



Assessing Circular Economy Adoption and Its Influence on Sustainable Business Development in Lebanese Small and Medium Enterprises

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Abstract

The rise in environmental threats, scarce resources, and the demand for sustainable business restructuring has made SMEs realize the necessity of adopting CE. There is insufficient evidence about the degree of circular economy adoption and its impact on sustainable business development in the case of SMEs operating in emerging countries, including Lebanon. The current paper is focused on examining the adoption of the circular economy by Lebanese SMEs and the role of such practice in sustainable business development via resource efficiency, waste minimization, recycling and reuse initiatives, sustainable production, and circular supply chain management. A quantitative approach was used based on a survey performed among 350 Lebanese SMEs. Data collection was followed by data analysis using descriptive statistics, reliability and validity testing, and correlations to determine associations between the application of the circular economy approach, organizational capabilities, environmental influence, and sustainable development of businesses. The results of the analysis show that circular economy adoption is at a fairly high rate for small and medium-sized enterprises in Lebanon, where the mean value of Circular Economy Adoption was 3.78, and the mean value of Sustainable Business Development was 3.92. A positive correlation was found between circular economy adoption and sustainable business development ($r = 0.74$, $p < 0.01$), proving that circular economy leads to higher operational efficiency, environmental awareness, and business resilience. It can be said that organizational capabilities and the external environment are necessary conditions for circular economy transition.

Keywords:

Circular economy, sustainable business development, small and medium enterprises, resource efficiency, circular supply chain management, lebanon.

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Introduction

Environmental problems, resource scarcity, and the need for sustainable business practices have prompted companies to shift from their old linear production practices to those following circular economy (CE) principles. CE practices are based on reducing waste production, promoting resource efficiency, prolonging the lifetime of products and value creation through recycling, reusing and recovery of resources. Circular economy principles and the development of technological advancements and sustainable supply chain management have been used as an effective means of improving green supply chain management performance and organizational sustainability results (Davidaviciene et al., 2026; Punam & Patel, 2026). Green supply chain management (GSCM) has received much attention since companies strive to include environmental accountability in their procurement, manufacturing, logistics, and distribution processes. Sustainability practices in the supply chain positively affect corporate sustainability performance by reducing environmental impacts, optimizing resource use, and ensuring long-term organizational efficiency (Al Masri & Wimanda, 2024; Latha, 2026). Moreover, green supply chain management practices affect organizational, environmental, and economic performance by allowing companies to adopt environmentally friendly practices and improve sustainability-oriented decision-making processes (Waiyawuththanapoom et al., 2025).

Small and Medium Enterprises (SMEs) are significant contributors to economic growth, job creation, and innovations; however, their capacity to adopt sustainability practices is usually restricted due to the lack of finance, technology, and sustainability awareness. The use of green entrepreneurship techniques could help SMEs gain more strategic capabilities, boost innovation, and ensure high-level business performance (Hui et al., 2025). Besides, circular economy concepts in supply chains are helpful for enhancing the financial performance of organizations and making them more sustainable through reducing inefficiencies and effective resource utilization (Fernandes et al., 2024). Transition to circular economy-oriented business models implies the need of implementation of sustainability practices at the organizational and supply chain levels. Green supply chain management has been revealed as an important factor in circular economy development due to improved environmental performance, sustainable production systems, and business competitiveness, including export performance (Bwaliez, 2025). Besides, collaboration between the participants of the supply chain increases operational performance through the exchange of knowledge and resources, as well as value creation in the regional business environment (Naaj, 2026).

The successful deployment of the circular economy is not only about improvements in terms of technology and supply chain but also about organizational skills and employee participation. Green supply chain learning, employee innovation, and environmentally responsible organizational practices lead to enhanced performance of circular supply chains through innovation and successful implementation of green practices (Agyabeng-Mensah et al., 2024). Likewise, green technology adoption allows SMEs to be more efficient in resource use, lower negative impact on the environment, and achieve sustainable performance improvement within the context of the circular economy (Khan et al., 2024). Strategic implementation of the circular economy in management practices helps organizations link sustainability goals with growth and competitiveness. The use of circular approaches in the process of making strategic decisions help ensure sustainable resource management and organizational transformation (Al-Jame & Al-Fares, 2025). Moreover, sustainable supply chain management with cooperation between stakeholders can improve the performance of organizations by increasing flexibility and resource utilization of the supply chain (Gunasekera et al., 2025).

However, despite the growing body of literature on the benefits of adopting circular economy principles, most of the research on the issue focuses primarily on large enterprises and developed countries, with only little empirical work conducted on circular economy adoption in emerging economies by SMEs. There are several peculiarities of the processes of adoption of circular practices among SMEs caused by problems such as financial restrictions, accessibility to technologies and infrastructure, and the level of sustainability awareness of organizations that can have an impact on their performance. Thus, the question of the interrelation between circular economy adoption and sustainable business development among SMEs requires further exploration. Lebanon is a country that can serve as a case study for the topic due to its economic problems, environmental issues, waste management challenges, and need for sustainable development approaches. Exploring the adoption of the circular economy in this context may offer useful knowledge regarding the ways that SMEs adopt resource efficiency, waste management practices, recycling and reuse, sustainable production, and circular supply chains. This paper seek to explore the adoption of the circular economy and the effects that it has on the sustainable development of businesses in Lebanon through Lebanese SMEs. This research adds to

existing knowledge by offering practical insights into the role played by circular economy practices in fostering sustainable growth and competitive advantage in the emerging economy context.

Key Contribution

- This study examines circular economy practices, including resource efficiency, waste reduction, recycling, sustainable production, and circular supply chain management among Lebanese SMEs.
- The study analyses how circular economy adoption contributes to economic, environmental, and social sustainability outcomes in SMEs.
- The findings support managers and policymakers in developing strategies to improve circular economy implementation and sustainable business growth.

The rest of this paper is structured as follows: Section II presents a literature review through discussions of past research on circular economy implementation, sustainable business development, green supply chain management, and sustainability transformation in SMEs. The research methodology is discussed in Section III, which includes the conceptual framework, research design, study population, sampling method, data collection procedure, measurement variables, and data analysis procedures. Section IV discusses the results and analysis, which include SME profiling, descriptive statistics, reliability and validity testing, correlation analysis, and hypothesis testing. Section V discusses the findings and their theoretical, managerial, and policy implications. Section VI concludes the study.

Literature Review

The trend toward sustainable business development has led organizations to adopt economic, environmental, and social aspects in the course of strategy development. Through sustainable economic activities, businesses can achieve financial performance while responsibly using resources and competing successfully. Large businesses have been observed to use sustainable economic activities to drive financial success through increased efficiency and reduced risk (Oluwagbade et al., 2026). This situation calls for research on sustainability practices as aspects of both environmental and strategic management aimed at improving business performance. Sustainable consumption and production have affected market behavior and decision-making. Sustainable consumption of eco-friendly products is influenced by sustainable marketing strategies that raise awareness about environmental issues and encourage consumers to adopt sustainable consumption habits. In this way, businesses can align their strategic activities to achieve the goals of sustainability and create a responsible value proposition for customers (Selvaraj et al., 2026). For SMEs, knowledge of sustainable market expectations is essential for business performance.

Adopting the circular economy by SMEs demands that efficient processes, waste reduction, recycling, and sustainable production be put into place. Research on SME industries shows that the circular economy contributes greatly by providing many advantages, such as resource management, environmental benefits, and opportunities for business, but at the same time raises the issues of finance and technology restrictions, as well as readiness for implementation (Benlaria et al., 2026). Such research highlights the necessity of analysis of the degree of circular economy adoption by SMEs and the impact it has on the sustainable performance of businesses. Digital transformation and eco-innovation have become key facilitators for implementing the circular economy. The use of green digital technologies helps companies manage resources used, improve processes, and create sustainable innovations. Institutional support becomes an enhancer of the connections between digital transformation, circular economy adoption, and sustainable performance (Masa'deh & Dannoun, 2026; Satheeskumar, 2026).

Measuring sustainability provides an organization with ways to measure its environmental performance, efficiencies, and resource management. Measuring sustainability allows the organization to find improvement areas, track its sustainability performance, and make better decisions based on facts. Sustainability measurement can be very helpful for SMEs that want to measure their sustainability maturity and develop circular economy strategies (Bansal et al., 2026). SMEs that are active internationally and, in the manufacturing, sector have to deal with the pressure of adopting sustainable practices due to the need for compliance within the supply chains and environmental laws. Sustainability helps SMEs build resilience, increase their market position, and solve environmental problems without compromising the performance of the organization (Kabbara et al., 2026). However, successful sustainability adoption requires organizational commitment, appropriate resources, and strategic planning.

The circular economy concept has shown potential to support sustainable economic growth in various sectors. The application of the green and circular economy in agricultural businesses is an indication that resource efficiency, waste minimization, and sustainable production methods can aid economic growth in a sustainable manner. These results give some indications on how sector-specific circular economy approaches can help achieve sustainable economic growth in a developing economy context (Alataweneh, 2026). The Lebanese case presents one of the critical areas to study the application of the circular economy concept due to the presence of various environmental issues, waste management problems, and sustainable resource management problems. It is therefore important to know policies, recycling approaches, and circular economy-based management systems in order to evaluate the application of the circular economy concept in Lebanese SMEs (Nehme et al., 2020). Sustainability in operations and supply chains is an integral part of the circular economy revolution. Businesses that are engaged in manufacturing and production activities can enhance sustainability via proper use of resources, waste reduction, sustainable coordination of the supply chain, and environmentally friendly operations. All these approaches help improve sustainability and operational efficiency (Adams et al., 2021).

A sustainable business model offers SMEs frameworks for integrating the concept of environmental responsibility into value creation processes in ways that ensure economic sustainability. It is clear from current literature that SMEs need adaptive business models, innovation abilities, and strategic sustainability considerations in order to adopt circular practices and ensure sustainable development in the long run (Durst et al., 2021). Consequently, it is important to assess circular economy adoption among SMEs not only through operational practices but also from the perspective of a business model shift. Reverse logistics and waste recovery systems are crucial elements of the circular economy model because allow for recovery, reuse, and recycling of materials during the life cycle of the product. The maturity level of reverse logistics practices determines how effectively sustainable waste management practices can be adopted and whether an organization be able to move towards the circular approach to operations (Peña-Montoya et al., 2020).

With regard to such research developments, it is important to conduct further research on the adoption of the circular economy and its impact on sustainable business development in Lebanese SMEs. Despite the fact that prior research was dedicated to sustainability practices, green technologies, circular economy strategies, and sustainable business models, very few studies have empirically addressed the issues of the adoption, difficulties, and impacts of the adoption of circular economy practices in Lebanese SMEs. Hence, the current research aims to fill the research gap through the analysis of circular economy adoption dimensions and the impact of those dimensions on sustainable business development.

Problem Statement

Small and Medium Enterprises (SMEs) are known to contribute significantly towards economic growth, job creation, and industrialization in Lebanon. However, a large number of these enterprises are still practicing linear production models that are resource-intensive, generate a lot of wastes, and do not adopt sustainable approaches. In spite of the increased attention to the circular economy (CE) principles in the world, including resource efficiency, waste minimization, reusing, recycling, and sustainable value creation, the adoption of circular economy models by Lebanese SMEs is low due to various organizational, financial, technological, and informational barriers. The existing literature has mainly addressed the adoption of circular economy models in developed countries, whereas there is not enough information about the process of adopting circular economy models by SMEs in emerging economies and how it influences their sustainable development. It is necessary to evaluate the current level of adoption of the circular economy model by Lebanese SMEs and its contribution to their sustainable business outcomes that include environmental, operational, innovative, and business performance.

Research Objective

1. To evaluate the current extent of the implementation of the concept of circular economy in Lebanese SMEs by assessing the actions undertaken regarding resource efficiency, waste reduction, recycling and reusing initiatives, sustainable production and circular supply chain management.
2. To explore the impact of capabilities and environment on the adoption of circular economy strategies in Lebanese small and medium-sized enterprises
3. To assess the effects of adopting and implementing circular economy on the sustainable development of businesses through an analysis of its contribution to economic, environmental, and social sustainability.

Hypothesis Development

H1: Circular Economy Adoption has a significant positive influence on Sustainable Business Development in Lebanese Small and Medium Enterprises.

H2: SME Organizational Capabilities have a significant positive influence on Circular Economy Implementation Level in Lebanese Small and Medium Enterprises.

H3: External Environmental Factors have a significant positive influence on Circular Economy Adoption among Lebanese Small and Medium Enterprises.

Research Methodology

Conceptual Framework for Proposed Methodology

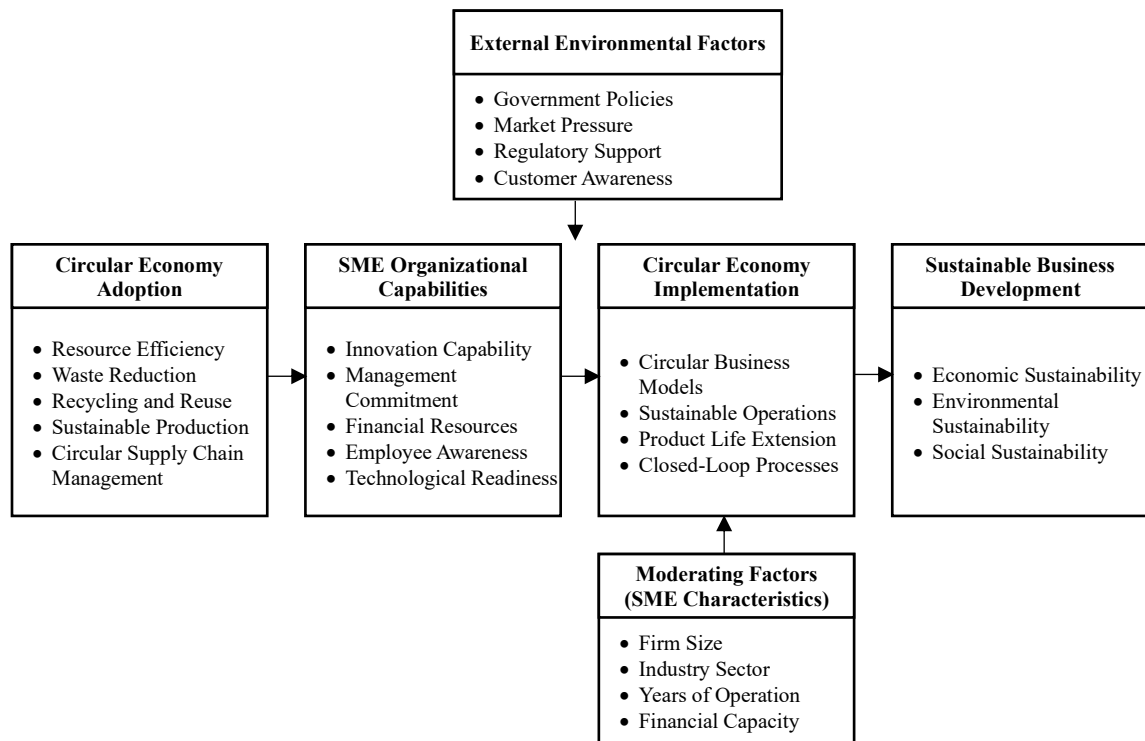


Figure 1. Conceptual framework for proposed methodology

Figure 1 shows the circular economy adoption and sustainable business development among Lebanese small and medium enterprises (SMEs), where circular economy adoption, implementation mechanisms, environmental factors, and organizational factors are considered as the key components. The framework proposes that circular economy adoption, in terms of resource efficiency, waste management, recycling/reuse, sustainable production, and circular supply chain, is the basis of the sustainable business outcome. The adoption of the circular economy, in terms of business sustainability, depends on the organizational capability of the SME, which includes innovation capability, management commitment, financial resources, employee environmental awareness, and technology readiness. Besides, external environmental factors like policy, pressure, regulation, and customer awareness can encourage and facilitate the process of circular economy adoption. The circular economy implementation dimension, which is demonstrated by circular business models, sustainable operations, extended life of the products, and the closed-loop processes, becomes a crucial channel that transforms efforts made in the adoption of the circular economy into sustainable results. The results include economic sustainability in terms of cost reduction and competitiveness, environmental sustainability through the minimization of waste production and resource saving, and social sustainability through the creation of stakeholders' value and social responsibility. In addition, the features of SMEs, which are the size of an organization, the sector of activity, the duration of existence, and financial capability, are taken into account as moderating variables that moderate the relationship between circular economy adoption and implementation and sustainable business development.

Research Design

The proposed research employs a quantitative approach to analyze the link between the adoption of the circular economy and the sustainable development of business operations within the sample of Lebanese Small and Medium Enterprises (SMEs) empirically. The structured questionnaire survey technique is used to gather data from the owners, managers, operation executives, and other sustainability decision makers at SMEs, who have enough knowledge about the practices and processes that take place within their organizations. The research considers such aspects of circular economy adoption as resource efficiency, waste reduction, recycling and reuse practices, sustainable production, circular supply chain management, and the contribution to economic, environmental, and social sustainability outcomes. A purposive sampling technique is used to identify 350 SMEs operating in various industries, such as manufacturing, services, agriculture, retail, and others.

Study Population

The sample population be made up of Small and Medium Enterprises (SMEs) operating in various industrial and service sectors in Lebanon. The potential participants be the owners, managers, and executives in charge of operations, as well as those making sustainability decisions who are knowledgeable about the business and resource management methods of their firms, as well as the sustainability initiatives carried out. The research is centred on Lebanese SMEs due to their considerable involvement in economic growth and their possible incorporation of circular economy to solve their environmental and operational issues. Enterprises belonging to diverse sectors such as manufacturing, retail, services, agriculture, and many other business activities be included in the research.

Sampling Approach

In this study, the researchers apply the principle of purposive sampling for selecting 350 Small and Medium Enterprises (SMEs) that operate in Lebanon. These businesses be chosen according to certain criteria that include owners and managers, as well as decision-makers of these firms, who have enough knowledge about organizational management, sustainability practices, and resource management practices. To obtain more diverse samples, various SME sectors, including manufacturing, services, agriculture, retailing, and other business activities, be selected. A stratified sampling technique be used to represent the samples according to different industrial sectors and various features of enterprises, for instance, size and experience of the enterprises. The gathered information reflect the current situation in implementing the circular economy principles and their contribution to the development of sustainable businesses.

Data Collection

For this research, the data collection process involve administering the structured questionnaire survey to Small and Medium Enterprises (SMEs) that are in operation in Lebanon. The targeted respondents consist of SME owners, managers and decision-makers who have the required knowledge of organizational processes, sustainability actions and strategies. The questionnaire be developed based on the proposed constructs such as adoption of circular economy, SME organizational capability, external environment, level of circular economy adoption and sustainable business development. A five-point Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree) be adopted to determine the perceptions of the circular economy activities and sustainability achievements by the respondents. The questionnaire be distributed both online and through direct contact with Lebanese SMEs in different industry sectors. The results obtained from the analysis of the questionnaire responses used to analyse the connections between the variables and test the formulated research hypotheses.

Measurement Variables

The measurement variables to be used in this research are intended for testing the effect of adopting circular economy on the development of sustainable businesses within the context of SMEs in Lebanon. Circular Economy Adoption be evaluated via such variables as resource efficiency, waste minimization, recycling and reuse practices, sustainable production practices, and circular supply chain activities. Organizational Capabilities be measured via organizational capabilities variables including the level of management commitment, innovation capability, technological readiness, financial resource availability, and employees' environmental awareness. The external environmental factors be measured using variables such as regulatory support, government policies, market pressure, consumer sustainability awareness, and competition. The mediating variable, Circular Economy Implementation Level, be assessed using the following variables: circular business model adoption, closed-loop practices, sustainable resource management practices, and improvement of product life cycle. The dependent variable, Sustainable Business Development, be measured

via economic sustainability, environmental performance, social responsibility, operational efficiency, and long-term business sustainability. All items be measured using a five-point Likert scale.

Data Analysis

The data gathered from the surveys be subjected to statistical analysis methods aimed at investigating the relationship between the adoption of the concept of circular economy and sustainable business development of SMEs in Lebanon. First, descriptive statistical analysis be conducted to determine the demographic attributes of the respondents and trends in circular economy practices among SMEs. Reliability analysis using Cronbach's alpha test the internal consistency of the measurement constructs, while validity testing be conducted using exploratory and confirmatory factor analysis.

Results and Analysis

Profile for Lebanese SME

Table 1 presents the demographic information for the selected 350 SMEs, including diverse representation across industries, organization sizes, operational scales, and geographic locations. The industry-wide distribution reveals that the sample represents SMEs in manufacturing (90), services (80), retail and wholesale (70), construction and others (60), and agriculture and food processing (50), ensuring the inclusion of various economic activities. The firm sizes indicate that most firms in the sample are small enterprises (170), followed by medium enterprises (100) and micro enterprises (80), revealing the major structure of the SMEs in Lebanon. From employee distribution, one can observe that most organizations in the sample employ 10 to 49 employees (170), 100 firms employ 50 to 249 employees, and 80 firms have fewer than 10 employees. From the operational experience point of view, the highest proportion of SMEs is those which have 5 to 10 years of experience (120) followed by SMEs operating 11 to 20 years (100), less than 5 years (70), and more than 20 years (60). From the ownership composition, one can see that the highest number of respondents came from family-owned companies (150), followed by sole proprietorships (80), partnerships (60), and corporate/private companies (60). In terms of geography, the sample was distributed across all major regions of Lebanon, namely Beirut and its environs (120), Mount Lebanon (80), North Lebanon (50), South Lebanon (50), and Bekaa (50). From the perspective of the respondents' positions, the sample included founders/owners of SMEs (120), general/executive managers (90), operations/managers of sustainability (80), and heads of departments/senior staff members (60). Overall, the sample composition can be considered representative for studying the adoption of the circular economy in Lebanese SMEs.

Table 1. Profile for lebanese SME

Category	Classification	Expected Sample Distribution (n=350)
Industry	Manufacturing	90
	Retail and Wholesale	70
	Services	80
	Agriculture and Food Processing	50
	Construction and Other Sectors	60
Firm Size	Micro enterprises	80
	Small enterprises	170
	Medium enterprises	100
Number of Employees	Less than 10 employees	80
	10–49 employees	170
	50–249 employees	100
Years of Operation	Less than 5 years	70
	5–10 years	120
	11–20 years	100
	More than 20 years	60
Ownership	Family-owned SMEs	150
	Sole proprietorship	80
	Partnership	60
	Corporate/private ownership	60
Location	Beirut and surrounding areas	120

	Mount Lebanon	80
	North Lebanon	50
	South Lebanon	50
	Bekaa region	50
Respondent Position	SME Owner/Founder	120
	General Manager/Executive Manager	90
	Operations/Sustainability Manager	80
	Department Head/Senior Employee	60

Descriptive Statistics

Table 2. Descriptive statistics of study variables (N = 350)

Construct	No. of Items	Mean	Standard Deviation	Minimum	Maximum
Resource Efficiency (RE)	5	3.86	0.72	1.80	5.00
Waste Reduction and Recycling (WRR)	5	3.74	0.76	1.60	5.00
Sustainable Production Practices (SPP)	4	3.81	0.70	1.75	5.00
Circular Supply Chain Management (CSCM)	5	3.69	0.79	1.40	5.00
Circular Economy Adoption (CEA)	19	3.78	0.65	1.90	5.00
Sustainable Business Development (SBD)	6	3.92	0.68	1.83	5.00

Table 2 shows the descriptive statistics analysis results for the study variables from the responses of 350 SMEs, revealing a moderate to high adoption level of the circular economy and sustainable business practices among Lebanese small and medium enterprises. In relation to the circular economy dimensions, Resource Efficiency (RE) achieved the highest mean score of 3.86 with a standard deviation of 0.72, signifying that SMEs adopt practices associated with effective resource use and management. High levels of adoption were observed in terms of Sustainable Production Practices (SPP), where SMEs attained a mean of 3.81 (SD = 0.70), reflecting the increasing significance of eco-responsible production practices. The analysis further reveals that Waste Reduction and Recycling (WRR) has scored a mean of 3.74 (SD = 0.76), implying that there is an adequate adoption of waste reduction and recycling activities by SMEs. In addition, Circular Supply Chain Management (CSCM) has scored a mean of 3.69 (SD = 0.79), which is the comparatively lowest score among the circular economy dimensions. This implies that supply chain management practices associated with the circular economy need improvement. On the whole, Circular Economy Adoption (CEA) has scored a mean of 3.78 with a standard deviation of 0.65. In addition to that, the highest overall mean score was recorded for SBD with a value of 3.92 (SD = 0.68), which means that the circular economy activities are seen by respondents as having positive contributions towards sustainable development of organizations. The relatively small standard deviation values obtained for all constructs show the consistency of the responses provided by respondents.

Reliability and Validity

Table 3. Reliability and validity analysis

Construct	No. of Items	Cronbach's Alpha (α)	Composite Reliability (CR)	Average Variance Extracted (AVE)
Resource Efficiency (RE)	5	0.86	0.90	0.64
Waste Reduction and Recycling (WRR)	5	0.84	0.88	0.61
Sustainable Production Practices (SPP)	4	0.87	0.91	0.66
Circular Supply Chain Management (CSCM)	5	0.85	0.89	0.63
Circular Economy Adoption (CEA)	19	0.91	0.93	0.62
Sustainable Business Development (SBD)	6	0.90	0.92	0.68

The results of reliability and validity tests are presented in Table 3, which shows that the reliability and convergent validity of all constructs utilized in this research are satisfactory. The Cronbach's alpha coefficient for all constructs is between 0.84 and 0.91 and therefore higher than the critical value of 0.70, thus proving the reliability and consistency of the measurement items. Of all the constructs, the highest reliability score was attained by Circular Economy Adoption (CEA) ($\alpha=0.91$) and Sustainable Business Development (SBD) ($\alpha=0.90$). This demonstrates that there is high consistency of the items that measure these constructs. The Composite Reliability (CR) scores lie between 0.88 and 0.93, which is yet another proof of the reliability of the constructs. CR values are above the acceptable level of 0.70, indicating that the observed indicators are good representatives of their corresponding latent variables. The Average Variance Extracted (AVE) is measured within the range of 0.61 and 0.68, which exceeds the suggested minimum level of 0.50, hence validating the convergent validity. The highest AVE is noted in Sustainable Business Development (SBD) (AVE = 0.68) and followed by Sustainable Production Practices (SPP) (AVE = 0.66). It is evident that the constructs account for a considerable amount of variance in the measures. Therefore, it is justified that the instrument used for the study has strong validity and reliability and can be used for exploring the correlation between circular economy and sustainable business development.

Correlation Analysis

Table 4. Correlation analysis among study variables (N = 350)

Variables	RE	WRR	SPP	CSCM	CEA	SBD
Resource Efficiency (RE)	1.000					
Waste Reduction and Recycling (WRR)	0.58**	1.000				
Sustainable Production Practices (SPP)	0.62**	0.55**	1.000			
Circular Supply Chain Management (CSCM)	0.51**	0.57**	0.59**	1.000		
Circular Economy Adoption (CEA)	0.82**	0.79**	0.84**	0.76**	1.000	
Sustainable Business Development (SBD)	0.65**	0.61**	0.68**	0.59**	0.74**	1.000

Table 4 presents the correlation analysis results for the study variables based on 350 respondents from Lebanese SMEs and shows that all variables are positively and significantly related to each other and hence support the relationship between circular economy practices and sustainable business development. The correlation coefficients of all circular economy practices dimensions are within the range 0.51 to 0.62, implying a positive moderate relationship between them. First, the dimension of Resource Efficiency (RE) has a positive significant correlation with the dimensions of Waste Reduction and Recycling (WRR) ($r = 0.58$, $p < 0.01$), Sustainable Production Practices (SPP) ($r = 0.62$, $p < 0.01$), and Circular Supply Chain Management (CSCM) ($r = 0.51$, $p < 0.01$), meaning that there is a connection between improvements in resource utilization and waste reduction and recycling, sustainable production practices, and circular supply chain management. Second, the correlation analysis reveals strong, positive, significant relationships between the Circular Economy Adoption (CEA) and all its dimensions, i.e., RE ($r = 0.82$, $p < 0.01$), WRR ($r = 0.79$, $p < 0.01$), SPP ($r = 0.84$, $p < 0.01$), and CSCM ($r = 0.76$, $p < 0.01$). In addition, there is a strong positive correlation between Sustainable Business Development (SBD) and the adoption of the Circular Economy Model (CEM) ($r=0.74$, $p<0.01$), proving that the higher the adoption rate of CEM, the more sustainable the development of the business. The positive correlations between all the variables provide preliminary proof of the hypothesis about the positive impact of adopting the circular economy on sustainable business development.

Hypothesis Testing

The suggested research model makes use of three hypotheses to determine the determinants of Circular Economy Adoption and its impact on sustainable business development in Lebanese Small and Medium Enterprises (SMEs). H1, the first hypothesis, suggests that Circular Economy Adoption positively impacts Sustainable Business Development. The hypothesis assumes that the utilization of circular economy practices such as resource efficiency, waste reduction, recycling and reusing, sustainable production processes, and circular supply chain management can have a positive effect on economic sustainability and environmental performance.

The second research hypothesis (H2) assumes that SME Organizational Capabilities have a significant positive influence on Circular Economy Implementation Level. Hypothesis 2 shows that internal organizational factors,

including the commitment of management, innovation ability, technological readiness, availability of financial resources, and environmental awareness of employees, are important for successful implementation of the circular economy in SMEs. Finally, the third hypothesis (H3) assumes that External Environmental Factors have a significant positive influence on Circular Economy Adoption in Lebanese SMEs. Hypothesis 3 indicates that external environmental factors such as government policy, regulation, market pressure, customer sustainability awareness, and competition are conducive to the adoption of the circular economy and increase sustainability-oriented transformation of SMEs. Thus, these hypotheses give a thorough understanding of the influence of internal and external environmental factors on the adoption of the circular economy and its contribution to sustainable development. These relationships meet the research objectives related to the examination of the importance of the circular economy for sustainability improvement.

Discussion

The results clearly show that the adoption of the circular economy model is vital for sustainable business development among Lebanese SMEs. Descriptive analysis reveals that Lebanese SMEs have successfully adopted the concept of the circular economy on a moderate to high level because resource efficiency, sustainable manufacturing processes, waste reduction, and circular logistics management are all parts of the sustainability transformation process. The significant positive correlation between the two variables confirms the idea that businesses adopting the circular approach can enhance operational efficiency, environmental awareness, and business sustainability. The results also confirm that internal organizational capabilities, which include management commitment, innovation capability, technological readiness, financial resources, and employee environmental awareness, are important factors contributing to the successful adoption of the circular approach. Furthermore, external factors also encourage the adoption of the circular approach among Lebanese SMEs.

Theoretical Implications

The present research adds to the body of knowledge regarding the topic of circular economy and sustainable business development through empirical studies conducted in the SME sector of Lebanon, which is still under-researched as compared to more developed countries. The study broadens current knowledge about the relationship among circular economy adoption, organizational capabilities, environmental factors, and sustainable business development by incorporating all these concepts into one model. The results of the study confirm the opinion that circular economy adoption is not just a way to improve environmental conditions; it is a strategic decision that can bring improvements in economic sustainability and environmental performance of organizations.

Managerial Implications

The conclusions offer significant insights for the management of SMEs and other business organizations that aim to enhance their sustainability performance using circular economy approaches. It is recommended that managers focus on resource efficiency, waste reduction, recycling programs, sustainable production processes, and circular supply chains to boost performance and competitiveness. The findings indicate that it is necessary to develop organizational capabilities like innovation ability, environmental consciousness among employees, technological readiness, and commitment from management to successfully adopt circular economy practices. It is also critical for SMEs to embrace sustainability-based business models and closed-loop operations.

Policy Implication

This paper emphasizes that policymakers should create an enabling environment that encourages the circular economy among small businesses operating in Lebanon. The government should create mechanisms that create enabling environments for businesses, such as financial benefits, sustainability training, technological benefits, and regulation, in order to lower the barriers for circular economy adoption. The external environmental variables, which include government policy, regulatory factors, market conditions, and customer awareness, help create an enabling environment for small business sustainability adoption.

Limitations and Future Research

While this paper presents valuable information about the circular economy application in the case of Lebanese SMEs, there are some limitations that should be taken into account. First, this research only considers SMEs

functioning in Lebanon and, therefore, the results cannot be generalized to other nations. Moreover, this research applies a cross-sectional survey methodology and, thus, the sustainability practices are considered from a one-time perspective and may not present long-term changes in implementing the circular economy. Future research can broaden the study by considering a longitudinal research design, by making cross-country and cross-sector comparisons of SMEs, as well as considering other aspects like digitalization, financial means, green innovations, and institutions.

Conclusion

The current research work sought to measure the adoption of the concept of circular economy and evaluate the impact of such adoption on sustainable business development for SMEs in Lebanon. This research work was done in light of the need to analyze how SMEs adopt circular economy practices, such as resource efficiency, waste reduction, recycling and reuse strategies, sustainable production, and circular supply chain management, in order to develop their sustainable development. A quantitative research approach was chosen and used in this study through a survey questionnaire conducted among 350 Lebanese SMEs. It was found that Lebanese SMEs have a moderate to high degree of circular economy implementation, as Circular Economy Adoption has an average score of 3.78 and Sustainable Business Development has an average score of 3.92. Resource efficiency and sustainable production have relatively high levels of implementation, whereas circular supply chain management needs more improvement. Correlation analysis proves the existence of a significant positive connection between circular economy adoption and sustainable business development ($r = 0.74$, $p < 0.01$). This means that the circular economy helps to improve efficiency, environmental friendliness, and business resilience. Also, this research highlights the importance of these capabilities of organizations – managerial commitment, innovation capability, technological readiness, and environmental awareness of employees – along with external factors. Future research can be conducted on the same topic but using different approaches, such as longitudinal analysis, cross-country comparison, or by adding more factors – digital transformation, green innovation, financial mechanisms, and others. In summary, this research contributes to sustainable business practices in developing countries by offering useful perspectives to SME managers and policymakers regarding the circular economy approach.

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