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From Linear Consumption to Circular Value Creation: Advancing Sustainability Through Circular Economy Practices

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Abstract

This paper investigates the role of the circular economy (CE) in advancing sustainability, focusing on how circular models can drive environmental, economic, and social benefits by minimizing waste, conserving resources, and promoting regenerative practices. The study reviews core CE strategies such as product lifecycle extension, resource recovery, and sustainable material sourcing and assesses their effectiveness in achieving sustainable development goals (SDGs). Through industry case studies and policy analyses, it identifies key challenges, including financial, regulatory, and cultural barriers that hinder CE adoption. This paper highlights the need for collaborative frameworks, supportive government policies, and innovative business models to enable a transition from linear to circular systems, emphasizing that CE is not only essential for reducing environmental impact but also crucial for building resilient, sustainable economies. The findings underscore the importance of CE as a fundamental approach to sustainability and climate resilience.

Keywords: Circular economy, sustainability, SDGs, climate change, waste management, circular transition

Introduction

Industrialization, urbanization and global consumption have put a huge strain on nature and ecosystems. Traditional economic systems are essentially linear, and are often referred to as the “take–make–dispose” model, whereby raw materials are extracted, used to create products and then thrown away as waste after use. This model has been beneficial for economic growth and technological advancements for many years but has also resulted in serious environmental problems like waste accumulation, pollution, depletion of resources and climate change (Geissdoorfer et al., 2017). With the population and economy growing, demand for resources on the planet is also increasing, and the limitations of linear economic systems are becoming more apparent. Thus, there is a current effort to find alternatives that are sustainable and can offer a balance between economic development and protecting the environment and society.

In such a scenario, the CE is now appearing as a paradigm to boost ecological production and consumption. The circular economy is a transition from a traditional linear economy to a regenerative economy that aims to use resources more efficiently and reduce waste by reusing, recycling, remanufacturing and repairing (Kirchherr et al., 2017). Circular systems seek to keep materials, products and resources in the economy for as long as possible, rather than as a by-product of economic activity. The idea is to encourage closed-loop supply chains, where materials are continuously cycled back through the system, minimizing the need for additional resource extraction and decreasing environmental impacts.

The idea of CE has received significant interest in academia and policy arena in the last decade. Researchers have pointed out that CE principles can play an important role in environmental sustainability by minimizing waste, saving natural resources and decreasing greenhouse gases (Ghisellini et al., 2016). The CE provides significant economic advantages, driving innovation, maximizing resource use and generating new markets, including recycling and remanufacturing. Also, social benefits are to be found in the creation of jobs, in the involvement of the community in resource recovery projects and in the encouraging of responsible consumption habits (Murray et al., 2017).

The CE also fits hand in hand with the United Nations Sustainable Development Goals (SDGs), in particular SDG12 Responsible consumption and production, SDG13 Climate action and SDG11 Sustainable industrial development. The circular economy strategies, for example, promote responsible consumption and production (SDG 12) both by optimizing the use of resources and by minimizing waste. Likewise, the practice of circularity can help achieve SDG 13 (Climate Action) by reducing carbon emissions in extraction and production processes, and SDG 9 (Industry, Innovation and Infrastructure) through sustainable industrial systems and innovative business models (United Nations, 2015). Governments and international organisations are both looking to accelerate progress towards these global sustainability targets and circular economy principles are being adopted on the national agenda, in corporate sustainability strategies and in global environmental programmes.

Although transitioning to a circular economy is becoming more essential, it is a complex and multidimensional process. The process of implementing a circular approach can be challenging for many organisations when trying to work circularly in their production and supply chain. Implementation of circular economy strategies on a large scale is often constrained by financial, technological, policy and consumer awareness factors (Kirchherr et al., 2018). Furthermore, traditional business models are widely incorporated in linear production processes, which also makes it hard for companies to change their production processes, products, and supply chains to include circular principles.

Collaborative governance and stakeholder engagement is another key challenge. Achieving circular economy practices needs everyone, from the government, industry, research institutions, and consumers to work together. Governments are key actors in creating regulatory frameworks, economic incentives and infrastructure that enable circular initiatives (Altin et al., 2023). Entrepreneurs need to also involve in creative circular business models like product-as-a-service, closed-loop supply chain, sustainable material sourcing, etc. to improve the efficiency of using resources and minimize the environmental footprint. Furthermore, consumers are key enablers of demand for sustainable products and engage in recycling and resource recovery systems.

In the context of the need for sustainable economic development and the need to mitigate environmental damage, there is an increased demand for research that looks at the effectiveness of the measures taken in the field of CE and how these measures contribute to reaching sustainability. Although several aspects of circular economy practices have been studied before, more research is needed to assess whether and how the three key strategies of circular economy (product lifecycle extension, resource recovery, sustainable material sourcing) can lead to environmental, economic and social sustainability outcomes. Furthermore, understanding the obstacles and constraints in the way of circular economy's adoption and analyzing the role of policy and governance frameworks are crucial to the transition towards sustainable economic systems.

The study, in the context of this, examines circular economy strategies and their contribution to sustainable development, and introduces key circular strategies. The research focuses on exploring the potential of circular economy models to contribute to resource efficiency, minimize environmental footprint, and generate economic value, by examining case studies and policy frameworks from the industry. Moreover, the study outlines major financial, regulatory and cultural challenges that hinder the implementation of circularity and makes recommendations for the need for collaborative approaches and for policies that can help shift from linear to circular economic models. This research builds on existing literature on sustainability transitions and highlights the significance of circular approaches in fostering resilient and sustainable economies, as it offers a holistic overview of different CE strategies and their implications for sustainability.

Literature Review

Evolution of the Circular Economy(CE)

The CE concept has become a paradigm shift towards overcoming the environmental and economic shortcomings of the linear production model. Economic systems have traditionally been based on a “take–make–dispose” system of extracting natural resources, manufacturing goods or services, and then discarding the

waste. This model has contributed to the development of industries and technologies, but also created many environmental problems, such as depletion of resources, overproduction of waste, environmental degradation, etc. (Geissdoerfer et al., 2017). The problems have forced researchers and policy makers to seek more viable economic models that can facilitate sustainable resource use and ecological equilibrium.

The CE has its roots in several previous sustainability terms such as “industrial ecology”, “cradle-to-cradle design”, “regenerative economy” and “closed-loop supply chain” (Ghisellini et al., 2016). In this regard, these frameworks place great importance on waste reduction and maximising resource efficiency by changing production and consumption patterns in a systemic manner (van Buren et al., 2016). For example, industrial ecology is about the development of industrial systems that mimic natural ecosystems in which waste from one process is used as input for another (Graedel & Allenby, 2010). Likewise, the cradle to cradle approach encourages a design that allows for products to be fully reused or returned to the environment without creating toxic waste (McDonough & Braungart, 2002).

Over the past few decades the vision of the circular economy emerged as part of policy initiatives and research work focussing on sustainable use of resources. Scholars like Kirchherr et al. (2017) have asserted that the circular economy is an economic system that aims to replace the classical end-of-life concept by strategies like reducing, reusing, recycling and recovering materials during the production and consumption process. The idea of this approach is to keep products, materials and resources in the economy for as long as possible with the least possible impact on the environment.

The circular economy is a policy priority at both the global and national level in recent years. The United Nations and the European Commission, among others, have integrated the principles of the circular economy into their sustainability strategies, working towards increasing resource efficiency and climate change resilience (European Commission, 2020). Such efforts underscore the growing awareness of the potential of circular economic systems to contribute significantly to ecological development and to solve global environmental problems.

The Transition to Circular Economy and Sustainable Development

CE is reflected as the most effective tools to achieve ecological development as it combines environmental, economic and social considerations. The concept of sustainable development is to meet the needs of the present without compromising the ability of future generations to meet their own needs (United Nations, 2015). The ideologies of the CE are closely related to this goal, encouraging the optimum use of resources, waste reduction and regenerative production systems.

The CE practices contribute to sustainability from the environmental perspective by reducing extraction of natural resources and environmental pollution. Significant landfill waste reductions and raw material extraction and production process associated GHG emissions reduction can be achieved through recycling, remanufacturing and resource recovery strategies (Ghisellini et al., 2016). Furthermore, the use of biodegradable and renewable materials in the circular systems is encouraged which further helps minimize the footprint of industrial activities on the environment (Štreimikienė, 2026).

The economic advantages of the circular economy also are significant. Circular business models can increase the productivity of resources, reduce operational costs and facilitate innovation in the design and production process (Bocken et al., 2016). This can extend the lifespan of the product, with better resource utilization and lower resource demands, which reduces the need for scarce resources and enhances the supply chain. Furthermore, new markets and jobs can be created in other sectors through the circular economy, such as recycling and repair services, remanufacturing and sustainable product design (Stahel, 2016).Social sustainability is one more essential aspect of the CE. Circular practices foster responsible consumption habits, involve citizens in recycling activities and create jobs in resource recovery industries (Murray et al., 2017). Circular economy activities, including waste collection and recycling, can help to create jobs for local communities and solve environmental problems in many developing economies.

The UN SDGs are also being achieved within the context of a circular economy. In particular, circular economy strategies help to achieve SDG 12 (Responsible Consumption and Production), which aims at reducing waste and promoting sustainable resource management. Besides, circular practices can contribute to SDG 13 (Climate Action) by reducing carbon emissions and SDG 9 (Industry, Innovation and Infrastructure) with the support of sustainable industrial development (Schroeder et al., 2019). The linkages illustrate the possibilities of CE practices that can help attain global sustainability goals.

Key strategies for circular economy

Different ways of implementing the circular economy concepts into practice have been suggested. Product life cycle extension, resource recovery, recycling, remanufacturing and sustainable material sourcing have been concepts that are discussed most frequently.

1. Product Lifecycle Extension-The extension of product life-cycle is an essential part of the circular economy; the idea is to keep products in use for as long as possible by repairing, refurbishing and upgrading them. By prolonging the life of products, new resource extraction is avoided and waste production is minimised. Bocken et al (2016) say lifecycle extension is possible by making products that are made to be repaired or upgraded. Product-as-a-service business models are one of the key strategies in achieving the extension of the product's lifecycle. In these models, the business keeps the product and charges for the services it offers, but doesn't sell the product. It promotes the use of the concept of designing products for longer life and better durability as the manufacturers are still liable for maintenance and end-of-life management (Tukker, 2015).
2. Resource Recovery and Recycling-Resource recovery is the extraction of important resources from waste streams and the return of those resources to production. Among the most prevalent resource recovery practices is recycling, and it is a significant way to decrease waste and conserve natural resources. The environmental footprint of manufacturing can be significantly lowered by recycling, as it can save energy and greenhouse gas emissions in raw material extraction (Korhonen et al., 2018).
3. Remanufacturing and Refurbishment-Remanufacturing is a process that combines disassembly, cleaning, repair, and reassembly of used products to restore them to a like-new condition. This approach helps manufacturers get the value out of valuable components and materials and the reduction of the use of new raw materials (Guide & Van Wassenhove 2009). The auto industry, electronics, industrial equipment, etc. are industries where remanufacturing is also prevalent. Refurbishment is a similar process, where used products are repaired and returned to functioning condition and may not conform to the original manufacturing requirements. Remanufacturing and refurbishment play a role in the goals of circular economy, by increasing product lives and minimizing waste.
4. Sustainable Material Sourcing-Sustainable material sourcing involves the use of environmentally sustainable materials and responsible sourcing from the supply chain. Use of recycled materials, renewable resources and environmentally friendly production methods (Lacy & Rutqvist, 2015). Transparent and traceable supply chains are also critical to sustainable sourcing as they will help to ensure that materials are produced in an environmentally and socially responsible way.

Circular Economy Business Models

Some circular economy solutions can be adopted using innovative business models which focus on resource efficiency and value retention. Bocken et al. (2016) have found a number of circular business model archetypes: product-as-a-service, sharing platforms, resource recovery systems, product life extension models and, circular supply chains. These business models foster innovation towards reducing waste and increasing resource efficiency by redesigning products and services. For instance, sharing platforms allow several users to use the same product, thus cutting down the necessity for further production. Likewise, circular supply chains include recycling and remanufacturing activities into the supply chain to recover valuable materials. Baiashvili (2025) examine the opportunities and barriers associated with the adoption of CE business models in Georgia, on public awareness, consumer behavior, waste management practices, and institutional readiness for circular transition. The research method applied was quantitative research, wherein 617 respondents of Georgia filled the questionnaires .The research was mainly aimed at understanding the citizens' perception of circular economy principles and their daily practices in terms of sustainable consumption and waste management practices. The

paper proposed that the overarching concept of ecological development is based on balancing the environmental, social and economic aspects, which puts in place a mechanism of operation with the circular economy based on the principle of resource efficiency, reduction of waste, re-use, recycling and regenerative systems.

Barriers to Circular Economy Adoption

While the CE is promising, there are serious challenges to many organisations who try to adopt a circular practice (Štreimikienė, 2026). Kirchherr et al. (2018) found that there are certain barriers to the implementation of the circular economy, such as financial, technological, regulatory and cultural.

The important challenge to the implementation of CE is financial barriers. The shift to a circular economy can come with significant initial costs and investments in new technologies, infrastructure, and product design methods. Companies might be hesitant to invest in circular solutions because they are unsure about the economic returns (Teixeira, 2025).

Digital barriers are also important for the adoption of the circular economy. Some industries and areas may lack the advanced technologies necessary for many recycling and remanufacturing processes. Also, product designs that are designed with cost in mind may make it difficult to recover resources. Another significant hurdle is the regulatory obstacles. In many countries, policies and regulatory regimes are not yet integrated with circular economy principles. The lack of supportive regulatory, policy framework and waste management infrastructure can have significant impacts in hampering the shift towards circular systems. There are also cultural and behavioral barriers to the adoption of circular economy. A possible barrier for consumers to buying refurbished/recycled products is the perception of quality and reliability (Teixeira, 2025). Likewise, there might be reluctance to alter existing business models and processes.

Policy and Governance Frameworks for Circular Economy

Governments have a fundamental role in setting up enabling policy frameworks and regulatory mechanisms which enable the shift towards a circular economic system. Policy can incentivize circular practices in a variety of ways including economic, regulatory and research and development (Altin et al., 2023). Similarly, extended producer responsibility (EPR) schemes can ask manufacturers to accept environmental responsibility over their products for their entire life cycle, which includes at the end of their life, disposal and recycling (OECD, 2016). Likewise, eco-design regulations create an incentive for manufacturers to make products easier to repair, reuse and recycle.

Other important enablers for the implementation of circular economy are public–private partnerships and co-operations. Circular systems need cooperation between a variety of stakeholders, such as governments, businesses, research institutions and civil society organizations.

Research Gaps

There has been considerable growth in literature on circular economy in recent years, yet there are a number of gaps in the research. First, many studies address mostly environmental aspects of circular economy practices, whereas less attention is given to its economic and social impacts. Second, more empirical studies on the effectiveness in various industrial settings are needed. Third, more studies are needed to investigate the policy and governance frameworks that can enable scale up of circular economy.

It is important to tackle these research gaps to further the knowledge on the role of circular economy and practices in sustainable development.

Objectives

The aim of this study is to analyse the role of the CE in the path towards sustainability by looking at how circularity practices can help shift from linear to regenerative and resource-efficient production systems. In particular, the study needs to accomplish the following objectives:

1. To explore the concept of circular economy and to learn the conceptual underpinning of CE and how it relates to SD.
2. To explore major circular economy strategies like extending the product life, recovering resources, recycling, remanufacturing and using sustainable materials, and measure their impact on waste reduction and resource efficiency.
3. To understand the impact of circular economy practices on sustainable socio-economic outcomes, such as resource savings, economic value creation and social benefits.
4. To understand how circular approaches contribute to the global SDGs especially SDG 9 (Industry, Innovation and Infrastructure), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action).
5. To study selected industry case studies to learn about the application of circular businesses and the incorporation of circular strategies in the industries' supply chains and operations.
6. To understand the main financial, technological, regulatory and cultural obstacles to effective implementation of circular economy practices.
7. To make suggestions to businesses, policy makers and stakeholders for a successful transition from linear to circular economy and improved sustainability performance.

Methodology

The research design used in this study is qualitative case study which aims to investigate the role of CE in sustainability in various contexts. The case study approach is especially appropriate for phenomena that are socio-economic and environmental in nature and have not well defined boundaries between the phenomenon and the context (Yin, 2018). The implementation of a circular economy will require interactions among businesses, governments and society, thus in-depth qualitative research can provide a comprehensive account of these interactions.

The research methodology is a multiple case study approach which provides the possibility to compare and contrast cases across organizational and geographic settings. Multiple-case designs strengthen the ability to generalize from the findings across cases, by examining patterns, similarities and differences among cases (Eisenhardt, 1989). In this study, three cases were chosen that span the spectrum of circular economy implementation, as a case study from the corporate level, an urban policy and a national policy. This way, the study can look at how circular economy strategies work in different governance and institutional settings. The cases were picked based on purposive sampling which is often employed in qualitative research to find cases, which have the richest characteristics with respect to the phenomenon studied (Patton, 2015). The following items were used to make a selection:

Relevance to circular economy practices, including product life extension, resource recovery, and sustainable material sourcing. Implementations of circular initiatives are demonstrated at organizational, city, or national levels. Availability of credible secondary data sources, including sustainability reports, policy documents, and academic studies. Based on these criteria, three representative cases were selected:

1. IKEA – Product Life Extension Programs

The case shows how the circular economy principles have been implemented at the corporate level, including product take-back schemes, product refurbishment and circular product design.

2. Amsterdam – Circular Construction Initiatives

This case is an example of the policy framework at the city level encouraging circular construction, city planning and circular procurement systems.

3. China – Circular Economy Promotion Policies

This case illustrates national-level regulatory measures that facilitate the application of circular economy principles on the industrial symbiosis, resource efficiency schemes and legislation. All of these cases contribute to the understanding of how circular economy can be implemented at different levels, and how various stakeholders can take part in the change from a linear to a circular economy.

Conceptual Framework

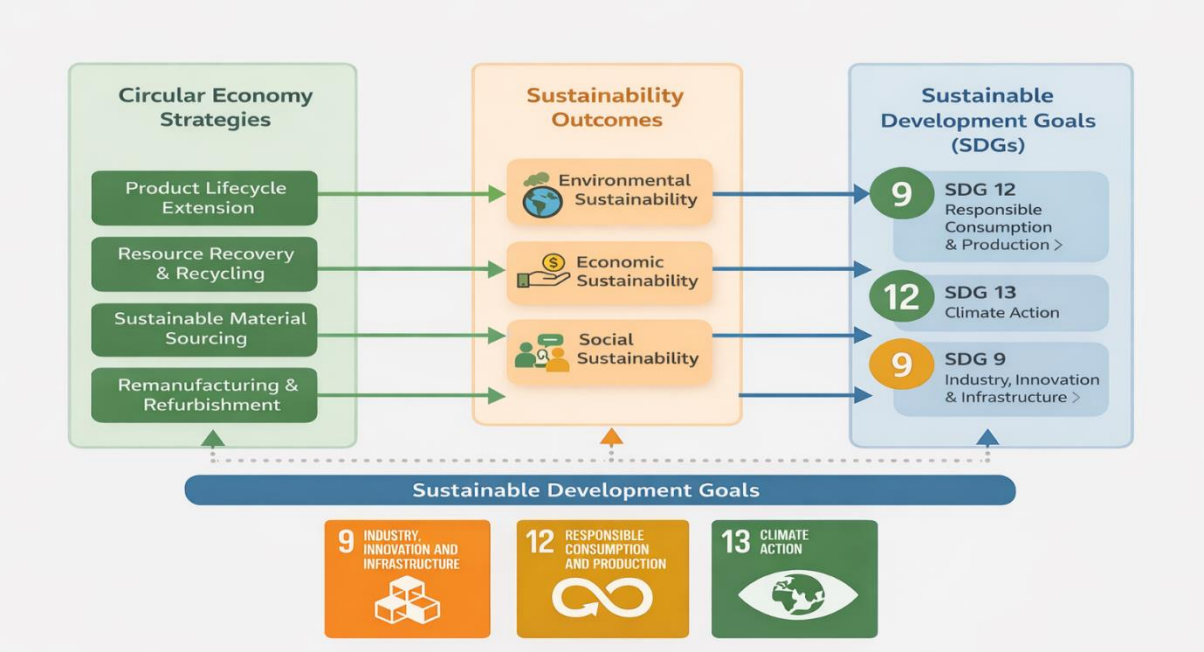

Figure1: Conceptual Framework

Source: Author

Case Studies

1. IKEA – Product Life Extension Programs

To make the transition to a circular economy, companies must revisit product design, supply chains and customer interaction. IKEA is an example of a company which has actively worked towards circular innovation, reducing the use of resources within the furniture retail sector by extending product life cycles.

One of IKEA's core pillars to its circular approach is its Buy Back & Resell program, which lets consumers bring back their used furniture to get credit towards another purchase at IKEA. Products returned to the company are refurbished and sold in company's "As-Is" store or e-sales. Over the years, it has grown substantially; for example, during 2024 alone, the program facilitated the purchase of almost 495,000 used furniture which were re-used instead of being discarded(IKEA,2026).

IKEA also has repair and spare parts programs to make existing products last longer in addition to take-back programs. Customers may order replacement parts for furniture items so that they are able to repair products instead of disposing of them too early. Millions of spare components are distributed per year which enhances product life and promotes circular consumption.

Circular Product Design is another important aspect of IKEA's circular approach. The company's goal is to make all its products be reusable, refurbishable, reparable or recyclable by 2030. This strategy is about promoting the use of renewables and reusables and minimising virgin materials. Today, over 80 percent of IKEA products are manufactured with renewable materials and an increasing amount of the products contain

recycled content (IKEA, 2026). These programs provide a number of benefits from a sustainability standpoint. Firstly, they minimize waste production and its environmental impact in furniture disposal. Second, they reduce the need for raw materials such as virgin materials, which is a conservation of natural resources. Thirdly, they generate new business opportunities in second-hand furniture market, which is gaining significant importance in the trend of sustainable consumption. Business model innovations and corporate leadership are crucial in enabling circular economy in the IKEA case. The company's strategy of product life extension, repair services and circular design demonstrates the potential for circular principles to be applied on large scale commercial systems.

2. Amsterdam – Circular Construction and Urban Development

The role of cities in fostering circular economy practices, especially in the construction, waste and urban planning sectors, is key. Amsterdam is one of the most renowned examples of a circular city project, where comprehensive measures are being taken to make the city's systems circular.

The city's Circular Strategy 2020-2025 presents an ambitious plan for the reduction of primary raw materials use by 50% by 2030 and to turn into a fully circular city by 2050.

The main value chains targeted are:

i. Consumer goods

ii. Food and organic waste streams

iii. The built environment (construction and infrastructure)

One of these sectors is construction, which is especially relevant due to the amount of material used and amount of waste produced. Amsterdam has, therefore, initiated circular construction policies such as using recycled materials, modular construction and digital tracking of materials.

The material passport system tracks information on the materials of buildings in an innovative way and is used in the city's construction sector. This digital database allows architects, engineers and builders to discover which components of buildings can be reused in their redesign or when the building is demolished. These systems reduce the loss of valuable materials as waste.

Additionally, Amsterdam has implemented circular procurement policies, which encourage sustainable practices in its supply chains by harnessing the power of its procurement. By 2030, the municipal government wants to buy 100% from recycled or reused sources, which it will be urging its contractors and suppliers to do as well(IKEA,2026).

Beyond this, one key part of Amsterdam's circular strategy is embedding the Doughnut Economics framework that aims to bring a balance between the economic, environmental and social limits. The city's policies take into account planetary limits, working towards sustainable consumption and economic prosperity.

The Amsterdam case illustrates that public policy, urban planning & governance and stakeholder cooperation can contribute to achieving a shift towards a circular economy. Cities can play a major role in minimizing environmental impacts and promote sustainable economic growth by incorporating circular approaches in infrastructure development and procurement processes.

3. China – National Circular Economy Policies

Governments at the national level are key players in setting the regulatory and institutional landscape that will enable the uptake of the circular economy. China is one of the first and most prominent countries that have implemented national policies around circular economy.

In 2008, China officially enacted the Circular Economy Promotion Law, which is meant to promote the efficient use of resources, reduce waste production and promote sustainable industrial development by providing a legal basis to implement the circular economy. The policy promotes the use of cleaner production processes,

promotes the recycling rate and promotes the development of eco-industrial parks for sharing resources between companies.

One of the essential elements of China's circular economy policy is to establish an industrial symbiosis network of waste or by-products from one industry are used as input into another. These networks can be used to help realize energy efficiency and to lower resource consumption within industrial clusters. They have been used extensively in Chinese eco-industrial parks with an integrated energy system, waste recycling facility and material recovery facility.

China has also invested heavily in upgrading the recycling facilities and resource recovery systems, including the management of electronic wastes and plastics recycling, besides the renewable energy technologies. The programmes are intended to tackle speedy industrialization and urbanization in the country without adding to environmental degradation.

Furthermore, the Chinese government has introduced the idea of "circular economy" into the national development plans, including the development plans of "five-year plan". Circular economy concepts have been introduced into national policy frameworks and a large circle of institutions for circular innovation have been created in various industries, in China.

The experience in China highlights the urgent need for strong regulation and policy commitments for the large-scale transition to circular economy. This shift towards sustainable production systems can be achieved to a large extent by using industrial cooperation and technological innovation as well as government policy.

The three case studies i.e. corporate (IKEA), urban (Amsterdam) and national (China) provide an understanding of how the principles of the circular economy are put into practice on different governance levels. Coordinated transitions towards a circular economy should happen at a number of governance levels. Innovative business models, supportive infrastructure and procurement policies in cities and national governments that frame regulations. Other life extension strategies i.e. repair services, refurbishment services and second-hand markets are important in reducing resource use and waste generation. Government policies, including the circular procurement requirement and environmental policies, play a vital role in providing incentives to businesses to practice circular economy. Technology (digital material passports, resource tracking and recycling infrastructure, etc.) helps to enable the effective implementation of circular supply chains. Successful circular systems require collaboration among governments, businesses, consumers and research institutions.

Results and Findings

The results of this research indicate that the CE has become a key framework for contributing to sustainability through efficient use of resources, waste reduction and regenerative production and consumption processes. The analysis of circular economy strategies, coupled with the IKEA, Amsterdam and China case studies, shows that the practice of CE can contribute to the environment, economy and society, and can help achieve the global goals of sustainability.

Reducing waste and conserving resources is one of the key findings of the study, and one of the main focuses of product lifecycle extension is to do just that. The shift towards a circular business model has taken organizations more and more by surprise, with an increasing emphasis on extending the life of a product by implementing repair, refurbishment, reuse and remanufacturing. It shows how buy-back programs, resale initiatives and repair services can help to curb product disposal and generate second markets for used products as in the case of IKEA. The results corroborate Bocken et al.'s (2016) call for the importance of product life extension strategies as the basis for business model innovation within the circular economy. Tukker (2015) noted also that service-oriented and reuse-based systems can have a considerable impact on the efficiency of resources and on environmental impacts.

The other major conclusion is that resource recovery and recycling systems have a huge positive impact on environmental sustainability by minimising landfill waste and reliance on virgin resources. The study revealed

that industrial symbiosis systems and recycling networks can help materials stay within the economy longer, thus increasing resource productivity. The case of China especially illustrates how material flows are exchanged in the eco-industrial parks between industries, in which waste from one industry is processed by another. This is in line with industrial ecology theory and the observation made by Ghisellini et al. (2016) that recycling and closed-loop systems are crucial to the economic development and environmental protection.

The results also show that the implementation of circular economy practices has a significant impact on climate change mitigation and environmental protection. Circular systems can lower greenhouse gas emissions from manufacturing and waste disposal activities by decreasing resource extraction, increasing the use of renewable resources, and enhancing energy efficiency. The circular economy was also recognized as a new paradigm of sustainability to decrease ecological footprints and promote regenerative economic systems by Geissdoerfer et al. (2017). These results support also Stahel's (2016) arguments that circular systems enable the conservation of resources by prolonging cycles and avoiding waste.

A major conclusion of the study is the contribution of sustainable sourcing and circular supply chain to the improvement of organizational's resilience and competitiveness. As the importance of the supply chain in creating environmental damage and vulnerabilities is growing, organisations are increasingly required to employ materials that are renewable, recyclable and environmentally friendly. The results demonstrate that sustainable sourcing not only is a positive environmental impact, but also can benefit the economy in the long-term by minimising material usage and operational costs. This is consistent with the findings of Genovese et al. (2017) that found that increase in the competitiveness of businesses can be achieved by improving their sustainability performance through the support of circular supply chain management.

The study also shows that innovation, technology plays a pivotal role in the implementation of circular economy. The following technologies were identified as enablers for circular transitions: Advanced recycling technologies, Digital material passports, Smart tracking systems, and Data-driven resource management tools. Furthermore, the use of digital tracking systems in Amsterdam's circular construction projects allows for the identification and reuse of construction materials, thus promoting material recovery and waste reduction. The results are in line with the latest studies that stress the role of digital transformation in facilitating the systems of circular economy (Ali et al., 2025).

Another key result is that institutional support and government policies show an important role for large scale implementation of CE. The study identified that enabling environments for businesses and industries to engage in circular practices are supportive regulatory frameworks, circular procurement policies and legislative interventions. van Buren, Demmers, et al. (2016) explores the role of logistics industries and the government in supporting a transition towards a CE in the Netherlands. The study explores the role of logistics networks, supply chain systems and government measures in facilitating circular resource flows and sustainable economic development. The study has several important conclusions, including the fact that the Netherlands has favourable institutional and infrastructural conditions for the implementation of circular economy. The availability of government policies that are promoting sustainability, waste reduction, renewable energy and collaboration between industry and government were found to be a significant enabler of circular practices. The Amsterdam Circular Strategy and the Circular Economy Promotion Law in China are two examples of public policies providing guidance and support that can drive sustainable transitions. This result is consistent with the findings by Kirchherr et al. (2018) that identified policy support as one of the main forces towards a successful circular economy implementation. The results also emphasize the need for multi-level governance and multi-stakeholder cooperation in the process of circular transition. A circular system needs to be co-ordinated between businesses, governments, consumers, and research institutions. Partnerships between public and private entities and networks were identified as facilitating knowledge sharing, resource sharing and innovation. Murray et al. (2017) also suggested that the circular economy is an inherently interdisciplinary study, and will need the cooperation of multiple parties to produce sustainable results.

The economic sustainability of the study results showed that the execution of the CE opens opportunities for cost reductions, innovation and new business models. Business Model like leasing, remanufacturing, and product-as-a-service models, enable companies to obtain ongoing revenue streams while making resources more

productive (Štreimikienė, 2026). Businesses implementing circular business models may benefit from a positive reputation due to the increasing demand from consumers for sustainable products and services. The results are congruent with Lacy and Rutqvist (2015) who suggested that circular business models could also improve profits and environmental performance.

The study also shows that circular economy systems help to achieve social sustainability by creating jobs, providing skills, and raising consumer awareness. Green jobs in the circular economy are generated in the recycling, repair, and remanufacturing sector and foster sustainable consumption patterns. People who are enrolled in return schemes and sharing will be familiar with resource protection and responsible consumption. This is in accordance with the ideas of Schroeder et al. (2019) who have mentioned that the actions taken by circular economy are related to sustainable development goals and the social welfare. The study highlighted some obstacles to the execution of the CE, although the sustainability impacts were positive. Financial barriers particularly for SMEs were identified as one of the main challenges, as these may lack the capacity to invest in circular infrastructure and advanced technologies. Inconsistency in regulation was also identified as a key challenge in many areas as was also poor waste management infrastructure. Furthermore, cultural resistance and customer attitudes towards reused and refurbished products are slowing down people from adopting circular business models. The results align with Govindan and Hasanagic (2018) who found financial, technological and behavioral constraints as key inhibitors of circular transitions.

The results also show that the circular economy is very aligned with the United Nations Sustainable Development Goals (SDGs). The CE strategies directly help in achieving SDG 12 (Responsible Consumption and Production) by ensuring efficient use of resources and minimizing waste. They are also contributing to SDG 9 (Industry, Innovation and Infrastructure) by sustainable industrial practices and technological innovations, and to SDG 13 (Climate Action) by the reduction in carbon emissions and the promotion of resource efficiency (Schroeder et al., 2019). The study thus confirms the circular economy systems as an important pathway for long-term sustainability and climate resilience.

As a whole, the results show that the CE should not be considered only as an environmental approach, but as a socio-economic approach that can impact production and consumption patterns. The shift from linear to circular models needs to be a joint effort of policy support, technological innovation, stakeholder cooperation and sustainable business models. The selected case studies indicate that circular principles can be implemented successfully in organizations and also by governments as a tool to fulfil the triple goals of environmental sustainability, economic growth and social development.

Discussion

The results are in line with the overarching theoretical frameworks of research on circular economy that focus on the shift from linear production systems to a continuous flow of resources in the economy (Geissdoerfer et al., 2017). The shift towards a circular economy is growing in importance for sustainable development. Traditional economic systems have been based on a “take–make–dispose” paradigm, one in which the intensive extraction of resources and waste production are the norm. The circular economy models are designed to close material loops by recycling, remanufacturing and reusing materials and by designing for regeneration (Kirchherr et al, 2017). The results from this study empirically support this theoretical suggestion as it shows how organisations and governments are now taking circular approaches that are prolonging the life cycle of resources and decreasing the environmental impact.

A major contribution of this research has been the finding of a strong association between the practices of the CE and environmental sustainability outcomes. The case studies demonstrate that CE activities have led to reductions in waste, conservation of resources and measures against climate change. The results support previous research which has shown that the circular economy is an important tool for mitigating environmental pressures of industry production and consumption (Murray et al., 2017).

The case studies show environmental advantages, which can be understood by means of the theoretical frame of industrial ecology, which considers industrial systems as a kind of ecosystems in which wastes from one system are the inputs of another. An example of such industrial symbiosis networks is seen in China's eco-industrial parks. These networks enable material flow among enterprises, which is the most efficient use of resources and less waste generation.

Likewise, the circular construction projects in Amsterdam show how urban infrastructure can be reconfigured to enable sustainable material cycles. Modular construction, recycled materials and digital material passports are examples of the applicability of circular principles in the built environment. These can contribute to overall sustainable urban development and resource-efficient cities goals. The results are consistent with the studies indicating that circular economy is the key mechanism to effectively lower global resource consumption and greenhouse gas emissions. The research community has expressed the need to close material loops and increase the productivity of resources to reduce long-term environmental impacts (Ghisellini et al., 2016).

The benefits of the circular economy practices are not just environmental; the study also emphasizes the economic value of circular economy. This follows the case of IKEA, in which new revenue streams are created as a result of implementation of circular business models like product refurbishment, resale and repair services. These are some of the ways it can be shown that sustainability and profit are not mutually exclusive, and that sustainable strategies can be used to gain competitive edge for organisations.

The RBV of the firm has been used to understand the economic implications of the adoption of circular economy in the organization; the RBV, as suggested by Barney (1991), assumes that the firm has a competitive advantage when it uses its unique resources and capabilities (Barney, 1991). Circular business models can help companies to increase the value of resources that are used by maximizing their lifespan and by recovering the resources. This will lessen the need for raw materials and help companies to avoid resources scarcity risks as well as decrease production costs.Furthermore, circular economy projects can foster innovation by design as companies are encouraged to design new products or services and/or new business models. The concept encourages manufacturers to create a product that is durable, can be repaired and used over and over again.

The results of this research align with some earlier studies that have indicated the potential of circular economy to drive innovative and economic resilient solutions. Businesses that embrace circular thinking can benefit from cost reductions over time, better resource utilization, and a boost in their brand image. The study also shows significant social benefits linked with the implementation of CE. Circular initiatives can help create jobs, develop skills, and raise awareness for consumers on sustainable consumption. Theory-wise, these social outcomes can be understood with the stakeholder theory which puts emphasis on the interests of multiple stakeholders such as employees, customers, communities and governments (Freeman, 1984). Circular economy projects tend to be multi-stakeholder projects, with a variety of government, waste management, manufacturer, and consumer partners.

Product take-back schemes, for example, can make consumers more active to support the circular systems by offering them the possibility to bring used products back for refurbishment or recycling. This is a participatory model which helps to change behaviours and creates a culture of sustainability. In the same way, jobs are generated in the fields of recycling, remanufacturing and sustainable construction in cities through circular infrastructure projects.

The results thus confirm the notion that inclusive socio-economic benefits can be achieved while promoting environmental sustainability within circular economy systems. The other key take-away from the findings is the importance of the role government policy and institutional frameworks can play in the transitions towards a CE. The cases of Amsterdam and China show that public policy can influence the development of circular ecosystems, while the examples from businesses, like IKEA, demonstrate the need for business leadership. The city of Amsterdam has embedded circularity in its urban planning and city procurement policies. These are examples of activities that show how public institutions can trigger sustainable innovation in supply chains through their regulatory frameworks and purchasing power. In the same way, there is the Circular Economy Promotion Law in China, which offers a comprehensive regulatory framework that promotes industries to adopt

the methods of reducing the use of resources in production. Incorporating circular economy goals into country development plans underscores the need for a long-term policy approach.

The results are consistent with the institutional theory that proposes that regulatory, normative, and cultural institutions have a significant impact on organizational behavior. The policy environment, including the role governments can play, is critical for information and to influence business and community actions to support sustainable development. Although the benefits of implementation of circular economy are present, it can also be seen that there are still some barriers to its widespread use. There were a number of issues highlighted across the case studies as barriers to the process: financial constraints, regulatory challenges, technological limitations, and cultural resistance. The cost of initial investment can be a disincentive for an organisation to invest in circular infrastructure or in advanced recycling technologies. Likewise, current regulations in certain areas can be a constraint to the progress of circular supply chains.

The above barriers are well documented in the circular economy literature. However, significant changes are needed in production systems, in supply chains and in consumer behaviour to move from linear to circular systems (Kirchherr et al., 2018). Technological innovation is also important to enabling the transition to circular economy. The use of new materials, digital technology, and recycling methods can enhance the efficiency of resource recovery systems and enable the creation of closed-loop supply chains.

The results of this study also illustrate the high level of agreement between the practices of circular economy and international sustainability frameworks. CE initiatives play a special role in reaching SDG targets on sustainable production, innovation and climate action. The use of circular business models, which focus on efficient use of resources and reduction of waste, helps advance SDG 12 (Responsible Consumption and Production) by promoting sustainable consumption patterns and reducing the environmental impact. In the same way, progress on circular manufacturing and industrial symbiosis moves towards SDG 9 (Industry, Innovation and Infrastructure) with regard to sustainable industrial development. Circular economy activities that cut out waste and usage of resources also support SDG 13 (Climate Action) as a way to mitigate climate change, in addition. CE systems aim to minimize environmental impacts from economic activity by closing material cycles and maximizing the utilization of resources. The correlation of circular economy actions and SDGs reinforces the relevance of integrating the circular principles into the global strategies for sustainability.

Implications for Future Research

There is a need for additional empirical research in order to estimate environmental and economic effects of circular economy projects in various sectors. Although case studies are useful and provide much insight, there could be more evidence pointing to the effectiveness of CE practices in large scale empirical analyses. Second, further studies are needed to investigate the role of new and upcoming technologies, such as artificial intelligence, blockchain, and digital platforms, in supporting circular supply chains. These technologies can develop the transparency, traceability and efficiency of resource management systems (Štreimikienė, 2026). Third, it is necessary to investigate behavioral and cultural aspects of the consumer's involvement in circular systems. The consumer response to the circularity initiatives, like product take-backs and sharing platforms, could serve to inform the development of an organization's sustainability strategy. Last but not least, there are opportunities to gain insights from cross-country comparative studies on the effect of different policy environments on implementation of circular economy practices.

Conclusion

The shift from linear models of the economy to circular economic models has gained significant importance in solving global problems associated with sustainability. The linear “take–make–dispose” approach is the traditional economic way of growth which has also been responsible for a lot of resource depletion, environmental degradation, and waste generation. The realization of the urgency to shift towards sustainable and regenerative economic models has grown as consumption has increased all over the world. The CE is a potential

way to make this change, as it encourages more resource efficiency, waste reduction, and sustainable production and consumption(van Buren et al., 2016)..

This study explored the role of circular economy strategies in the realization of sustainability and support for the global development goals. The research examines several effective strategies, including product lifecycle extension, resource recovery and recycling, sustainable material sourcing and remanufacturing, and how these are being applied by organisations and governments to reduce the environmental impact while delivering economic and social value.

The results show that the implementation of circular economy programmes can lead to a substantial improvement in sustainability parameters in three key areas: environment, economy and society. Environmentally, CE practices lead to less waste generation, reduced use of natural resources and reduced greenhouse gas emissions through the continued use of materials for longer period. Circular strategies offer economic opportunities for innovation, cost reduction and new business models which enable organizations to be more competitive and resilient. Socially the transition to circular systems is beneficial for job creation, involving stakeholders and raising consumer awareness of sustainable consumption.

The comparative case analysis concerning IKEA, Amsterdam and China shows the possibilities for implementing the practices of circular economy at various governance levels: corporate, urban and national. The cases raise awareness about the need for collaboration between businesses, governments and communities to facilitate circular transformation.

Business practices, including product take-back initiatives, refurbishment programs and circular product design are examples of corporate efforts that combine to add value economically as well as contribute to sustainability. Urban actions, such as Amsterdam, demonstrate the possibilities for the city government to promote circular construction, sustainable infrastructure and circular procurement. The Chinese circular economy legislation at a national level is an example of how regulatory policy and industrial policy can facilitate resource efficiency and industrial symbiosis on a large scale.

This study also reveals some obstacles that prevent many people from implementing circular economy practices. The barriers are high upfront capital investments, regulatory and policy restrictions, technological and cultural resistance to change within the organization and consumer. This will need cooperation between sectors and creation of supportive policy frameworks to foster innovation and sustainable practices.

The overall results validate that circular economy systems are one of the most important solutions for sustainable development and making resilient economies. The transition to renewable economic models can help alleviate environmental pressures and promote economic growth and social wellbeing while replacing unsustainable production models. To achieve a shift to circular economy, it is crucial to have policy support and strategic collaboration from the different stakeholders. This study has identified several policy implications for governments, businesses and international organisations based on the results.

Governments are an important factor in facilitating circular economy transitions, as they can create regulatory frameworks that support sustainable production and resource efficiency. Policymakers should develop legislation that promotes recycling, remanufacturing and extension of product life. Extended producer responsibility (EPR) policies, which involve manufacturers taking responsibility for the end-of-life management of their products, can be included in regulations. These policies can encourage businesses to create durable, reparable and recyclable products. Moreover, governments can create sustainable materials and waste management standards to enable the establishment of circular supply chains. New business models, emphasising resource efficiency and product lifecycle management, should be promoted in businesses. Governments and industry bodies can facilitate this shift by offering incentives, tax breaks, and grants for businesses that adopt circular solutions and technologies.

Circular business models like product-as-a-service, sharing platforms and refurbishment programs help to decrease resource consumption and generate new economic opportunities. Firms that incorporate such models within their operations will get the advantage of enhancing their client engagement and reducing environmental

effects. The infrastructure is key to facilitate circular economy systems. Governments should fund future advanced recycling technologies, waste management systems and technologies that recover resources, to boost the circulation of material within the economy. Digital tracking systems, material passports and blockchain-based supply chain monitoring are technological innovations that could improve the transparency and efficiency of circular supply chains. Investment in research and development will also be key to enabling recycling technologies to progress and their ability to be recycled to be enhanced. The role of cities is crucial in the shift towards circular economic systems, as they gather critical resources, infrastructure and population. Incorporate the principles of the circular economy into city planning, construction processes and procurement practices. Circular construction projects, with a focus on modular design, the use of recycled materials, and reuse of buildings, can make the built environment much less impactful. Moreover, circular procurement policies can push suppliers to make their production sustainable and thus impact the entire supply chain.

To shift to a circular economy, it is essential that all stakeholders, including governments, businesses, research institutes and civil society organizations, work together. Public–private partnerships can help to share knowledge, transfer technology and invest in circular projects. Governments can establish a platform for collaboration to co-create solutions on sustainable resource management. Such partnerships are particularly important for scaling up circular innovations and overcoming financial or technological barriers. This is because; successful circular economy systems need a consumer's involvement (Teixeira, 2025).. Policy measures that aim to shift consumption patterns towards sustainability should address consumer awareness on the environmental advantages of circular consumption. Educational campaigns, labelling and incentives for recycling and return of products can promote consumers' engagement with circular systems. Further, digital platforms offer the opportunity to share, rent and resell products – which essentially extends the lifespan of products.

The implementation of circular economy projects shall be linked to international sustainable development instruments like United Nations Sustainable Development Goals (SDGs). CE supports SDG 12 Responsible Consumption and Production by ensuring efficient resource use and waste reduction (Teixeira, 2025). They are also part of SDG 9 (Industry, Innovation and Infrastructure), promoting sustainable industrial development and technological innovation. Moreover, circular strategies also contribute to SDG 13 (Climate Action), as they help to cut down on GHG-footprints of extraction and production processes. When circular economy policies are integrated in the SDGs, governments and organisations can work towards global sustainability goals and realize national development goals.

This study offers insights into the practices of circular economy and the sustainability outcomes, but more research is required to gain more depth about circular transitions. Future research could investigate quantitative evaluation of the effects of the circular economy on the efficiency of resources and economic performance. Also, research projects could include the potential for emerging technologies like artificial intelligence, digital platforms, and blockchain technologies in supporting circular supply chains. The latter is an important field of future research that needs to be explored by analysing consumer behavior and social acceptance of circular business models. It will be important to know how citizens perceive and adapt circular practices in order to scale up circular systems globally.

The circular economy is a paradigm shift that is designed to tackle the multivulnerability of environmental degradation, resource scarcity and climate change. Circular economy models can play a role in the development of societies toward sustainable and resilient future by rethinking production and consumption systems to focus on resource efficiency and regeneration. This study's results show there is a need for involvement of all three businesses, government and communities to make this transition a reality. If policies can foster this and there is continuous innovation, fifty years from now, the circular economy can contribute to the twenty-first century sustainable development.

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