

(REVIEW ARTICLE)



## Challenges and opportunities in implementing circular economy models in FMCG Industries

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### Abstract

The implementation of circular economy (CE) models in the Fast-Moving Consumer Goods (FMCG) industry presents a dynamic landscape of challenges and opportunities. Circular economy models emphasize the importance of resource efficiency, waste reduction, and sustainability, aiming to close the loop of product life cycles through greater recycling, re-use, and refurbishment. This review explores the key challenges faced by FMCG companies in adopting these models and identifies the opportunities that arise from successful implementation. Challenges in implementing circular economy models in the FMCG sector include logistical complexities, such as establishing effective reverse logistics systems to handle the collection and processing of used products. The industry also faces difficulties in redesigning products to facilitate recycling and reduce waste, requiring significant changes in manufacturing processes and materials. Financial constraints and the need for substantial initial investment pose another hurdle, particularly for smaller companies or those with limited resources. Additionally, regulatory and market uncertainties can impede the adoption of circular practices, as businesses navigate evolving regulations and consumer expectations. Opportunities for FMCG companies, however, are substantial. Adopting circular economy principles can lead to enhanced brand value and differentiation in a competitive market. Companies that successfully implement circular models can achieve cost savings through more efficient use of resources and reduction in waste management expenses. Furthermore, there is potential for innovation in product design and packaging, creating new business models that align with consumer demand for sustainable and environmentally responsible products. Collaboration with stakeholders, including suppliers and consumers, can further facilitate the transition to a circular economy by fostering shared responsibility and developing scalable solutions. In conclusion, while the path to integrating circular economy models in the FMCG industry is fraught with challenges, the potential benefits offer compelling reasons for companies to pursue these sustainable practices. By addressing the challenges and leveraging the opportunities, FMCG companies can drive significant environmental and economic improvements, positioning themselves as leaders in a rapidly evolving marketplace.

**Keywords:** Circular economy; FMCG industry; Sustainability; Resource efficiency; Waste reduction; Product redesign; Reverse logistics; Innovation

### 1 Introduction

The concept of the circular economy represents a transformative shift from traditional linear economic models, where resources are used, disposed of, and replaced, to a system that emphasizes the continual use of resources through

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recycling, reuse, and regeneration (Geissdoerfer et al., 2017, Olaleye, et. al., 2024). This approach aims to create a closed-loop system that minimizes waste, reduces environmental impact, and enhances sustainability by keeping products, materials, and resources in use for as long as possible (Kirchherr et al., 2018). The circular economy model has gained traction as a critical strategy for addressing the pressing environmental challenges of the modern era, including resource depletion and waste accumulation (Adegbola, et. al., 2024, Akinsulire, et. al., 2024, Oriji & Joel, 2024, Ucha, Ajayi & Olawale, 2024).

The Fast-Moving Consumer Goods (FMCG) industry, encompassing products that are sold quickly at relatively low cost, plays a significant role in the global economy. This sector includes a wide range of goods such as food and beverages, personal care items, and household products (Kumar & Ranjan, 2020, Odonkor, et. al., 2024). Due to its high turnover rate and substantial environmental footprint, the FMCG industry is a focal point for sustainability initiatives and is increasingly exploring circular economy practices to mitigate its impact on the environment (Anozie, et. al., 2024, Ige, Kupa & Ilori, 2024, Oluokun, Idemudia & Iyelolu, 2024).

Implementing circular economy models in the FMCG sector is of paramount importance due to the industry's substantial resource consumption and waste generation. The adoption of circular economy principles in this sector can lead to significant reductions in waste, lower carbon emissions, and more sustainable use of resources (Lacy & Rutqvist, 2015, Urefe, Odonkor & Agu, 2024). By transitioning to circular models, FMCG companies can not only improve their environmental performance but also gain competitive advantages through enhanced brand value, reduced operational costs, and compliance with increasingly stringent regulations (Ellen MacArthur Foundation, 2019, Odonkor, et. al., 2024).

The objective of this study is to examine the challenges and opportunities associated with implementing circular economy models within the FMCG industry. The scope of the study encompasses an analysis of the barriers to adopting circular practices, such as supply chain complexities and economic considerations, as well as the potential benefits, including resource efficiency and innovation. By providing a comprehensive review of these factors, this study aims to offer insights into how FMCG companies can effectively integrate circular economy principles into their operations and contribute to a more sustainable future (Ajayi & Udeh, 2024, Babalola, et. al., 2023, Obeng, et. al., 2024, Toromade, et. al., 2024).

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## 2 Conceptual Framework of Circular Economy

The conceptual framework of the circular economy (CE) is founded on principles that seek to transform traditional linear economic models—characterized by a 'take-make-dispose' approach—into regenerative systems that emphasize sustainability and resource efficiency. This framework is particularly relevant to the Fast-Moving Consumer Goods (FMCG) industry, where the high turnover and frequent consumption of products contribute significantly to environmental degradation and resource depletion (Geissdoerfer et al., 2017, Urefe, Odonkor & Agu, 2024). Understanding the principles and strategies of the circular economy is crucial for overcoming the challenges and capitalizing on the opportunities associated with its implementation in FMCG sectors.

One of the core principles of the circular economy is waste minimization. This principle advocates for designing products and processes that generate minimal waste throughout their lifecycle. Waste minimization involves adopting practices that prevent the creation of waste rather than managing it after it has been generated (Akinsanya, Ekechi & Okeke, 2024, Kedi, et. al., 2024, Raji, Ijomah & Eyieyien, 2024). Strategies include the optimization of resource inputs, the reduction of waste through efficient production methods, and the prevention of waste by designing products for longevity and recyclability (Kirchherr et al., 2018, Urefe, Odonkor & Agu, 2024). This principle is integral to the circular economy as it addresses the root cause of environmental impact by aiming to eliminate waste from the outset.

Resource efficiency is another fundamental principle of the circular economy. It emphasizes the need to use resources more effectively, ensuring that they are utilized to their maximum potential and that the lifecycle impact of these resources is minimized. Resource efficiency can be achieved through strategies such as the use of renewable resources, improvements in production processes, and the adoption of technologies that enhance resource recovery and recycling (Lacy & Rutqvist, 2015, Urefe, Odonkor & Agu, 2024). By optimizing the use of resources, companies can reduce their environmental footprint and operational costs, contributing to a more sustainable business model.

Product life extension is a third key principle, focusing on prolonging the usability of products. This principle involves designing products that are durable, repairable, and upgradeable, thus extending their lifecycle and reducing the frequency of disposal (Murray et al., 2017, Urefe, et. al., 2024). Strategies to extend product life include incorporating modular design elements, offering repair services, and facilitating product upgrades. Extending the life of products not

only reduces waste but also minimizes the need for new resources, aligning with the goals of the circular economy (Bello, Idemudia & Iyelolu, 2024, Iyelolu, et. al., 2024, Seyi-Lande, et. al., 2024).

The implementation of these principles involves several key components and strategies. One such strategy is the development of closed-loop systems. Closed-loop systems are designed to ensure that products and materials are continually cycled through the economy, either through reuse, recycling, or remanufacturing (Akinsulire, et. al., 2024, Idemudia, et. al., 2024, Paul & Iyelolu, 2024, Udeh, et. al., 2024). This approach contrasts with traditional linear models, where products are discarded at the end of their life cycle. In closed-loop systems, materials are kept in use for as long as possible, and waste is minimized by reintegrating used products and materials into the production process (Rosa et al., 2020, Urefe, et. al., 2024). This strategy requires significant changes in supply chain management, production processes, and consumer behavior.

Product redesign is another crucial component of the circular economy framework. Redesigning products involves incorporating circular economy principles from the initial design phase to ensure that products are easily recyclable, repairable, or upgradable. This may include the use of modular components, the selection of materials that are easier to recycle, and the design of products that can be disassembled for repair or refurbishment (Bocken et al., 2016. Urefe, et. al., 2024). Product redesign is essential for facilitating the transition to a circular economy, as it addresses the challenges of waste generation and resource inefficiency at the source.

Recycling and reuse are integral strategies within the circular economy model. Recycling involves the processing of used materials to create new products, thereby reducing the need for virgin resources and decreasing waste (Adeusi, et. al., 2024, Benjamin & Adeusi, 2024, Oladayo, et. al., 2023, Toromade, et. al., 2024). Reuse focuses on the repeated use of products or components, either for the same purpose or in a different context. Both recycling and reuse contribute to the circular economy by closing the loop of product lifecycles and ensuring that materials and products do not end up in landfills (Stahel, 2016, Urefe, et. al., 2024). Implementing effective recycling and reuse systems requires collaboration between various stakeholders, including manufacturers, consumers, and waste management entities.

In conclusion, the conceptual framework of the circular economy provides a comprehensive approach to addressing the environmental and resource challenges faced by industries, including FMCG. By focusing on principles such as waste minimization, resource efficiency, and product life extension, and by employing strategies like closed-loop systems, product redesign, and recycling and reuse, companies can transition towards more sustainable practices (Abdul-Azeez, Ihechere & Idemudia, 2024, Nwosu, Babatunde & Ijomah, 2024, Ucha, Ajayi & Olawale, 2024). This framework not only offers opportunities for reducing environmental impact but also presents avenues for innovation and efficiency in product lifecycle management. Adopting these principles and strategies can help FMCG companies overcome the challenges associated with circular economy implementation and achieve long-term sustainability goals.

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### 3 Current State of Circular Economy in FMCG Industries

The concept of the circular economy (CE) is increasingly recognized as a crucial strategy for promoting sustainability in various industries, including Fast-Moving Consumer Goods (FMCG). The transition to circular models in the FMCG sector involves substantial changes in how products are designed, manufactured, used, and disposed of (Chukwurah, Okeke & Ekechi, 2024, Iyelolu & Paul, 2024, Oriji, et. al., 2023, Udeh, et. al., 2024). This shift aims to close the loop of product lifecycles through greater resource efficiency, waste reduction, and enhanced sustainability (Adegoke, et. al., 2024, Geissdoerfer et al., 2017). Despite the potential benefits, the adoption of circular economy practices in FMCG industries is uneven, with significant variations in implementation rates and effectiveness.

Adoption rates of circular economy principles within the FMCG sector have been growing, though challenges remain. Companies are increasingly acknowledging the environmental and economic benefits of circular practices, such as reducing resource consumption and minimizing waste. For instance, Unilever has made substantial progress in integrating circular economy principles into its operations (Adesina, Iyelolu & Paul, 2024, Ige, Kupa & Ilori, 2024, Osundare & Ige, 2024). The company has committed to ensuring that all of its plastic packaging is recyclable, reusable, or compostable by 2025 and has been exploring innovative approaches to close the loop on plastic waste (Unilever, 2020). Similarly, Procter & Gamble (P&G) has embarked on initiatives to reduce packaging waste and increase the use of recycled materials. Their commitment includes achieving a 50% reduction in greenhouse gas emissions across their value chain by 2030, part of which involves adopting circular economy principles in their product design and packaging strategies (Procter & Gamble, 2020).

Despite these efforts, the adoption of circular economy practices in FMCG industries faces several challenges. One significant barrier is the complexity of transitioning from linear to circular models. The implementation of circular

principles often requires redesigning products, modifying supply chains, and developing new business models, which can be both costly and complex (Adegoke, et. al., 2024, Kirchherr et al., 2018). Furthermore, the lack of standardized metrics and frameworks for measuring circularity poses challenges for companies seeking to assess and demonstrate their progress.

A notable example of circular economy implementation in the FMCG sector is the initiative by the Dutch company, Philips. Philips has pioneered a circular approach with its "Circular Lighting" business model, which focuses on providing lighting as a service rather than selling products outright (Ameyaw, Idemudia & Iyelolu, 2024, Ige, Kupa & Ilori, 2024, Raji, Ijomah & Eyeyien, 2024). This model allows Philips to maintain ownership of the lighting equipment and ensures that it can be returned, refurbished, and reused, thereby extending the product lifecycle and reducing waste (Adegoke, et. al., 2024, Philips, 2019). This approach not only aligns with circular economy principles but also offers Philips a recurring revenue stream and strengthens customer relationships through long-term service agreements.

Another compelling case study is that of the French multinational, Danone, which has committed to circularity through its "One Planet. One Health" initiative. Danone's efforts include the development of a closed-loop system for its packaging, where used bottles are collected, recycled, and used to produce new bottles (Adegbola, et. al., 2024, Bello, Ige & Ameyaw, 2024, Olawale, et. al., 2024). Danone has also been investing in innovative packaging solutions, such as biodegradable and compostable materials, to reduce its environmental footprint and promote a circular approach in its operations (Danone, 2020). The company's focus on integrating circular principles into its product packaging and supply chain illustrates the practical application of circular economy concepts in the FMCG industry.

These case studies highlight the diverse approaches that companies are taking to integrate circular economy principles into their operations. However, the successful implementation of circular economy models is not without its challenges. Companies often encounter difficulties in achieving the necessary scale and infrastructure for effective recycling and reuse (Ajayi & Udeh, 2024, Akinsanya, Ekechi & Okeke, 2024, Okatta, Ajayi & Olawale, 2024c). Additionally, consumer behavior plays a crucial role in the success of circular initiatives. Educating and engaging consumers about the benefits of circular products and services is essential for driving demand and ensuring the effectiveness of circular economy practices (Adegoke, et. al., 2024, Murray et al., 2017).

The circular economy offers numerous opportunities for FMCG companies to enhance their sustainability efforts and reduce their environmental impact. By adopting circular principles, companies can improve resource efficiency, reduce waste, and create new business models that align with evolving consumer preferences for sustainability (Ekechi, et. al., 2024, Hassan, et. al., 2023, Kedi, et. al., 2024, Toromade, et. al., 2024). However, realizing these opportunities requires overcoming significant challenges, including the need for technological innovation, investment in infrastructure, and changes in consumer behavior.

In conclusion, the current state of circular economy adoption in the FMCG industry reflects both progress and challenges. Companies like Unilever, Procter & Gamble, Philips, and Danone are leading the way in implementing circular economy practices, demonstrating the potential benefits and opportunities of this approach (Benjamin, et. al., 2024, Eziamaka, Odonkor & Akinsulire, 2024, Amajuoyi & Adeusi, 2024). However, the transition to circular models requires overcoming obstacles related to complexity, scale, and consumer engagement. As the FMCG sector continues to evolve, the integration of circular economy principles will play a crucial role in shaping the future of sustainable business practices.

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#### **4 Challenges in Implementing Circular Economy Models**

Implementing circular economy (CE) models in the Fast-Moving Consumer Goods (FMCG) sector presents a range of challenges that hinder the transition from traditional linear models to more sustainable practices. These challenges encompass technological and operational issues, financial and economic barriers, regulatory and compliance concerns, and supply chain and logistics constraints (Akinsulire, et. al., 2024, Amajuoyi, Benjamin & Adeusi, 2024, Oluokun, Ige & Ameyaw, 2024). Addressing these obstacles is crucial for successfully adopting circular economy principles and achieving sustainability goals within the FMCG industry.

Technological and operational challenges are among the primary hurdles faced by FMCG companies seeking to implement circular economy models. One significant issue is the limitation of existing infrastructure, which often lacks the necessary capacity or capability to support circular practices such as recycling, remanufacturing, or closed-loop systems (Abitoye, et. al., 2023, Akinsulire, et. al., 2024, Odonkor, Eziamaka & Akinsulire, 2024). For instance, current recycling facilities may be inadequate for processing complex materials used in FMCG products, leading to inefficiencies and higher costs (Adegoke, 2024, Ghisellini et al., 2016). Furthermore, integrating circular economy practices with

existing systems can be technically demanding. Many companies operate with established linear supply chains and manufacturing processes that are not easily adapted to circular models, necessitating substantial modifications to production lines and supply chain management (Kirchherr et al., 2018).

Financial and economic barriers also pose significant challenges to the adoption of circular economy models in the FMCG sector. The initial costs associated with transitioning to circular practices can be substantial, encompassing investments in new technologies, infrastructure, and processes (Abdul-Azeez, Ihechere & Idemudia, 2024, Ijomah, et. al., 2024, Raji, Ijomah & Eyieyien, 2024). For example, redesigning products to be more recyclable or durable may involve higher production costs, which can be a deterrent for companies operating under tight profit margins (Lieder & Rashid, 2016). Additionally, the return on investment (ROI) for circular economy initiatives can be uncertain and slow to materialize. Companies may face difficulties in quantifying the long-term financial benefits of circular practices, such as reduced waste disposal costs or enhanced brand value, which can complicate the decision-making process (Adegoke, et. al., 2020, Bocken et al., 2016).

Regulatory and compliance issues further complicate the implementation of circular economy models. Navigating complex legal frameworks and ensuring compliance with various regulations can be challenging for FMCG companies. Regulations governing waste management, product safety, and recycling vary widely across regions and can impose differing requirements on businesses (Murray et al., 2017). For instance, the European Union's Circular Economy Action Plan mandates specific recycling targets and extended producer responsibility programs, which may not align with regulations in other regions (Bello, Idemudia & Iyelolu, 2024, Eyieyien, et. al., 2024, Olawale, et. al., 2024). Adapting to these diverse regulatory environments requires significant resources and expertise, posing an additional burden for companies pursuing circular economy initiatives (Cohen & Kharb, 2020).

Supply chain and logistics constraints are also critical factors that impact the successful implementation of circular economy models. Coordinating with suppliers to ensure that materials are sourced sustainably and can be effectively recycled or reused is a complex task (Adesina, Iyelolu & Paul, 2024, Esan, Ajayi & Olawale, 2024, Okatta, Ajayi & Olawale, 2024). Companies need to establish robust partnerships with suppliers and invest in traceability systems to ensure the circularity of materials throughout the supply chain (Rosa et al., 2019). Additionally, managing logistics for recycling and recovery can be challenging, particularly when dealing with dispersed collection points and varying local recycling capabilities. Efficiently organizing the collection, sorting, and transportation of used products and materials requires a well-developed logistics network and collaboration across various stakeholders (Gao et al., 2018).

Despite these challenges, there are opportunities for overcoming barriers and advancing the implementation of circular economy models in the FMCG industry. Technological advancements, such as innovations in recycling technologies and materials science, can help address infrastructure limitations and integrate circular practices with existing systems (Adepoju, Sanusi & Toromade Adekunle, 2018, Ajayi & Udeh, 2024, Osundare & Ige, 2024). Financial models that highlight the long-term economic benefits of circular practices can also support investment decisions and demonstrate the value of circular economy initiatives (Lieder & Rashid, 2016). Collaborative efforts between industry stakeholders, policymakers, and researchers can facilitate the development of standardized regulations and best practices for circular economy implementation (Murray et al., 2017). By addressing these challenges and leveraging opportunities, the FMCG sector can make significant progress toward adopting circular economy models and achieving greater sustainability.

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## 5 Opportunities for Implementing Circular Economy Models

Implementing circular economy (CE) models in the Fast-Moving Consumer Goods (FMCG) industry presents several significant opportunities that can lead to substantial environmental, economic, and market benefits (Abdul-Azeez, Ihechere & Idemudia, 2024, Kedi, et. al., 2024, Orij, et. al., 2023, Udeh, et. al., 2024). These opportunities are driven by the potential for reducing waste and pollution, conserving resources, achieving economic advantages, responding to consumer and market trends, and leveraging technological innovations. Embracing these opportunities can help FMCG companies transition towards more sustainable practices and create long-term value.

One of the primary opportunities presented by circular economy models is the substantial environmental benefit of reducing waste and pollution. Traditional linear economic models often result in large quantities of waste and environmental degradation due to the take-make-dispose approach. In contrast, circular economy principles emphasize waste minimization through strategies such as recycling, reusing, and repurposing materials (Adegbola, et. al., 2024, Akinsulire, et. al., 2024, Obeng, et. al., 2024, Udeh, et. al., 2024). By implementing closed-loop systems and redesigning products for easier recycling or reuse, FMCG companies can significantly reduce the volume of waste that ends up in landfills and decrease the overall pollution associated with product disposal (Geissdoerfer et al., 2017). Furthermore, circular economy models can contribute to the conservation of natural resources by promoting the efficient use of

materials and encouraging the use of renewable resources. This approach not only helps to mitigate resource depletion but also reduces the environmental footprint of production processes (Kirchherr et al., 2018).

From an economic perspective, circular economy models offer several advantages that can benefit FMCG companies. One of the key economic benefits is cost savings through improved efficiency. Circular practices such as resource optimization and waste reduction can lead to lower operational costs and reduced material expenses (Abdul-Azeez, Ihechere & Idemudia, 2024, Iyelolu, et. al., 2024, Okatta, Ajayi & Olawale, 2024b). For example, companies that implement recycling programs or use recycled materials in their products may experience reduced raw material costs and decreased waste management expenses (Bocken et al., 2016). Additionally, circular economy models can create new revenue streams and business models by opening up opportunities for product-as-a-service models, remanufacturing, and secondary markets. These models can generate additional income and provide businesses with new ways to engage with customers beyond traditional product sales (Lieder & Rashid, 2016).

Consumer and market trends also present significant opportunities for FMCG companies adopting circular economy models. There is a growing demand for sustainable products among consumers, driven by increasing environmental awareness and concerns about the impact of traditional consumption patterns (Akinsanya, Ekechi & Okeke, 2024, Benjamin, Amajuoyi & Adeusi, 2024, Olawale, et. al., 2024). Consumers are increasingly seeking out products that are designed with sustainability in mind and are willing to support brands that demonstrate a commitment to circular practices (Nielsen, 2018). By aligning their products and practices with these consumer preferences, FMCG companies can enhance their brand reputation and build customer loyalty. This alignment not only helps to attract and retain environmentally conscious consumers but also differentiates brands in a competitive market (Bocken et al., 2016).

Technological innovations play a crucial role in advancing circular economy models and creating new opportunities for FMCG industries. Advances in recycling technologies, such as improved sorting and processing techniques, are making it more feasible to recycle complex materials and increase recycling rates (Ajayi & Udeh, 2024, Akinsulire, et. al., 2024, Ijomah, et. al., 2024, Udeh, et. al., 2024). Innovations in material science and engineering are also contributing to the development of circular product designs that are easier to disassemble, repair, or upgrade (Ghisellini et al., 2016). These technological advancements enable companies to implement more effective circular practices and integrate sustainability into their product design and manufacturing processes.

Overall, the implementation of circular economy models in the FMCG industry offers a range of opportunities that can drive significant environmental and economic benefits while aligning with consumer trends and technological advancements. By focusing on reducing waste and pollution, conserving resources, capitalizing on cost savings and new business models, responding to growing consumer demand for sustainable products, and leveraging technological innovations, FMCG companies can achieve substantial progress towards sustainability goals and create long-term value (Agu, et. al., 2024, Akinsulire, 2012, Bello, Idemudia & Iyelolu, 2024, Toromade, Chiekiezie & Udo, 2024).

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## 6 Strategies for Overcoming Challenges and Capitalizing on Opportunities

Implementing circular economy models in the Fast-Moving Consumer Goods (FMCG) industry involves navigating a range of challenges while also seizing numerous opportunities for improvement. Addressing these challenges effectively requires a strategic approach that incorporates best practices, policy recommendations, and the development of a circular supply chain (Abitoye, et. al., 2023, Akinsanya, Ekechi & Okeke, 2024, Olawale, et. al., 2024). By leveraging collaborations and partnerships, investing in research and development, advocating for supportive policies, and building efficient recycling systems, FMCG companies can overcome barriers and capitalize on the benefits of circular economy practices.

One of the most effective strategies for overcoming challenges in implementing circular economy models is fostering collaborations and partnerships. Collaborations between FMCG companies, suppliers, technology providers, and other stakeholders can facilitate the sharing of knowledge, resources, and best practices (Bello, Ige & Ameyaw, 2024, Ekechi, Okeke & Adama, 2024, Okatta, Ajayi & Olawale, 2024). Partnerships with technology firms can enhance the development and deployment of advanced recycling technologies and circular product designs (Bocken et al., 2016). Additionally, working with suppliers to establish circular procurement practices can ensure that materials used in production are sustainably sourced and recyclable (Lieder & Rashid, 2016). Collaborative efforts can also include participating in industry-wide initiatives and consortia focused on advancing circular economy principles, which can provide valuable insights and support for overcoming implementation challenges (Geissdoerfer et al., 2017).

Investment in research and development (R&D) is another crucial strategy for addressing challenges and capitalizing on opportunities in circular economy implementation. R&D efforts can drive innovation in product design, materials

science, and recycling processes, enabling FMCG companies to develop more effective circular solutions (Ghisellini et al., 2016). For example, investing in the development of materials that are easier to recycle or have a longer lifespan can reduce the environmental impact of products and enhance their circularity (Kirchherr et al., 2018). Furthermore, R&D can support the creation of new business models and technologies that align with circular economy principles, such as product-as-a-service models and closed-loop systems (Lieder & Rashid, 2016). By prioritizing R&D, companies can stay at the forefront of circular economy innovations and effectively address the challenges associated with transitioning to a circular model (Abdul-Azeez, Ihechere & Idemudia, 2024, Ige, Kupa & Ilori, 2024, Amajuoyi & Adeusi, 2024).

Policy and regulatory recommendations play a significant role in supporting the successful implementation of circular economy models. Advocating for supportive policies at the national and international levels can create an enabling environment for circular practices (Akinsulire, et. al., 2024, Amajuoyi, Nwobodo & Adegbola, 2024, Osundare & Ige, 2024). Governments can implement policies that incentivize the use of recycled materials, provide funding for circular economy initiatives, and set regulations that promote waste reduction and resource efficiency (Bocken et al., 2016). Engaging with regulatory bodies to shape and influence these policies is essential for ensuring that they align with the needs of the FMCG industry and effectively address the challenges faced by companies adopting circular economy practices (Geissdoerfer et al., 2017). Companies can also collaborate with industry associations and advocacy groups to support the development of standards and regulations that facilitate circular economy implementation (Kirchherr et al., 2018).

Building a circular supply chain is another critical strategy for overcoming challenges and capitalizing on the benefits of circular economy models. Integrating circular principles into procurement practices can help ensure that materials and products meet sustainability criteria and support circularity (Lieder & Rashid, 2016). This involves selecting suppliers that prioritize sustainable sourcing, use recyclable or biodegradable materials, and adhere to circular economy principles (Adeusi, Amajuoyi & Benjami, 2024, Eziamaka, Odonkor & Akinsulire, 2024, Udeh, et. al., 2024). Developing efficient recycling systems is also essential for closing the loop in the supply chain. Companies should invest in infrastructure and technologies that enable effective collection, sorting, and processing of recyclable materials (Ghisellini et al., 2016). By creating a circular supply chain, FMCG companies can enhance the sustainability of their operations and contribute to the overall success of circular economy models.

In summary, overcoming the challenges and capitalizing on the opportunities associated with implementing circular economy models in the FMCG industry requires a multifaceted approach. Best practices such as fostering collaborations and partnerships, investing in R&D, and building a circular supply chain are crucial for addressing technological, financial, and operational challenges (Adepoju, Oladeebo & Toromade, 2019, Ajayi & Udeh, 2024, Okatta, Ajayi & Olawale, 2024a). Policy and regulatory recommendations play a vital role in creating an enabling environment for circular practices. By adopting these strategies, FMCG companies can effectively transition to circular economy models, realize environmental and economic benefits, and contribute to a more sustainable future.

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## 7 Future Directions and Trends

The future of circular economy models in the Fast-Moving Consumer Goods (FMCG) industry is shaped by several emerging trends and advancements, driven by both technological innovations and evolving regulatory frameworks. As companies strive to integrate circular principles into their operations, they face opportunities and challenges that will define the trajectory of sustainability in the FMCG sector (Abdul-Azeez, Ihechere & Idemudia, 2024, Ige, Kupa & Ilori, 2024, Toromade, et. al., 2024).

One prominent trend in the circular economy for FMCG is the development and adoption of circular business models. These models shift away from traditional linear approaches, focusing instead on creating closed-loop systems where resources are continually reused and regenerated. Companies are increasingly exploring models such as product-as-a-service, where consumers pay for the utility of a product rather than owning it outright (Lieder & Rashid, 2016). This approach not only reduces waste but also fosters greater customer engagement by maintaining ownership and responsibility for the product throughout its lifecycle (Akinsanya, Ekechi & Okeke, 2024, Esan, Ajayi & Olawale, 2024, Amajuoyi & Adeusi, 2024). Additionally, subscription-based services and take-back schemes are gaining traction, enabling companies to recover used products for refurbishment or recycling (Bocken et al., 2016). These circular business models offer significant potential for reducing environmental impact while creating new revenue streams and customer relationships.

Technological advancements are another crucial factor driving the future of circular economy practices in FMCG. Innovations in recycling technologies are making it increasingly feasible to process complex waste streams and recover valuable materials. For example, advancements in chemical recycling are enabling the breakdown of plastic waste into

its constituent monomers, which can then be used to produce new plastics of the same quality as virgin materials (Geyer et al., 2017). Furthermore, developments in digital technologies, such as blockchain and the Internet of Things (IoT), are enhancing transparency and traceability in supply chains (Bello, Idemudia & Iyelolu, 2024, Ekechi, et. al., 2024, Olawale, et. al., 2024). Blockchain technology can be used to track the lifecycle of materials, ensuring that products are recycled and reused according to circular principles (Ritchie et al., 2019). IoT devices can provide real-time data on product usage and end-of-life, facilitating more effective recycling and resource recovery strategies.

The role of policy and regulation is pivotal in advancing the adoption of circular economy models in the FMCG sector. Governments and regulatory bodies play a crucial role in creating an enabling environment for circular practices by setting standards, providing incentives, and enforcing regulations that support sustainability (Geissdoerfer et al., 2017). For instance, Extended Producer Responsibility (EPR) policies require manufacturers to take responsibility for the entire lifecycle of their products, including end-of-life management and recycling (Kumar et al., 2019). Such policies incentivize companies to design products with recycling and reuse in mind, thereby promoting circular economy principles (Adegbola, et. al., 2024, Chukwurah, et. al., 2024, Obeng, et. al., 2024). Additionally, policymakers are increasingly focusing on integrating circular economy goals into broader sustainability frameworks and economic strategies. The European Union's Circular Economy Action Plan, for example, outlines measures to promote sustainable product design, increase recycling rates, and reduce waste (European Commission, 2020). By aligning regulatory frameworks with circular economy objectives, governments can drive systemic changes that support the transition to a more sustainable FMCG industry (Abdul-Azeez, Ihechere & Idemudia, 2024, Bello, Idemudia & Iyelolu, 2024).

Looking ahead, the long-term vision for the circular economy in the FMCG sector involves creating a more sustainable and resilient industry that fully embraces circular principles. This vision includes several key components: Achieving widespread adoption of circular economy models will require systemic integration across the entire value chain (Akinsulire, et. al., 2024, Amajuoyi, Nwobodo & Adegbola, 2024, Okatta, Ajayi & Olawale, 2024). Companies will need to collaborate with suppliers, customers, and other stakeholders to develop and implement circular practices effectively. This includes designing products for durability and recyclability, optimizing supply chains for resource efficiency, and establishing robust recycling and recovery systems (Ghisellini et al., 2016). Continuous innovation will be essential for advancing circular economy practices and overcoming existing challenges. Companies must invest in research and development to explore new materials, technologies, and business models that support circularity. This may involve adopting cutting-edge technologies such as artificial intelligence for optimizing recycling processes or exploring new ways to close material loops (Kirchherr et al., 2018).

Engaging consumers in the circular economy transition is crucial for its success. Educating consumers about the benefits of circular products and encouraging participation in recycling programs can drive demand for sustainable products and practices (Ajayi & Udeh, 2024, Akinsulire, et. al., 2024, Esan, Ajayi & Olawale, 2024). Companies can also leverage digital platforms to enhance customer engagement and facilitate take-back schemes and product returns (Lieder & Rashid, 2016). The transition to a circular economy is a global challenge that requires international cooperation and knowledge sharing. Companies and governments should work together to address common challenges, share best practices, and develop global standards for circular economy practices. International collaborations can also help harmonize regulations and create a level playing field for companies operating across different regions (Geissdoerfer et al., 2017).

In conclusion, the future of circular economy models in the FMCG industry is shaped by emerging trends such as circular business models and technological advancements, as well as the critical role of policy and regulation (Bello, Idemudia & Iyelolu, 2024, Benjamin, Amajuoyi & Adeusi, 2024, Scott, Amajuoyi & Adeusi, 2024). By focusing on systemic integration, innovation, consumer engagement, and global collaboration, FMCG companies can navigate the challenges and capitalize on the opportunities presented by circular economy practices. As the industry continues to evolve, the commitment to sustainability and circularity will be key drivers of long-term success and resilience.

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## 8 Conclusion

The implementation of circular economy models in the Fast-Moving Consumer Goods (FMCG) industry reveals a complex landscape marked by both significant challenges and promising opportunities. The key findings highlight the multifaceted nature of transitioning to a circular economy, where the principles of waste minimization, resource efficiency, and product life extension are at the forefront. While the adoption of circular practices offers substantial benefits, including reduced environmental impact and new revenue streams, it also presents considerable obstacles that need addressing. Challenges such as technological and operational limitations, financial constraints, and regulatory hurdles are prominent. The infrastructure necessary for effective recycling and recovery often lags behind, complicating efforts to close material loops. Financially, the initial investment required for implementing circular processes can be



substantial, and the return on investment may not be immediately apparent, which can deter companies from pursuing these models. Additionally, navigating the complex landscape of regulations and ensuring compliance can be daunting, particularly in regions with varying legal frameworks and standards. Supply chain and logistics constraints further exacerbate these issues, requiring intricate coordination and innovative solutions to manage recycling and recovery effectively.

Despite these challenges, the opportunities offered by circular economy models are substantial. Embracing circular practices can lead to significant environmental benefits, such as reducing waste and conserving resources. These models also present economic advantages, including cost savings through increased efficiency and the creation of new business models and revenue streams. Consumer demand for sustainable products is rising, and companies that adopt circular practices can enhance their brand reputation and build customer loyalty. Technological advancements, such as improved recycling technologies and innovations in circular product design, are also creating new possibilities for implementing circular economy principles more effectively. To navigate the path forward, FMCG industries must adopt strategic approaches that address both the challenges and opportunities identified. Effective implementation requires robust collaborations and partnerships, as well as substantial investments in research and development to overcome technological and financial barriers. Engaging with policymakers to advocate for supportive policies and regulations is crucial, as is developing circular supply chains that integrate circular principles in procurement and establish efficient recycling systems.

Future research and development should focus on exploring innovative solutions to overcome existing limitations and advancing circular economy practices. Areas for further investigation include improving the economic feasibility of circular models, enhancing recycling technologies, and developing comprehensive policy frameworks that support circular practices globally. In summary, while the transition to circular economy models in the FMCG sector presents several challenges, the potential benefits underscore the importance of pursuing these practices. By addressing the obstacles and leveraging the opportunities, FMCG companies can contribute to a more sustainable future, driving both environmental and economic gains.

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## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

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