

Is There a Circular Economy Business Model That can be Easily Implemented?

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Abstract: Strategic management, operations management, and technology management are just a few of the areas where the circular economy concept is gaining more and more attention. It requires that businesses create their business models around a new idea of sustainable development that reduces resource consumption and protects the environment. This includes the value network, interactions with supply chain partners, and value offerings to customers. Existing research, however, falls short of fully describing how businesses design their business models in accordance with the concepts of the circular economy. This paper presents an overview of the current business models of the circular economy.

Keywords: circular economy, business model, value, environment, strategic management

1. Introduction

The most developed economies in the world and, more recently, some of the biggest businesses worldwide, are adopting this model more frequently. The three guiding principles of this concept, 3R (reducing, reusing, and recycling), speak to its core. The circular economy concept has both economic and environmental implications as its end result. cost-saving measures include resuming the manufacture of used materials and lowering trash production, which has a positive influence on the environment.

In the process of implementing the circular economy, certain business models or circular business models are available to states. Business models by definition are instruments that understand how a company operates, and can be used for various analysis, comparisons and performance evaluations [1].

In order to apply the circular economy, managers had to apply certain managerial practices, and at the same time include: value creation, value transfer and capture value. There are three factors that are important when applying the circular economy, the first factor is the role of policy makers or international institutions, the second factor is to support the creation, transfer and capture of value in the circular economy, it is important to understand the importance of Industry 4.0 which could be supports the implementation of the circular economy and the third factor is that the implementation of the circular economy requires constant monitoring of the achieved goals of the circular economy. [2]

When we discuss the main challenges to the practical application of the circular economy, we primarily refer to the scarcity of accurate data and information, the absence of cutting-edge technologies, the lack of strong or even nonexistent economic incentives, the poor application of laws, the management and management of the development strategy, the lack of public awareness of the benefits and promises of the circular economy, and the absence of a comprehensive circular system for evaluating the effects of the circular economy. [3] As for the design of circular business models, the existing literature has identified several business activities related to the circular economy and some guidelines on how to adapt the existing business model to this "newly composed" business model. While existing business model frameworks can be used to apply circular economy principles, hardly any study has identified how circular economy principles can be applied to each component of a business model framework. Therefore, there is a need for a comprehensive conceptual framework for a circular business model that would support practitioners in the transition of their jobs to a circular economy. [4]

Value creation, value transfer, and value capture are the three basic conceptual categories that appear in the literature. If we take into account these dimensions of the circular economy, the question arises whether it is possible to define all the actions that a nation or company needs to take in order to introduce a circular economy?

2. Business model canvas vs Circular Business model canvas

2.1 Business model canvas

A business model simply explains how an organization creates value, delivers it to customers, and captures value for itself (Osterwalder and Pigneur, 2010). A business model is one of the critical topics that deals with creating a business model and transitioning from an existing model to a new one (De Reuver, Bouwman and Haaker, 2013; Murray and Scuotto, 2016). One of the practical and strategic questions is the transition to a new business model, which means that existing value propositions for clients need to be replaced with new ones, how to acquire new resources and capabilities, and whether to start or terminate partnerships (De Reuver, Bouwman and Haaker, 2013). Certain authors have utilized the business model canvas to develop strategies for business growth. The business model canvas and SWOT analysis were employed. By using these two tools, weaknesses and threats were leveraged to create an appropriate strategy (Mustaniroh, Prabaningtias and Citraresmi, 2020). Based on this study, it is clear that a business model does not have to be standalone; it can also be used to create better strategies for strengthening a company's position.

2.1.2 The Framework of the Business Model Canvas

A popular framework for organizing business models is the Business Model Canvas (BMC), which was developed by Osterwalder and Pigneur is presented in the following figure. The BMC consists of nine building blocks that focus on different aspects of how value is created, delivered, and captured.

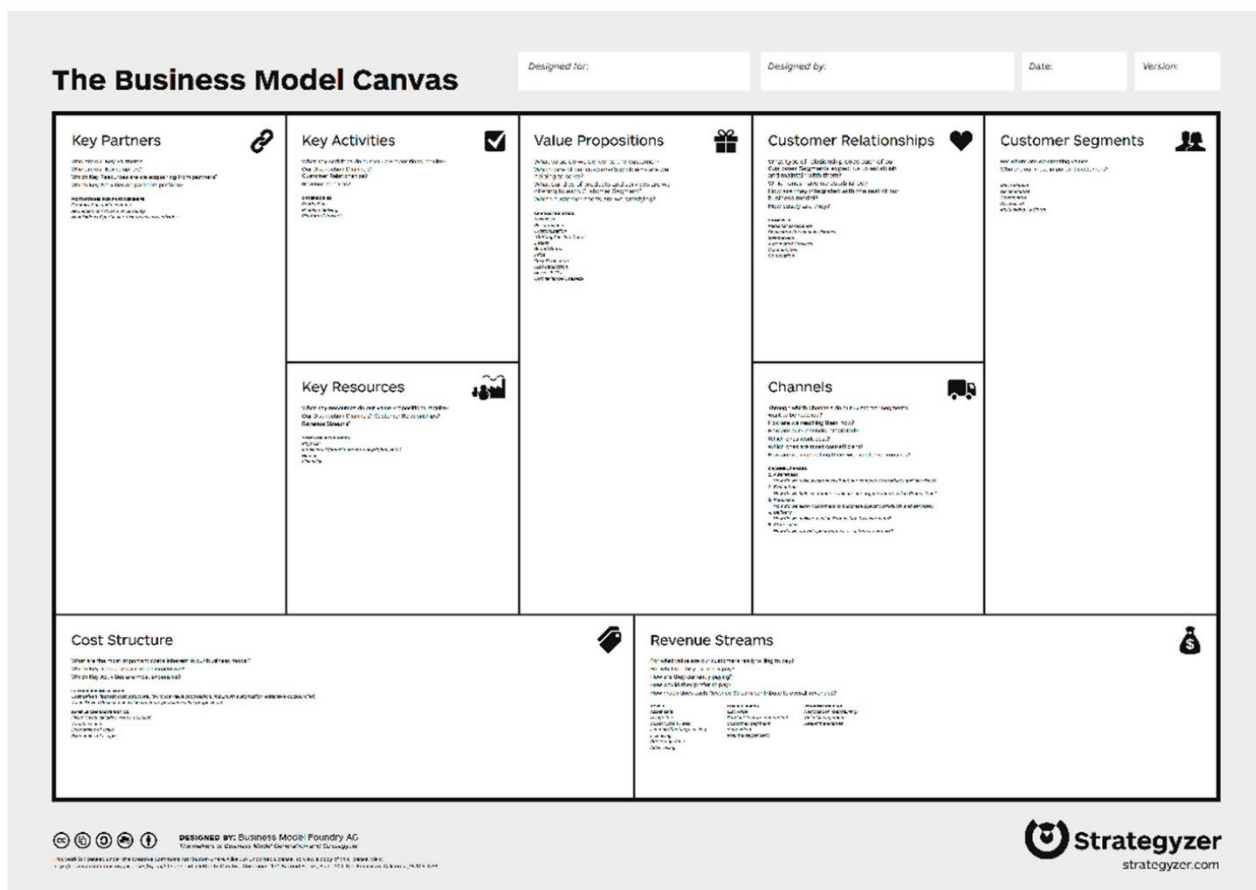


Figure 1 A framework of the Business Model Canvas(Osterwalder and Pigneur, 2010)

- Customer Segments: For whom is the organization creating value? What products and services are the organization offering to each customer segment?
- Value Proposition: What value is the organization delivering to its customers? Which customer pain-points are the organization addressing?
- Channels: Which channels are the organization using to reach the desired customer segments? How are those channels integrated? Which ones are the most cost-effective?

- Customer Relationships: What type of relationship does the organization maintain with each customer segment? What are the expectations of the customers? How does the organization establish those relationships?
- Revenue Streams: How does the organization make money? Who are the customers willing to pay and for what benefit? How do they prefer to pay? How are they currently paying? How does each stream add up to the total revenue, i.e., asset sale, subscription fees, leasing, licensing, advertising, etc.?
- Key Activities: What are the key activities the organization's value proposition require?
- Key Resources: What key resources does the organization's value proposition require?
- Key Partners: The organization's key partners and suppliers. Which key resources does the organization acquires from them? Which key activities does the organization's partners perform?
- Cost Structure: What are the most important cost drivers in the organization's business model? Which key resources and activities are most expensive?

This structure of the BMC allows organizations to develop innovative business models by redesigning the contents of any one of its nine blocks to uncover new business opportunities and turn customers' needs into profitable activities. (Giourka *et al.*, 2019)

2.2 The Framework of the Circular Business Model Canvas

The circular business model canvas builds on and adapts the traditional business model canvas developed by (Osterwalder and Pigneur, 2010), incorporating principles of the circular economy. It consists of 11 components, one of which includes three sub-components. These building blocks help design business models aligned with circular economy principles and include:

1. Value propositions: Circular products that enable product-life extension, product-service systems, virtualized services, and collaborative consumption. This component also includes incentives for customers to return used products.
2. Customer segments: Directly linked to the value propositions, focusing on aligning offerings with specific customer needs and preferences.
3. Channels: Can be virtual, enabling the sale and delivery of virtualized value propositions, or using virtual channels for non-virtual products and customer communication.
4. Customer relationships: Emphasizes production based on customer demand, social marketing strategies, and collaboration with community partners, especially when implementing advanced recycling systems (Recycling 2.0).
5. Revenue streams: Based on circular products or services, with payments tied to availability, usage, or performance. Additional revenue may come from the value of resources recovered from material loops.
6. Key resources: Focuses on sourcing better-performing materials, virtualizing resources, regenerating natural capital, and using resources from customers or third parties to maintain closed material loops.
7. Key activities: Aims to boost performance through efficient practices, technological upgrades, product redesign for better recyclability, and eco-friendliness. It may also involve advocacy and lobbying.
8. Key partnerships: Collaborating with value and supply chain partners who support circular economy initiatives.
9. Cost structure: Reflects financial implications of the circular model, including customer incentives. It requires special evaluation criteria and accounting methods.
10. Take-back system: Designing systems for managing product returns, including associated channels and customer interactions.
11. Adoption factors: Successful transition to a circular business model depends on organizational capabilities and external support factors.
12. These components ensure that the circular business model integrates sustainability throughout the value chain. (Lewandowski, 2016)

Partners • Cooperative networks • Types of collaboration	Activities • Optimising performance • Product Design • Lobbying • Remanufacturing, recycling • Technology exchange	Value Proposition • PSS • Circular Product • Virtual service • Incentives for customers in Take-Back System	Customer Relations • Produce on order • Customer vote (design) • Social-marketing strategies and relationships with community partners in Recycling 2.0	Customer Segments • Customer types
	Key Resources • Better-performing materials • Regeneration and restoring of natural capital • Virtualization of materials • Retrieved Resources (products, components, materials)		Channels • Virtualization	
	Take-Back System • Take-back management • Channels • Customer relations			
Cost Structure • Evaluation criteria • Value of incentives for customers • Guidelines to account the costs of material flow			Revenue Streams • Input-based • Availability-based • Usage-based • Performance-based • Value of retrieved resources	
Adoption Factors • Organizational capabilities • PEST factors				

Figure 2 A framework of the circular business model canvas (Lewandowski, 2016)

3. Value creation bases

The concept of the "power of the inner circle" emphasizes prolonging the lifespan of products, ideally with the original owner or user. This involves ensuring products remain functional through straightforward maintenance, repairs, and updates. Effective product design and supportive business models are crucial to maximizing this opportunity. The inner circles of reuse and maintenance offer significant potential for profitability, as they yield greater savings in materials, labor, energy, and capital, while also reducing environmental impacts such as greenhouse gas emissions and resource consumption. (MacArthur, 2013)

The "power of circling longer" focuses on extending the number of consecutive cycles a product can go through and maximizing the duration of each cycle. For durable goods like cars, manufacturers can achieve this by ensuring long initial use through high-quality production, easy repairs, upgrades, or service programs that keep the product in excellent condition. Once the product's first life ends, it can continue serving subsequent users, benefiting from the same support systems. Eventually, the product can be repurposed for spare parts or its components can be reused to create new products. This approach aligns with the principle of cascaded use, which involves maximizing value extraction from products and materials. For consumables, different strategies may be more suitable. For instance, while soft drink cans or bottles have short lifespans with users, resource optimization can still be achieved by selecting the right packaging materials and implementing efficient return systems. Glass bottles, for example, can be reused about 27 times before recycling, while aluminum cans are typically recycled after a single use. However, due to material losses during each recycling loop, even at a 50% recycling rate, the original aluminum is lost after 17 cycles. Increasing the recycling rate to 90% extends this to 35 cycles. Despite practical considerations such as convenience, glass offers superior resource conservation in comparison. (MacArthur, 2013)

For energy-consuming products, the environmental benefits of repairing versus replacing must be weighed against the improved energy efficiency of newer models. For example, white goods like refrigerators, freezers, washing machines, and dishwashers with an energy efficiency rating of B or better should generally be repaired rather than replaced, as this yields better environmental performance. However, products with a C rating or lower should be replaced with more efficient models. For mobile air-conditioning units and tumble dryers, a C rating or better is sufficient to justify repairs over replacement. (MacArthur, 2013)

The "power of cascaded use" is another principle companies can leverage in circular business models. This involves diversifying the reuse of products and materials across different industries. Textiles illustrate this well: clothing can first be reused as second-hand apparel, then repurposed as upholstery in the furniture industry, and eventually used as insulation material in construction. Each step reduces the need for virgin materials, cutting raw material costs for businesses. (MacArthur, 2013)

Lastly, the "power of pure circles" emphasizes the importance of uncontaminated material streams to preserve material quality over multiple cycles. Using cleaner, purer materials aligns with established ecodesign principles and remains crucial for maintaining the sustainability of circular systems. (MacArthur, 2013; Guldmann, 2016; Widmer, 2016)

3.1 Five distinct types of circular business models

Drawing from an analysis of over 120 circular economy case studies across industries such as high-tech, textiles, automotive, and consumer goods, has identified five key types of circular business models. These models are: circular supplies, resource recovery, product life extension, sharing platforms, and product-as-a-service. Each represents a distinct approach to embedding circular economy principles into business operations. (Lacy, 2014)

On the following image, we can see how the circular business model connects with these four value bases. The left side outlines these value bases, while the top row lists the five generic business models, starting with "circular supplies." The colored sections highlight shared principles between the value bases proposed by the (MacArthur, 2013 and the business model archetypes identified by Lacy, 2014.

Table 1 Interlinkages between five business models and four principles of value creation. (Guldmann, 2016)

	Circular supplies	Resource recover	Product life extension	Sharing platforms	Product as a service
Inner circle					
Circling longer					
Cascaded use					
Pure circles					

Lacy, 2014 outlines five distinct circular business models, each aligned with core principles of circular value creation:

1. **Circular Supplies:** This model focuses on replacing scarce resources with renewable, recyclable, or biodegradable materials while minimizing waste and inefficiencies. It is particularly relevant for industries with a significant environmental footprint and is closely linked to the principles of *circling longer* and *pure circles*.
2. **Resource Recovery:** Emphasizing the capture of embedded value from end-of-life products, this model leverages innovative recycling and upcycling processes, such as industrial symbiosis and Cradle-to-Cradle certified systems. It aligns with the principles of *pure circles*, *circling longer*, and *cascaded use*.
3. **Product Life Extension:** This model extends the lifecycle of products through repair, upgrades, remanufacturing, and resale. It is particularly suitable for capital-intensive industries and consumer markets where new product iterations offer marginal performance improvements. The value creation is grounded in the principles of the *inner circle* and *circling longer*.
4. **Sharing Platforms:** By facilitating the shared use of underutilized products or assets, this model promotes increased productivity and efficiency. It is commonly adopted by companies that do not manufacture the shared products themselves but can also be relevant for manufacturers. This model supports the principles of the *inner circle* and *circling longer*.
5. **Product as a Service:** Offering products through leasing or pay-per-use arrangements, this model ensures product durability and upgradability. It transforms traditionally perceived risks, such as product longevity and reusability, into revenue-generating opportunities. This approach aligns with the principles of the *inner circle* and *circling longer*.

These models provide a structured framework for integrating circular economy principles into business operations, highlighting opportunities for sustainable value creation. (Lacy, 2014)

4. Conclusion

The Circular Economy (CE) has proven successful in engaging the business community with sustainable development initiatives. The concept is compelling because it recognizes the inherent value of natural resources. Rather than using these resources just once, as is common in the traditional linear economic model, CE encourages their repeated use, adding value through multiple cycles. This approach not only makes sound business sense but also offers a clear environmental advantage. By maximizing the utility of resources, companies reduce the need for virgin materials, thereby minimizing waste and emissions associated with production processes. This cyclical use of resources aligns economic activities with sustainability goals, making it a rational and strategic choice for businesses. (Korhonen, Honkasalo and Seppälä, 2017)

While the circular economy presents exciting opportunities, it is not without its challenges. One of the main barriers to implementing a circular business model is the need for collaboration and systemic change across the value chain. Transitioning to a circular economy requires cooperation among multiple stakeholders, including manufacturers, suppliers, distributors, consumers, and policymakers. This level of collaboration can be complex and challenging, as it involves rethinking traditional business relationships, supply chains, and regulatory frameworks.

Another challenge lies in the economic viability of circular business models. Implementing circular practices often requires upfront investments in infrastructure, technology, and new business processes. These costs can be a deterrent for companies, particularly small and medium-sized enterprises (SMEs) with limited financial resources. Overcoming this barrier requires financial incentives, supportive policies, and access to funding mechanisms that encourage and reward circular practices.

Furthermore, consumer behavior and attitudes play a significant role in the success of the circular economy. While there is a growing awareness and demand for sustainable products and services, consumer preferences and behaviors are still largely influenced by convenience, affordability, and short-term value. Shifting consumer perceptions and behaviors towards a circular mindset requires education, awareness campaigns, and clear communication about the environmental and economic benefits of the circular economy.

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