



# Circular Economy in Emerging Countries: A Systematic Literature Review of Challenges and Solution Strategies for Sustainability

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**Abstract.** A circular economy is an economic model that aims to generate economic growth by maintaining the value of products, materials and resources in the economy for as long as possible, thereby minimizing social and environmental damage caused by a linear economic approach. The implementation of a circular economy is important to implement in developing countries. If implemented effectively, the circular economy can help organizations and society as a whole move towards more sustainable and environmentally friendly consumption and production patterns. Existing literature does not yet provide comprehensive knowledge about the circular economy in emerging markets that explains the challenges and strategic solutions for sustainability. This study uses PRISMA methodology to systematically review 56 peer-reviewed research articles on the circular economy in developing countries. We expect this systematic literature review can contribute significantly by giving strategic solutions for the impact of circular economy in emerging countries towards a more sustainable and inclusive economy. Various theoretical and practical implications will be generated in this research.

**Keywords:** Circular Economy, Economic Growth, Sustainability.

## 1 Introduction

The concept of a circular economy has garnered increasing attention as an innovative economic model that prioritizes sustainability and resource efficiency [1], [2]. Unlike the traditional linear model which typically follows a 'take-make-dispose' approach, a circular economy seeks to retain the value of products, materials, and resources within

the economy for as long as possible [3]. This model not only aims to stimulate economic growth but also strives to mitigate the environmental and social harms associated with conventional consumption and production methods [4]. The relevance of adopting a circular economy is particularly pronounced in developing countries, where resource efficiency and environmental impact are critical to sustainable development [5].

Despite its significance, there remains a notable gap in literature concerning the application of circular economy practices in emerging markets. The challenges and strategic solutions necessary for effective implementation in these contexts are not comprehensively understood [6]. Addressing this knowledge gap, this study aims to unearth strategic solutions that could facilitate the transition towards a more sustainable and inclusive economic system in these regions. By doing so, this research anticipates offering both theoretical and practical implications that could significantly influence sustainable development strategies in emerging markets.

The research gap identified in this domain pertains to the absence of a comprehensive and systematic analysis of the scholarly literature surrounding the circular economy in emerging countries. Existing research often lacks a holistic perspective, and a systematic literature review can provide the necessary insights into the challenges and strategic solutions for implementing a circular economy in emerging countries [7]. Bridging this gap will facilitate a deeper understanding of how to address the challenges of the circular economy using optimal solution strategies, offering valuable insights for both researchers and practitioners. Hence, the primary objective of this research is to address the research questions:

**RQ1.** What is the profile of past research that exposes circular economy in emerging markets that explains the challenges and strategic solutions for sustainability (e.g., publication trends, publishers, methodologies, and units of analysis)?

**RQ2.** What are the key barriers and challenges to implementing circular economy practices in emerging countries as reported in the existing literature (e.g., implementation of a green supply chain, consumer perceptions and behavior, industrial type, and firm level)?

**RQ3.** What strategic solutions have been proposed or implemented to overcome the challenges of circular economy adoption in emerging markets (e.g: implementation of a green supply chain, consumer perceptions and behavior, industrial type, and firm level)?

**RQ4.** What gaps exist in the current literature on circular economies in developing countries, and what areas require further research?

This study is poised to make a significant contribution by providing a systematic literature review (SLR) on the circular economy in emerging countries, a topic that has received limited comprehensive analysis to date. This study identifying the challenges associated with implementing circular economy models in these regions. By delineating strategic solutions that have proven effective and highlighting areas where further research is needed, this work will not only advance academic understanding but also offer practical guidance for policymakers and businesses aiming to foster sustainable economic practices in developing contexts. Thus, the study aims to bridge critical knowledge gaps and contribute to the development of a more sustainable and inclusive global economy.

## 2 Literature review

A circular economy is an economic approach designed to improve sustainability by minimizing waste and maximizing resource reuse [8]. This model challenges the traditional linear economic paradigm based on a 'take-make-dispose' approach by promoting the reuse, repair, re-improvement and recycling of products and materials to extend their life cycles. The main goal of a circular economy is to decouple economic growth from overconsumption of natural resources and environmental degradation, thereby supporting job creation while reducing the environmental impact of economic activities [9]. This strategy reduces the need for new raw materials, reduces waste volumes, reduces greenhouse gas emissions and increases energy efficiency. In the context of developing countries, the circular economy offers opportunities for sustainable economic growth by reducing material costs and waste disposal while improving quality of life and reducing CO<sub>2</sub> emissions [10], [11].

In recent decades, the circular economy concept has gained increasing attention as an innovative economic model prioritising sustainability and resource efficiency [12]. Unlike traditional linear models, this model seeks to maintain the value of products, materials, and resources in the economy for as long as possible. Thus, a circular economy aims to stimulate economic growth and reduce the environmental and social damage associated with conventional consumption and production methods. The relevance of adopting a circular economy is especially evident in developing countries, where resource efficiency and environmental impact are critical for sustainable development [2].

Despite the importance of the circular economy, there remains a significant literature gap regarding implementing circular economy practices in emerging markets [13]. The challenges and strategic solutions required for effective implementation in this context are not yet fully understood. This research aims to uncover strategic solutions to facilitate the transition to a more sustainable and inclusive economic system in these regions. Thus, this research anticipates providing theoretical and practical implications that can significantly influence sustainable development strategies in emerging markets.

The research gaps identified in this domain relate to the lack of comprehensive and systematic analysis of the academic literature on the circular economy in developing countries. Existing research often lacks a holistic perspective, and a systematic literature review can provide necessary insights into the challenges and strategic solutions for implementing a circular economy in developing countries. Addressing this gap will facilitate a deeper understanding of how to face circular economy challenges with optimal solution strategies, providing valuable insights for researchers and practitioners.

This study aims to contribute significantly by providing a systematic literature review (SLR) on the circular economy in developing countries, a topic that has not been comprehensively analysed. This research identifies the challenges of implementing circular economy models in these regions. By outlining strategic solutions that have proven effective and highlighting areas that require further research, this work will advance academic understanding and provide practical guidance for policymakers and businesses aiming to encourage sustainable economic practices in emerging contexts.

Thus, this study aims to bridge critical knowledge gaps and contribute to developing a more sustainable and inclusive global economy.

### 3 Method

#### 3.1 Inclusion and exclusion criteria

The inclusion and exclusion criteria were carefully chosen to ensure the accuracy and relevance of the literature review results. The set inclusion criteria include publications in English and articles that specifically discuss circular economy strategies, business model value dimensions, and the impact of the circular economy on sustainability in developing countries. Conversely, the exclusion criteria involve the removal of studies from non-peer-reviewed books, book chapters, conference papers, practical reports, theses/dissertations, works in predatory journals, and articles that do not have a clear connection regarding the challenges and strategic solutions for circular economy sustainability. This selective process ensures that the literature review only involves high-quality sources relevant to the research topic. The inclusion and exclusion criteria can be seen in Table 1.

**Table 1.** Inclusion and exclusion criteria

<b>Inclusion</b>	<b>Exclusion</b>
Published in English	Ignoring studies originating from nonpeer-reviewed books, book chapter, conference paper, practical reports, theses/dissertation, working paper, and predatory journal
All Year	Article that missing a connection of challenges and solution strategies for sustainability of Circular economy in emerging countries
Final Paper that published in academic journal article	
Article that emphasize and have relevance in challenges and solution strategies for sustainability of Circular economy in emerging countries	

### 3.2 Data screening and selection

This research employs a detailed guide on implementing a systematic literature review following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. PRISMA offers a structured approach for organizing and reporting systematic reviews. The procedure initiates by selecting specific keywords to establish sample criteria that help identify pertinent studies, focusing on the challenges, and strategic solutions for circular economy implementation in emerging countries. The selected keywords for this analysis are ("circular economy" AND "emerging economy" AND "emerging country" AND "challenge" AND "solution" AND "sustainability").

For the article search, we utilize the Google Scholar database through the Publish or Perish software. Google Scholar is chosen for its extensive database coverage, ease of use, and accessibility, which are crucial for compiling data for systematic reviews (Haddaway et al., 2015). We initially retrieved 342 articles. Following the PRISMA methodology for article selection, as illustrated in Figure 1, the first filtering step, conducted using Mendeley desktop, focused on titles and keywords, which resulted in the exclusion of 176 articles, leaving 166 articles. The second stage involved scrutinizing abstracts, leading to the exclusion of 76 articles due to their irrelevance to the study's focus on the challenges, and strategic solutions for circular economy implementation in emerging countries. Subsequent thorough evaluation of the remaining 90 articles resulted in the exclusion of 35 articles that did not fulfill the defined inclusion, exclusion, and quality criteria, leaving 55 articles for detailed analysis. Additionally, a citation chain search was conducted on these 55 articles to identify further pertinent studies, adding one more article and bringing the final tally to 56 articles for the review.

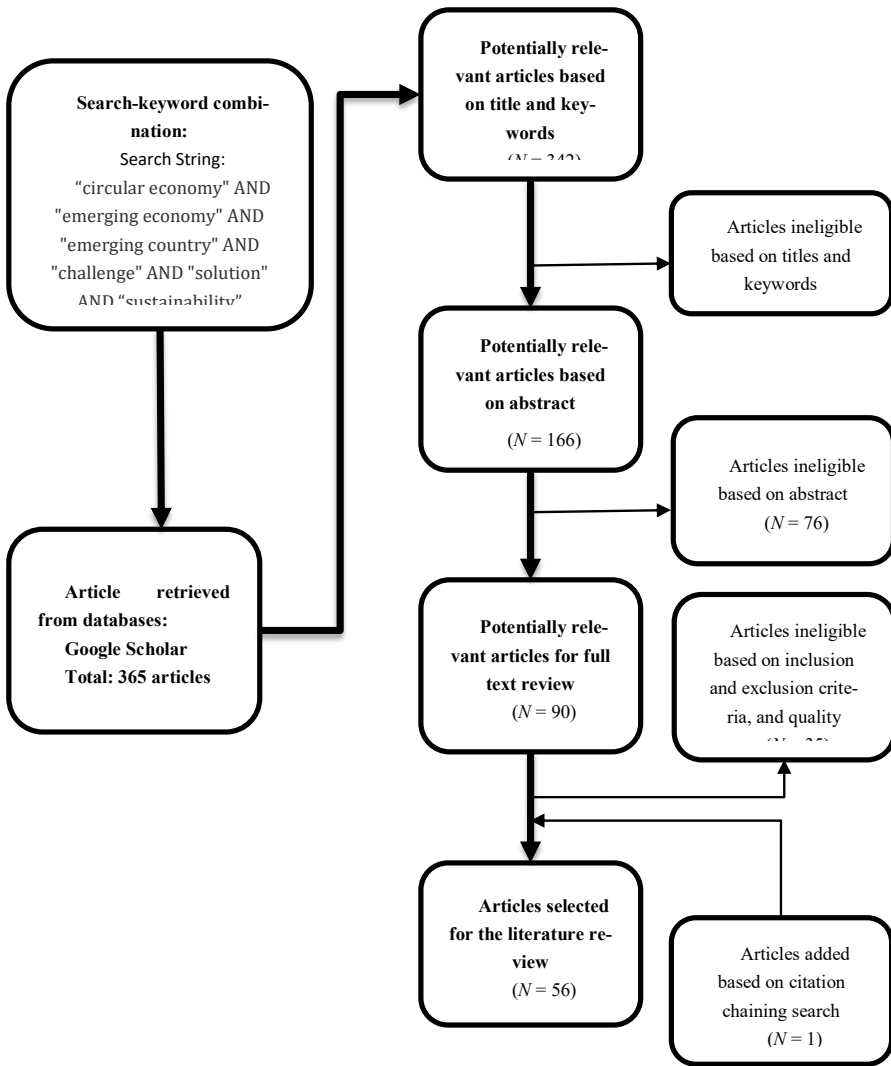
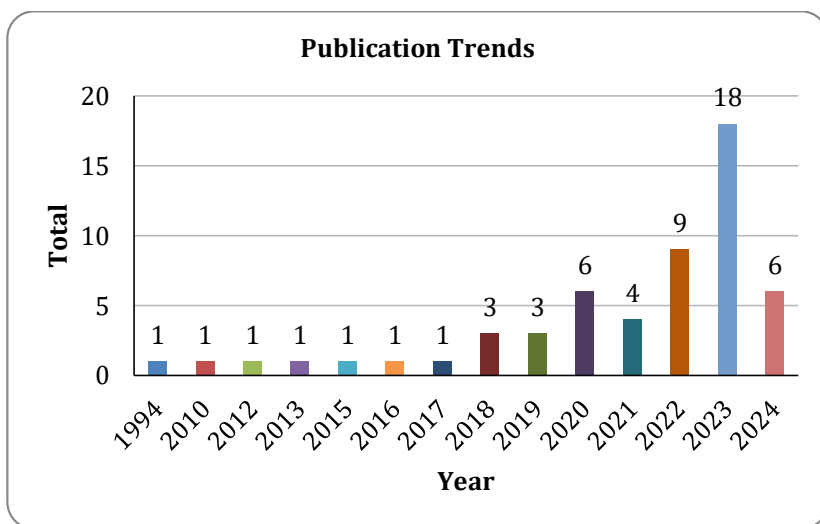


Figure. 1. PRISMA model

#### 4 Result and Analysis

The discussion section presents the results of a systematic literature review regarding challenges and strategic solutions for implementing a circular economy in developing countries. This study identifies various barriers that hinder the adoption of a circular

economy and proposes or implements strategic solutions to overcome these challenges. The data obtained will be described in several sub-sections, covering the main challenges based on green supply chains, consumer perceptions and behaviour towards sustainable products, industry type and company level. This analysis aims to provide a comprehensive picture of the factors influencing the implementation of a circular economy in the context of developing countries and how various stakeholders can work together to overcome these obstacles.



**Figure. 2.** Publication trends

Before entering the main part of the discussion, this research also explains previous research trends by explaining several things, such as publication trends from 1994 to 2024, publishers, methodologies, and units of analysis.

Based on Figure 2, the trend of publications regarding challenges and strategic solutions for implementing a circular economy in developing countries is increasing. Starting from 1994 and peaking in 2023. These articles were published in various journals of various quality. This research analyzes articles indexed by Scopus starting from Q1-Q3 with various SJRs. Apart from Scopus, there are also several journal articles that are indexed internationally besides Scopus, such as EBSCO.

The articles published in various quality journals in this research were published by various well-known publishers, most of them by Elsevier, Emerald, Taylor & Francis, and MDPI. The methodology and unit level of analysis are explained in Table 2. Research on challenges and strategic solutions for implementing a circular economy in developing countries is often conducted at the organizational unit level of analysis using a quantitative research approach.

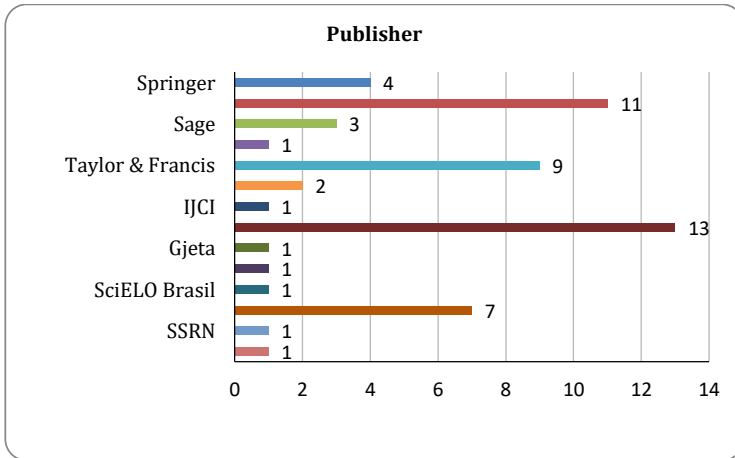


Figure 3. Publishers

Table 2. Methodology and unit level analysis

Research methodology	Level of unit analysis						
	Individual	SMEs	Start Up	Organizational	Industry	Country	Multi-level
Literature review							5
Quantitative	11	5		10	3	2	
Qualitative	3		1	7	2		
Mixed-method	2			4	1		
Total	16	5	1	21	6	2	5

### 4.1 Challenges and solution strategies for a green supply chain

Green supply chains aim to integrate environmentally sustainable processes into traditional supply chains [14]. However, implementing green initiatives often faces significant challenges that can hinder their adoption and effectiveness. These challenges can be broadly categorized into financial, regulatory, technological, infrastructure and operational barriers [15] (See Table 3). Overcoming these challenges requires a solution strategy that involves collaboration between governments, financial institutions and companies. The following is an explanation of each challenge and the solution:

Adopting green supply chain initiatives often involves high financial costs [16]. Significant initial costs and perceived low return on investment can deter companies from



adopting sustainable practices. Financial support from governments and financial institutions is essential to overcome these challenges. The government can provide grants, subsidies, and low-interest loans to help companies offset initial investment costs [17]. Tax incentives for companies adopting green technologies can also encourage investment in sustainable practices.

The lack of government regulations and legislation is also a major obstacle to implementing green supply chains. In many developing countries, the absence of regulatory pressures allows companies to continue operating under traditional, less sustainable models. To overcome this, the government needs to strengthen regulations and legislation related to environmental sustainability [18]. Establishing clear legal standards, procedures, and incentives for sustainable operations will create a more conducive environment for companies to shift to greener practices. These regulatory measures can be accompanied by sanctions for non-compliance, thereby encouraging compliance with sustainable practices.

Waste processing technology that is less efficient and environmentally friendly is also a big challenge in the green supply chain. Many regions still lack the infrastructure and expertise to implement advanced waste management solutions. The solution to this problem is to invest in clean and sustainable technologies. Companies can work with third parties with better waste processing facilities or develop their own technology. Continuous innovation and improvement in waste processing techniques can increase the efficiency and sustainability of supply chain operations [1].

Poor transport infrastructure also hinders the efficiency of green supply chains. Poor road conditions, inefficient logistics networks and limited access to sustainable transport options can increase emissions and operational costs. To address this, investment in better transport infrastructure is urgently needed. Governments and the private sector can work together to develop and maintain transportation infrastructure that supports green supply chain initiatives. This infrastructure improvement will reduce emissions, lower operational costs, and speed up the delivery of goods.

Lack of adequate storage facilities and efficient packaging methods also pose challenges in maintaining product quality and reducing waste. Poor storage conditions can lead to wastage, damage and increased waste. The solution to this challenge is to use better storage technology and efficient packaging methods. Implementing more advanced storage solutions, such as climate-controlled facilities and optimal packaging design, can extend product shelf life and reduce spoilage.

**Table 3.** The key barriers and challenges to implementation of a green supply chain

<b>Key barriers</b>	<b>Causes of the barriers</b>	<b>Strategic solutions</b>
Lack of adoption of green supply chain initiatives	<ul style="list-style-type: none"> <li>• Expensive financial costs</li> <li>• High investment and low return on investment</li> <li>• Financial support from government and financial institutions</li> </ul>	<ul style="list-style-type: none"> <li>• Development of waste processing technology that is more efficient and environmentally friendly</li> <li>• Collaborate with third parties who have better waste processing facilities</li> </ul>

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Lack of government regulations and legislation	<ul style="list-style-type: none"> <li>• Sustainable implementation of clean technologies</li> <li>• Feedback system</li> <li>• Sustainable circular economy training for resilience issues</li> </ul>	<ul style="list-style-type: none"> <li>• External stakeholders (the company faces pressure from various stakeholders)</li> <li>• Government regulations (regulatory measures), standards, laws, procedures and incentives set by regulatory institutions</li> <li>• Pressure from competitors may encourage companies to adopt green initiatives to gain a competitive advantage</li> </ul>
Lack of good transportation infrastructure	Poor transportation conditions and improper handling	Invest in better transportation infrastructure and training for proper product handling
Lack of adequate storage	Inadequate storage and poor packaging	Using better storage technology and more efficient packaging to extend product shelf life and reduce waste
Lack of ability to sell products according to estimates	Inability to sell products according to estimates	Develop methods to sell or distribute excess products, such as through donation programs or processing into other products that have a longer shelf life

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Many companies have difficulty matching supply with demand, which often results in product surpluses or shortages. Unable to sell products as expected can lead to increased waste or lost sales opportunities. The solution to this problem is to develop better demand forecasting and inventory management methods. Data analytics, machine learning, and other technology tools can improve the accuracy of demand predictions and optimize inventory levels. Effective inventory management helps reduce excess stock, minimize waste, and ensure timely delivery of products to meet customer needs.

By addressing these challenges and implementing the proposed solution strategies, businesses can significantly improve the sustainability and efficiency of their green supply chains, ultimately contributing to overall environmental and economic well-being.

## **4.2 Challenges and solution strategies based on consumer perceptions and behavior**

Consumer perception and behaviour play an important role in successfully adopting sustainable products [19]. However, many companies face significant challenges in encouraging consumers to purchase and adopt environmentally friendly products. These challenges include low adoption of sustainable products, lack of environmental awareness and concern, and negative perceptions of green advertising [20] (See Table 4). To overcome these challenges, effective solution strategies are needed that can change consumer perceptions and behaviour towards sustainable products [21].

One of the main challenges is the low level of consumer adoption and purchase of sustainable products. Many consumers still perceive sustainable products unfavourably, often due to inadequate or unpersuasive environmental advertising [22]. Crises such as climate change and the COVID-19 pandemic also affect consumer behaviour. Educating consumers about the benefits and value of sustainable products is essential to overcome these challenges. Effective educational campaigns can increase consumer awareness and encourage the adoption of green products. Additionally, education and regulations to encourage green consumption as well as social influence, can play an important role in encouraging environmentally friendly behavior [23].

Lack of health awareness and environmental concern is also a big challenge. Many consumers are poorly educated about the environmental impact of their consumption and do not have sufficient awareness of the importance of sustainability. Consumer education and regulations supporting green consumption are needed to overcome this. Social influence can also be used to encourage environmentally friendly behaviour by demonstrating that individual actions significantly impact the environment [24].

Negative perceptions of green advertising are another challenge that needs to be overcome. Green advertising that is not transparent and inconsistent with the company's real actions can damage consumer trust. Companies need to increase transparency and provide clear information about their sustainability commitments to overcome this. Consumers must see real evidence of a company's sustainability efforts to trust the green advertising they deliver.

Collaboration between consumers and organizations is also important to increase the adoption of green products. Lack of oversight and certification of green products can lead to consumer distrust of sustainability claims [25]. Increasing monitoring and certification of green products and green labels can help build consumer trust. Companies must also work closely with consumers to understand their needs and preferences regarding sustainable products.

**Table 4.** The key barriers and challenges based on consumer perceptions and behavior

<b>Key barriers</b>	<b>Causes of the barriers</b>	<b>Strategic solutions</b>
Low Level of Adoption and Purchase of Sustainability/Green Products	<ul style="list-style-type: none"> <li>• Unfavorable perception of sustainable products</li> <li>• Biased, inadequate, or lacking persuasive eco-friendly advertising</li> <li>• Crises such as climate change and the COVID-19 pandemic</li> </ul>	<ul style="list-style-type: none"> <li>• Consumer education about the benefits and value of sustainable products</li> <li>• Education and regulation to encourage green consumption</li> <li>• Social influence to encourage environmentally friendly behaviour</li> </ul>
Lack of health awareness and environmental concern	<ul style="list-style-type: none"> <li>• Lack of education and regulation</li> <li>• Social norms that influence individual decisions</li> </ul>	<ul style="list-style-type: none"> <li>• Education and regulation to encourage green consumption</li> <li>• Social influence to encourage environmentally friendly behavior</li> </ul>
Negative perceptions of green advertising	Green advertising that is not transparent and inconsistent with the company's real actions	Increasing transparency and information about the company's sustainability commitments
Collaboration between consumers and organizations	Lack of monitoring and certification of green products	Increase supervision and certification of green products and green labels
The high price of sustainable products/green products	Consumers feel that the price of organic products is not commensurate with the benefits obtained	Balancing sustainability attributes with other factors that are important to consumers
Availability of sustainable products that are difficult to reach	Lack of distribution and marketing of green products	Increasing distribution and marketing of green products
Increase in household waste	Changes in behavior and food consumption patterns	Improved food consumption management
Regulatory policies and interventions	Inadequate policies and interventions	Increased financial awareness with education
Demographic factors	Family structure, number of children, and level of education	Policies and regulatory interventions that are appropriate to demographic factors

The high price of sustainable products is often a barrier for many consumers. Many consumers feel that organic product prices are not commensurate with the benefits obtained. To overcome these challenges, companies must balance sustainability attributes with other essential consumer factors. Developing affordable and sustainable products and providing clear value to consumers can help increase adoption.

Access to sustainable products is also a challenge that needs to be overcome. The lack of distribution and marketing of green products makes it difficult for many consumers to find and purchase sustainable products [26]. Improving the distribution and marketing of green products can help ensure consumers have easy access to sustainable products. By addressing these challenges and implementing effective solutions, companies can encourage consumer adoption and purchase of sustainable products, ultimately improving sustainability and overall quality of life [9].

### **4.3 Challenges and solution strategies based on industrial types**

Every industry faces unique challenges in adopting green supply chain practices. These challenges include specific issues such as increasing energy consumption, the environmental impact of operations, and a lack of regulation and innovation (See Table 5). To overcome these challenges, a solution strategy tailored to each industry's characteristics and needs is needed. Identifying key challenges and strategic solutions in various industries is an important step to improving sustainability and operational efficiency.

In the technology industry, increasing automation and digitalization often increase energy and resource consumption. Reliance on inefficient energy infrastructure can worsen environmental impacts. The strategic solution for this industry is to focus on clean and sustainable production practices and the use of energy-efficient technological devices. Investments in green technology and improved energy efficiency can help reduce resource consumption and environmental impact [12].

The mining industry faces significant challenges regarding the environmental impact of their operations. Mining practices not in line with green supply chains can cause significant environmental damage. A lack of green purchasing policies and green innovation is also a problem. To overcome these challenges, it is essential to increase the implementation of green HRM, green purchasing, and ecological labeling for products. Encouraging green innovation with a holistic and strategic approach can also help reduce the environmental impact of the mining industry [27].

The textile industry often does not consider sustainability in its practices. Lack of collection, sorting, and recycling and uncertainty in profit margins and return rates are key challenges. The strategic solution for this industry is to implement frugal innovations that help companies stay competitive by maximizing the use of limited resources and reducing environmental impact [28]. Encouraging recycling practices and using environmentally friendly materials is also essential to improve the sustainability of the textile industry.

The water industry faces substantial challenges regarding future water availability due to climate change and unequal water distribution [29]. Lack of infrastructure and

weak water governance exacerbate this problem. Strategic solutions include using technology and innovation to increase water use efficiency and increasing engagement with local stakeholders, including communities, government, and NGOs. Better supply chain management and effective regulation of water use are also needed.

The energy industry is heavily reliant on non-renewable energy sources, which has significant environmental impacts. Uncertainty in access to renewable energy is also a challenge. Strategic solutions for the energy industry include sustainability innovation and investment in renewable energy resources [30]. The government must also provide policies and support to encourage companies to switch to cleaner and more sustainable energy [31].

The food industry faces the challenges of high energy consumption, greenhouse gas emissions, food waste, and large water consumption [32]. Soil degradation and impacts on biodiversity are also severe problems. To overcome these challenges, changes in supply strategies and continuous innovation are essential. Using sustainability certification and developing environmentally friendly farming practices can help reduce the food industry's environmental impact [33].

**Table 5.** The key barriers and challenges based on industrial types

Industry	Key barriers	Causes of the barriers	Strategic solutions
Technology	Increased automation and digitalization can increase energy and resource consumption	Dependence on energy infrastructure	<ul style="list-style-type: none"> <li>• Focus on clean and sustainable production practices</li> <li>• Use of energy efficient technological devices</li> </ul>
Mining	Mining practices are not in line with green supply chains	<ul style="list-style-type: none"> <li>• Environmental impacts of mining operations</li> <li>• Lack of green purchasing policies</li> <li>• Lack of green innovation</li> </ul>	<ul style="list-style-type: none"> <li>• Increasing the implementation of green HRM</li> <li>• Green purchasing and ecological labeling for ITS products</li> <li>• Driving green innovation with a holistic and strategic approach</li> </ul>
Textiles	Textile industry practices that do not yet consider sustainability	<ul style="list-style-type: none"> <li>• Lack of collection, sorting and recycling</li> <li>• Uncertainty in profit margins</li> </ul>	Frugal innovation helps companies to stay competitive by maximizing the use of limited resources

Industry	Key barriers	Causes of the barriers	Strategic solutions
Irrigation	<ul style="list-style-type: none"> <li>Substantial impact on future water availability due to climate change</li> <li>Uneven spatial and temporal distribution of water and lack of infrastructure</li> </ul>	<p>and rates of return</p> <ul style="list-style-type: none"> <li>Increased industrialization</li> <li>Impact of climate change</li> <li>Relatively weak water governance</li> <li>Limited water use regulations</li> </ul>	<p>and reducing environmental impact</p> <ul style="list-style-type: none"> <li>Use of technology and innovation</li> <li>Increase engagement with local stakeholders, including communities, government, and NGOs</li> <li>Supply chain management</li> </ul>
Energy	<ul style="list-style-type: none"> <li>Dependence on non-renewable energy sources</li> <li>Uncertainty of access to renewable energy</li> <li>Environmental impact of the energy sector</li> </ul>	<ul style="list-style-type: none"> <li>Resource limitations</li> <li>Use of fossil fuels</li> </ul>	<ul style="list-style-type: none"> <li>Sustainability innovation</li> <li>Stable financial investment and resource mobilization</li> <li>Government policies and support</li> </ul>
Food industry	Food industry practices that do not yet consider sustainability	<ul style="list-style-type: none"> <li>High energy consumption and greenhouse gas emissions</li> <li>Food waste</li> <li>Consume lots of water</li> <li>Soil degradation and impacts on biodiversity</li> <li>Pressure from the market and stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>Changes in supply strategy</li> <li>Continuous innovation</li> <li>Use of sustainability certification</li> </ul>
Leather industry	Leather industry practices that do not yet consider sustainability	<ul style="list-style-type: none"> <li>Use of dangerous chemicals</li> <li>High resource consumption</li> <li>Lack of focus on social sustainability</li> </ul>	<ul style="list-style-type: none"> <li>Use of environmentally friendly chemicals</li> <li>Waste management and circular economy</li> <li>Increased social sustainability</li> </ul>

Industry	Key barriers	Causes of the barriers	Strategic solutions
Automotive	Implementation of automotive industry practices that do not yet consider sustainability	<ul style="list-style-type: none"> <li>• Lack of knowledge and expertise</li> <li>• There is no supporting public policy</li> <li>• Inadequate leadership and management</li> </ul>	<ul style="list-style-type: none"> <li>• Education and training programs</li> <li>• Academic-industry collaboration</li> <li>• Policy advocacy</li> <li>• Financial incentives</li> <li>• Leadership Training</li> <li>• Circular economy integration in KPI</li> </ul>
Manufacture	Implementation of manufacturing practices that do not consider sustainability	<ul style="list-style-type: none"> <li>• Financial constraints, high initial investment</li> <li>• Lack of top management support</li> <li>• Limited resources: limited organizational knowledge and capabilities</li> </ul>	<ul style="list-style-type: none"> <li>• Integration of knowledge management in organizational strategy</li> <li>• Capability development and human resource training</li> </ul>

The leather industry often uses hazardous chemicals and consumes a lot of resources. A lack of focus on social sustainability is also a challenge. Strategic solutions include the use of environmentally friendly chemicals, waste management, and implementing a circular economy. Increasing social sustainability with fair and ethical working practices is also necessary to improve the industry's reputation [34].

The automotive industry faces challenges implementing sustainable practices due to a lack of knowledge, supportive public policies, and adequate leadership. Strategic solutions include education and training programs, academic-industry collaboration, policy advocacy, financial incentives, and circular economy integration in KPIs [35]. Developing sustainable practices in the automotive industry can reduce environmental impacts and increase operational efficiency.

The manufacturing industry often faces financial constraints and lacks top management support to implement sustainable practices. Limited resources and knowledge are also challenges. Strategic solutions include integrating knowledge management into organizational strategy, capability development, and human resource training [36]. Continuous capability development and training can increase the adoption of sustainable practices in the manufacturing industry [37].



Thus, by identifying and addressing these challenges through appropriate solution strategies, various industries can improve the sustainability of their operations and contribute to overall environmental sustainability.

#### **4.4 Challenges and solution strategies based on firm levels**

Companies at various levels, from SMEs to multinational corporations, face challenges in adopting green supply chain practices. These challenges include limited resources, lack of training, and operational complexity (See Table 6). Each level of enterprise requires tailored resolution strategies to overcome these obstacles and improve the sustainability of their operations.

At the SME level, limited resources are a major challenge. Many SMEs have limited access to financial resources and incentives that influence managers' environmental intentions. To overcome these challenges, governments and financial institutions can provide better access to resources, especially banking financing, information, advice, and support [38]. Specific training in the environment and sustainable development is also important to improve the capabilities of SME employees in adopting sustainable practices. Lack of compliance with environmental standards is also a problem for SMEs. Many SMEs are not yet fully aware of the long-term benefits of sustainability practices and see them as a cost burden rather than a strategic investment. To overcome this, SMEs must be encouraged to comply with the ISO 14001 standard, which has been proven to increase export intensity and competitiveness in international markets. Integrating sustainability as part of a long-term business strategy can help SMEs see green practices as a profitable investment.

At the startup level, institutional challenges such as lack of regulatory incentives and non-compliance with the Triple Bottom Line (TBL) are the main obstacles. Public policy reformulation and increased stakeholder participation can help overcome these challenges. In addition, organizational cultures that do not support sustainability and are reluctant to provide new resources also need to be addressed. Encouraging companies to allocate resources for long-term innovation and developing an organizational culture that supports sustainability is critical. Startups also face challenges in market and sales due to a lack of product-market fit. Raising consumer awareness about the importance of sustainability through educational campaigns can help address this issue. Maintaining continuous training is also a challenge for research and development innovation. Encouraging companies to allocate resources for long-term innovation and developing an organizational culture that supports sustainability can help overcome these barriers [39].

At the national company level, implementing environmental management in company operations often faces challenges such as a lack of an integrated approach, limitations in implementing green technology, and a lack of compliance with regulations. To overcome these challenges, companies need to develop strategies that simultaneously benefit the company, customers, and the environment. Using green technologies and recycling practices to reduce environmental impacts and developing proactive, industry-specific risk mitigation programs can help address these issues [40].

**Table 6.** The key barriers and challenges based on firm levels

<b>Firm level</b>	<b>Key barriers</b>	<b>Causes of the barriers</b>	<b>Strategic solutions</b>
SMEs	Resource limitations	<ul style="list-style-type: none"> <li>• The availability of financial resources and incentives influences managers' environmental interests</li> <li>• Lack of employees trained in sustainable development</li> </ul>	<ul style="list-style-type: none"> <li>• Access to resources, especially banking financing, information, advice and support</li> <li>• Specialized training in environment and sustainable development</li> </ul>
	Lack of compliance with environmental standards	<ul style="list-style-type: none"> <li>• Not yet fully aware of the long-term benefits of sustainable practices</li> <li>• View sustainability as a cost burden rather than a strategic investment that can improve company performance</li> </ul>	<ul style="list-style-type: none"> <li>• Integrate sustainability as part of a long-term business strategy</li> <li>• Encouraging MSMEs to comply with the ISO 14001 standard, which is proven to increase export intensity and competitiveness in international markets</li> </ul>
Start Up	Institutional	<ul style="list-style-type: none"> <li>• Lack of regulatory incentives</li> <li>• Nonconformity with the Triple Bottom Line (TBL)</li> </ul>	<ul style="list-style-type: none"> <li>• Public policy reformulation</li> <li>• Increased stakeholder participation</li> </ul>
	Organizational culture	<ul style="list-style-type: none"> <li>• Less strategic importance of sustainability</li> <li>• Reluctance to provide new resources</li> </ul>	Encourage companies to allocate resources for long-term innovation and develop an organizational culture that supports sustainability
	Market and sales	Lack of product-market fit	Increase consumer awareness about the importance of sustainability through educational campaigns

<b>Firm level</b>	<b>Key barriers</b>	<b>Causes of the barriers</b>	<b>Strategic solutions</b>
National company	Innovation, research and development	Difficulty in maintaining continuous training	Encourage companies to allocate resources for long-term innovation and develop an organizational culture that supports sustainability
	Supply chain, operations and logistics	<ul style="list-style-type: none"> <li>• Lack of technological updates in monitoring systems by public bodies</li> <li>• Dependence on supply chains</li> </ul>	Building partnerships with suppliers to ensure sustainable availability of raw materials
	Implementation of environmental management in company operations	<ul style="list-style-type: none"> <li>• Lack of an integrated approach</li> <li>• Limitations in the implementation of green technology</li> <li>• Lack of compliance with regulations</li> <li>• Sustainability initiatives can increase operational risks and costs for companies</li> </ul>	<ul style="list-style-type: none"> <li>• Develop strategies that benefit the company, customers, and the environment simultaneously</li> <li>• Use of green technology and recycling practices to reduce environmental impact</li> <li>• Not only comply but also take further steps to reduce environmental impact</li> <li>• Developing proactive, industry-specific risk mitigation programs can help reduce the long-term costs of sustainability initiatives</li> </ul>
Multinational company	The complexity of achieving sustainability	Diversity of goals	Integrate various SDGs goals in national and local policies
	Differences in country conditions	Differences in regulations, technology and resources	<ul style="list-style-type: none"> <li>• Adapt policies based on local conditions</li> </ul>

Firm level	Key barriers	Causes of the barriers	Strategic solutions
	Resource limitations	The need for large investments in various sectors	<ul style="list-style-type: none"> <li>• Increase investment in research and development to drive innovation and adoption of new technologies</li> <li>• Collaboration between government, business and society</li> </ul>
	Cross-stakeholder partnerships	Multi-sector collaboration	<ul style="list-style-type: none"> <li>• Training and development of human resources</li> <li>• Allocate an adequate budget and seek alternative funding sources such as public-private partnerships and international assistance</li> <li>• Encourage partnerships between government, the private sector, non-governmental organizations and local communities to combine resources and expertise</li> <li>• Establish a cross-sector forum or committee to plan and implement SDGs initiatives together</li> <li>• Increase local capacity through training, technology transfer and institutional strengthening</li> <li>• Encourage international cooperation to share knowledge and technology that</li> </ul>

Firm level	Key barriers	Causes of the barriers	Strategic solutions
			can support the achievement of the SDGs

At the multinational company level, the complexity of achieving sustainability is often caused by the diversity of goals and differences in country conditions, such as regulations, technology and resources [41]. Strategic solutions include integrating various SDG goals into national and local policies and adapting policies based on local conditions. Increasing investment in research and development to drive innovation and adoption of new technologies and collaboration between government, business and society is critical. Limited resources are also a challenge, which can be overcome by training and developing human resources, allocating adequate budgets, and seeking alternative funding sources such as public-private partnerships and international assistance [42].

Cross-stakeholder partnerships are critical to achieving sustainability. Multi-sector collaboration can encourage partnerships between governments, the private sector, non-governmental organizations, and local communities to combine resources and expertise. Establishing cross-sector forums or committees to jointly plan and implement SDG initiatives and increasing local capacity through training, technology transfer, and strengthening institutions is also important. Encouraging international cooperation to share knowledge and technology that can support the achievement of the SDGs is a crucial strategic step.

By identifying and addressing these challenges through appropriate solution strategies, companies at various levels can improve the sustainability of their operations and contribute to overall environmental sustainability.

## 5 Discussion

This systematic literature review has identified challenges and strategic solutions for implementing a circular economy in developing countries. The main challenges faced include financial, regulatory, technological, infrastructure and operational obstacles. Additionally, consumer perceptions and behaviour, as well as industry and company-level characteristics, also influence the adoption of circular economy practices. This study found that strategic solutions involving collaboration between governments, financial institutions and companies can significantly improve sustainability and operational efficiency.

### 5.1 Theoretical implications

This research makes an important contribution to the literature on the circular economy by offering a comprehensive understanding of the challenges and strategic solutions in developing countries. In this context, this research identifies various obstacles

that hinder the adoption of a circular economy, such as financial problems, inadequate regulations, technological limitations, and infrastructure constraints. In addition, this research also explores how consumer perceptions and behaviour can influence the adoption of sustainable practices. Thus, this study emphasizes the importance of a holistic approach involving multiple stakeholders, including governments, companies and communities, to address these challenges and drive the adoption of a circular economy [43].

The findings of this research underscore the importance of strong regulatory support to facilitate the transition to a circular economy. Clear regulations and financial incentives from governments can encourage companies to invest in green technologies and sustainable practices [44]. In addition, this research highlights the need for technological improvements, particularly in waste processing and energy efficiency, to support the implementation of a circular economy. Changes in consumer behaviour are also a key factor that must be considered, with education and effective campaigns to increase awareness and adoption of sustainable products [45]. By understanding and integrating these various aspects, circular economy strategies can be more effective and positively impact sustainability.

This research also emphasizes the importance of further theoretical development regarding integrating sustainability strategies in various industrial and company-level contexts [46]. Each industry has unique characteristics that require a special approach to implementing a circular economy. Therefore, this research encourages a cross-disciplinary approach that combines economics, engineering, management, and social sciences to develop comprehensive and effective solutions [13]. Thus, this study not only contributes to the development of theory but also provides practical guidance for implementing a circular economy that can be adapted in various industrial and regional contexts, thereby helping achieve sustainable development goals more broadly.

## 5.2 Practical implications

From a practical perspective, the findings of this research provide concrete guidance for various stakeholders in developing and implementing circular economy strategies. For policymakers, this research underscores the importance of formulating policies supporting green technologies and sustainable practices. Governments can play a key role by providing financial incentives such as grants, subsidies and low-interest loans to encourage companies to invest in environmentally friendly technologies and processes. In addition, clear and strict regulations are needed to ensure company compliance with established sustainability standards while providing environmental protection and improving people's quality of life [47].

These findings emphasize the need for companies to adopt more energy-efficient technologies and develop better waste management systems [48]. Companies can implement technologies that minimize the use of natural resources and reduce carbon emissions, thereby contributing to global efforts to address climate change. In addition, transparency in a company's sustainability commitments is very important to build trust with consumers and other stakeholders. Companies can publish regular sustainability

reports, which include data and achievements related to their green practices. These efforts improve a company's reputation and can be an effective marketing tool.

Financial institutions are also important in supporting the transition to a circular economy. By providing the necessary financing to support green initiatives, financial institutions can help companies overcome financial barriers, often a major barrier to adopting sustainable practices [49]. Financial institutions can also develop products specifically designed to support sustainability projects, such as green bonds or sustainable loans. Collaboration between financial institutions, government and the private sector can create an ecosystem that supports greener and more sustainable economic growth [50].

Additionally, companies can work with consumers to increase awareness and adoption of sustainable products. Effective educational campaigns can help consumers understand the benefits of environmentally friendly products and encourage them to make more sustainable choices [51]. Transparency of information regarding product origins, production processes and environmental impacts can help consumers make wiser decisions. By engaging consumers in sustainability efforts, companies increase sales of green products and contribute to a broader behavioural shift towards more environmentally responsible consumption.

### 5.3 Social implications

Implementing a circular economy has significant social implications, especially in improving the quality of life and reducing environmental impacts. By reducing waste and optimizing resource use, a circular economy can significantly reduce greenhouse gas emissions, a major contributor to climate change. Reducing these emissions not only helps slow the rate of climate change but also improves air quality, reducing the incidence of respiratory illnesses and improving overall public health [52]. In addition, more efficient use of resources in a circular economy can reduce pressure on ecosystems and natural resources, helping maintain biodiversity and environmental balance.

Adopting sustainable practices in a circular economy also has great potential to create new job opportunities. Sectors such as recycling, waste processing and renewable energy production will grow as the focus on sustainability increases. These new job opportunities will not only help reduce the unemployment rate but also improve the workforce's skills and knowledge in green technology and sustainable practices. Thus, the circular economy contributes to economic growth and social development by providing decent and sustainable employment [53].

In addition, consumer education about the benefits of sustainable products is key to changing people's behaviour and making them more environmentally friendly. Effective educational campaigns can help consumers understand the importance of choosing products with a low environmental impact and encourage them to adopt a more sustainable lifestyle. This change in consumer behaviour will impact market demand, encouraging more companies to adopt sustainable practices and produce environmentally friendly products. Thus, consumer education increases individual awareness and creates a domino effect that can accelerate the transition to a circular economy. Ultimately, these efforts will contribute to the development of a more sustainable and inclusive

society, where economic, social and environmental benefits can be felt by all levels of society [54].

## 6 Conclusion

This study successfully answers the research questions and provides comprehensive insight into the challenges and strategic solutions for implementing a circular economy in developing countries. First, this research identifies the profile of previous research exploring the circular economy in emerging markets, including publication trends, publisher domains, methodologies, and units of analysis. These results demonstrate increasing academic interest in this topic and provide a basis for further research.

Second, this research reveals the main obstacles to implementing circular economy practices in developing countries. These barriers include challenges in green supply chains, consumer perceptions and behaviour, industry type, and company level. Financial, regulatory, technological, infrastructure and operational barriers were identified as key barriers that must be overcome to achieve sustainability. For example, a lack of strong regulations and financial incentives from governments often discourages companies from investing in green technologies and sustainable practices.

Third, this research offers various strategic solutions proposed or implemented to overcome these challenges. This solution involves collaboration between governments, financial institutions, and companies. Financial support from governments, investment in clean technologies, consumer education, and increased transparency in sustainability commitments are some of the strategies identified as key to increasing circular economy adoption.

This research also highlights gaps in the current literature and identifies areas that require further research. These gaps include the lack of a holistic and systematic analysis of the implementation of the circular economy in developing countries and the need for a cross-disciplinary approach that combines economics, engineering, management, and social sciences. By addressing this gap, it is hoped that future research can provide deeper insights and more effective solutions to support the transition to a more sustainable and inclusive economy.

Overall, this research significantly contributes to the circular economy literature and offers practical guidance for policymakers, companies and financial institutions in developing sustainability strategies. By understanding the challenges and relevant strategic solutions, it is hoped that developing countries can adopt a circular economy more effectively and achieve sustainable development goals.

## 7 Limitations and future research directions

This study has several limitations that need to be noted. First, this systematic literature review only includes articles published in English, which may limit understanding of circular economy practices in developing countries for which literature is available in other languages. Second, although PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) was used to ensure rigour and systematicity in the



selection of articles, there may still be relevant studies that were missed due to limitations in the keywords or databases used. Third, this research focuses on literature published in academic journals, which may not include practical reports, case studies, or government policies that could provide important insights into the challenges and solutions in implementing a circular economy. In addition, this research provides more of a general description of challenges and solutions without empirically testing the effectiveness of the proposed solutions. This limits the ability to determine the most effective solution in a particular context. Finally, contextualising challenges and solutions across developing countries may not fully reflect the variation and diversity that exists on the ground, given the significant cultural, economic, and social differences across regions.

To overcome these limitations and expand understanding of the application of circular economy in developing countries, future research can be carried out in the following directions. First, including literature in multiple languages and from underrepresented regions in this study would provide a more comprehensive and in-depth picture of relevant challenges and solutions in a broader context. Second, combining literature analysis with empirical studies, such as surveys, interviews, and case studies, can test and validate the effectiveness of identified strategic solutions, providing more concrete and relevant practical insights for policymakers and practitioners. Third, more in-depth research in various industrial sectors is conducted to understand specific challenges and solutions in different contexts and explore how certain industry characteristics influence the adoption and success of the circular economy.

Furthermore, developing longitudinal studies to track the development and impact of circular economy implementation over time will help understand the long-term dynamics and effectiveness of implemented sustainability strategies. Exploring the role of collaboration between the public, private, and community sectors in driving a circular economy can identify the most effective policies and regulations supporting sustainable practices and provide recommendations for policymakers. Finally, further studies could explore the most effective education and communication strategies to shift consumer perceptions and behaviour towards more sustainable consumption, which is important for increasing market demand for environmentally friendly products. By overcoming these limitations and following the proposed research direction, it is hoped that future research can contribute more to supporting the transition to a sustainable circular economy in developing countries.

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