circular ecosystem, business ecosystem.

## References

- Augustine, G., Soderstrom, S., Milner, D., & Weber, K. (2019). Constructing a distant future: Imaginaries in geoengineering. *Academy of Management Journal*, 62(6), 1930-1960.
- Baldassarre, B., Konietzko, J., Brown, P., Calabretta, G., Bocken, N., Karpen, I. O., & Hultink, E. J. (2020). Addressing the design-implementation gap of sustainable business models by prototyping: A tool for planning and executing small-scale pilots. *Journal of Cleaner Production*, 255, 120295.
- Bianchini, A., Rossi, J., & Pellegrini, M. (2019). Overcoming the main barriers of circular economy implementation through a new visualization tool for circular business models. *Sustainability*, 11(23), 6614.
- Bouwman, H, T Haaker and H De Vos (2008). *Mobile Service Innovation and Business Models*. New York: Springer.

- Brown, P., Baldassarre, B., Konietzko, J., Bocken, N., & Balkenende, R. (2021a). A tool for collaborative circular proposition design. *Journal of Cleaner Production*, 297, 126354.
- Brown, P., Von Daniels, C., Bocken, N. M. P., & Balkenende, A. R. (2021b). A process model for collaboration in circular oriented innovation. *Journal of Cleaner Production*, 286, 125499.
- Bocken, N., Miller, K., & Evans, S. (2016a). Assessing the environmental impact of new Circular business models. *Proceedings of the "New Business Models"—Exploring a Changing View on Organizing Value Creation, Toulouse, France, 1*, 16-17.
- Bocken, N. M., De Pauw, I., Bakker, C., & Van Der Grinten, B. (2016b). Product design and business model strategies for a circular economy. *Journal of industrial and production engineering*, 33(5), 308-320.
- Bocken, N., Strupeit, L., Whalen, K., & Nußholz, J. (2019). A review and evaluation of circular business model innovation tools. *Sustainability*, 11(8), 2210.
- Bocken, N. M., Harsch, A., & Weissbrod, I. (2022). Circular business models for the fastmoving consumer goods industry: Desirability, feasibility, and viability. *Sustainable Production and Consumption*, 30, 799-814.
- Coffay, M., & Bocken, N. (2023). Sustainable by design: An organizational design tool for sustainable business model innovation. *Journal of Cleaner Production*, 427, 139294.
- De Reuver, M., Bouwman, H., & Haaker, T. (2013). Business model roadmapping: A practical approach to come from an existing to a desired business model. *International Journal of Innovation Management*, 17(01), 1340006.
- de Oliveira, M. G., Routley, M., & Phaal, R. (2022). The digitalisation of roadmapping workshops. *Journal of Engineering and Technology Management*, 65, 101694.
- Frishammar, J., & Parida, V. (2019). Circular business model transformation: A roadmap for incumbent firms. *California Management Review*, 61(2), 5-29.
- Geissdoerfer, M., Pieroni, M. P., Pigosso, D. C., & Soufani, K. (2020). Circular business models: A review. *Journal of cleaner production*, 277, 123741.
- Hedman, J., & Kalling, T. (2003). The business model concept: theoretical underpinnings and empirical illustrations. *European journal of information systems*, 12(1), 49-59.
- Kanda, W. (2023). Systems and Ecosystems in the Circular Economy: What's the Difference?. *Circular Economy*, 1(3), 1-10.
- Kerr, C., Phaal, R., & Probert, D. (2012). Cogitate, articulate, communicate: The psychosocial reality of technology roadmapping and roadmaps. *R&D Management*, 42(1), 1-13.

- Kerr, C., & Phaal, R. (2021). Roadmapping and roadmaps: Definition and underpinning concepts. *IEEE Transactions on Engineering Management*, 69(1), 6-16.
- Khan, O., Daddi, T., & Iraldo, F. (2020). The role of dynamic capabilities in circular economy implementation and performance of companies. *Corporate Social Responsibility and Environmental Management*, 27(6), 3018-3033.
- Konietzko, J., Das, A., & Bocken, N. (2023). Towards regenerative business models: A necessary shift?. *Sustainable Production and Consumption*, 38, 372-388.
- Mendoza, J. M. F., Sharmina, M., Gallego-Schmid, A., Heyes, G., & Azapagic, A. (2017). Integrating backcasting and eco-design for the circular economy: The BECE framework. *Journal of Industrial Ecology*, 21(3), 526-544.
- Mont, O., & Tukker, A. (2006). Product-Service Systems: reviewing achievements and refining the research agenda. *Journal of Cleaner Production*, 14(17), 1451-1454.
- Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: a handbook for visionaries, game changers, and challengers* (Vol. 1). John Wiley & Sons.
- Pieroni, M. P., McAloone, T. C., & Pigosso, D. C. (2019). Business model innovation for circular economy and sustainability: A review of approaches. *Journal of cleaner production*, 215, 198-216.
- Scarpellini, S., Marín-Vinuesa, L. M., Aranda-Usón, A., & Portillo-Tarragona, P. (2020). Dynamic capabilities and environmental accounting for the circular economy in businesses. *Sustainability Accounting, Management and Policy Journal*, 11(7), 1129-1158.
- Susur, E., & Engwall, M. (2023). A transitions framework for circular business models. *Journal of Industrial Ecology*, 27(1), 19-32.
- Tapscott, D., Ticoll, D., & Lowy, A. (2000). Digital capital: Harnessing the power of business webs. *Ubiquity*, 2000(May), 3-es.