



Does the transition to a circular economy contribute to business resilience and transformation? Evidence from SMEs

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ABSTRACT

The implementation of the circular economy in companies undoubtedly requires a transition of their business systems towards more environmentally oriented ones. However, there is a lack of empirical research on the topic in the micro-level. Based on a sample of 404 managers with positions of responsibility in SMEs that are in transition towards a circular economy, this paper analyses at the micro level, through the use of structural equation modelling, how internal and external drivers contribute to this transition process and, at the same time, how the process itself impacts the resilience of the company and, consequently, its transformation process. The obtained results contribute to the literature by observing that internal factors carry more weight than external factors when implementing the CE transition. They illustrate how resilience derived from the CE transition can foster transformative change and demonstrate the CE's impact beyond environmental sustainability, extending its influence into strategic management and organizational fields.

1. Introduction

The Circular Economy (CE) pursues the optimization of the use of raw materials, resources, and zero waste through various strategies that keep them in closed loops. The main objective of CE is to break away from the dominant linear production system and replace it with a new circular system (Ellen MacArthur Foundation, 2019). Given that resources are finite and waste generation is increasing, CE sounds very attractive as a potential solution to achieve sustainable development and implement Sustainable Development Goals (SDGs) such as SDG-7 (affordable and clean energy), SDG-12 (responsible production and consumption), SDG-13 (climate action), among others (Ogunmakinde et al., 2022; Schroeder et al., 2018). In fact, there is a growing trend in organizations restructuring and rethinking their operations and businesses to mitigate negative environmental and social impacts worldwide (Loorbach and Wijsman, 2013; Schroeder et al., 2018) and to promote more sustainable consumption in society (Bianchini et al., 2018; Szita, 2017).

The transition to a circular economy (CE) in Europe started in the last decade, led by the European Commission. Domenech and Bahn-Walkowiak (2019) advised that while the Circular Economy (CE)

philosophy is easy to understand, it is very complex to put into practice and requires deep changes at all levels - macro, meso, and micro. In this paper micro-level is referred to the single firms while meso-level is referred to the industries or sectors and macro-level to countries (Kristensen and Mosgaard, 2020).

Nowadays, CE adoption is advancing at the macro level and slowly at the meso level, especially in more polluted industries (Ghisellini et al., 2018; Guzzo et al., 2022; Ghazanfari, 2023, among others). However, permeation is low at the micro level (Stal and Corvellec, 2018). One of the reasons pointed out is that CE is considered a disruptive innovation aimed at dramatically changing the current linear models of production toward a more pro-environmental approach (Nowicki et al., 2023). To convince businesses to adopt CE, the previous research has focused on the promised opportunities and benefits. The positive results confirm the legitimacy of deploying CE organizations (Nowicki et al., 2023). However, CE implementation implies making decisions, facing external challenges and internal resistance, and driving business transformation (Barford and Ahmad, 2023) and practical implications are ambiguously defined yet (Belmonte-Ureña et al., 2021). To ease the transformation, the transition management perspective provides a way to drive the transformation that will shift the market and the business itself

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(Loorbach and Wijsman, 2013).

Transition management theory (TM) is a relatively young interdisciplinary research field. Transition is defined as a gradual and continuous change to a new dynamic equilibrium from an initial dynamic equilibrium (Loorbach et al., 2008). Additionally, TM has roots in adaptive system theory. TM is further described as a management approach that transforms traditional business models into another system by adapting to new environmental conditions. It starts at the macro level and extends through the meso and micro levels (Barreiro-Gen and Lozano, 2020).

This theory considers that business should be dynamic and adapt or transform to accommodate perturbations or changes in environmental variables (Reike et al., 2023).

Previous research has focused on analysing the transitions at the macro level. Examples include the CE transition in Italy (Ghisellini and Ulgiati, 2020) and other countries, such as the UK, Germany and France (Gutberlet et al., 2023) or Greece (Trigkas et al., 2020). Other recent examples outside the EU include Bangladesh (Ferdoush et al., 2024) and even the G20 economies (excluding the European Union) for the period 1995–2009 (Bashir et al., 2024). On the other hand, research has also considered the CE transition in certain sectors with significant environmental impacts, such as construction (Ghisellini et al., 2018), the energy (Ghazanfari, 2023), electrical and electronic equipment (Guzzo et al., 2022), and textile industries (Franco, 2017).

Nevertheless, analyses of circular economy transitions at the micro-level are scarce (Tosi et al., 2024). Like Tosi et al. (2024) explain research has focused mainly on business models and reasons and benefits of CE strategies while transition since the business linear production situation towards a circular one can be considered in its infancy. Hofmann and Jaeger-Erben (2020) emphasized this idea and developed a theoretical model to help companies configure and navigate a successful transition from a linear to circular business model. Guzzo et al. (2022) built a framework for examining CE transitions to support decision-making at the micro level, and Bertassini et al. (2021) proposed a theoretical framework that addresses the requirements for the transition towards CE from the organizational perspective. In addition, the previous empirical research is mostly qualitative. For instance, Barford and Ahmad (2023) presented a case study of the multinational chemical company Dow and its transition to a circular organization. Loorbach and Wijsman (2013) developed a theoretical framework and applied it in an experimental participatory case study of the transition in the Dutch roof sector.

For the aforementioned reason, this paper focuses on analysing a societal challenge—the transition to CE—at the micro level, trying to shed light and help firms navigate the transition to circularity by leveraging environmental factors, while addressing internal and external resistance to transforming the business. To achieve this goal, this study utilizes an exploratory empirical approach using a questionnaire administered to 404 managers with senior positions in SMEs who are transitioning from a linear business model to a circular model.

Furthermore, this study aims to contribute to overcoming the aforementioned limitations to advance the topic and provide insight into the call for more research on transitions and characterization in various contexts and geographical regions. Firstly, this paper responds to the call for further empirical research to explore the factors driving the transition to a circular economy and its impacts (Tosi et al., 2024). Secondly, it extends and tests the role of circular transition in resilience and business transformation (Kennedy and Linnenluecke, 2022). Additionally, the findings of this research elucidate how practitioners and decision-makers can manage transitions at the micro-level. As a result, businesses will strengthen their knowledge about how to manage a business transition both inside and outside the company from a practical viewpoint. Additionally, businesses will also be able to identify drivers for the transition and business transformation.

To achieve these goals, the article is organized as follows. The next section presents a review of the literature transition and model of study.

This is followed by the method that was used for the empirical study and a quantitative analysis of the data. Finally, the article concludes with an analysis of the results, a presentation of the conclusions and proposals for future research.

2. Literature review

2.1. Drivers of the transition to a circular economy at the microlevel

As TM theory states, while transition starts at the macro level, companies should incorporate into the transition at the micro level as quickly as possible. Otherwise, companies could fall into difficulties, lose competitiveness, and even become bankrupt in the medium-long term (Vedenik and Leber, 2015). To avoid such negative situations, companies can adopt different approaches, but some typical mistakes are ignorance of changes in the environment; in such cases, companies think that changes are not necessary or that they can wait to see what happens or give a very late organizational answer.

Benefits associated with the transition could provide direction on how to conduct operations to minimize burdens (Nowicki et al., 2023). Thus, an early response can contribute to making the transition inside the company easy (Vedenik and Leber, 2015) and stimulating circularity when the organization has already started to explore circular deployment (Hofmann and Jaeger-Erben, 2020).

Thus, internal enablers of the organization, such as the company's strategy, values, or commitment to sustainability, when implemented, can serve as drivers towards a new production model. In the case of CE transition, early strategies of reducing, reusing, and recycling materials, among others, in production and consumption systems are considered enablers to lead a CE transition in companies (Awan and Sroufe, 2022; Murray et al., 2017). The circular strategies most adopted are reduction, reuse and recycling (Murray et al., 2017; Gaustad et al., 2018). Thus, practices such as reduction of raw materials in production (Gaustad et al., 2018; Grafström and Aasma, 2021); the reduction of use of single-use plastics (Choudhary et al., 2022) reusing packaging among other practices and the use of recycled materials (Morseletto, 2020) are considered drivers to circular transition.

Nowicki et al. (2023) asserted that a greater adoption of CE strategies could be a significant help to push the transition at the micro level due to the perception of positive benefits. Thus, company's perceptions of internal improvements in raw material efficiency, processes, and compliance with the law encourage them to continue the CE transition.

Therefore, the following hypothesis is proposed.

H1a. Internal enablers are likely to positively push the CE transition at the micro level.

TM unanimously asserts that a transition begins with a gradual increase in pressure on the dominant regime to address an existing challenge in society or the environment. Furthermore, political support is crucial to the success of the transition towards new rules, regulations and incentives to promote innovation to accelerate the transition (Loorbach and Wijsman, 2013). Barford and Ahmad (2023, pp. 1206) advised that “*Regulation is widely recognised for its potential to drive circularity*”.

Governments pilot the EC transition centrally using strong coercive measures such as laws and control regulation on production and consumption and the introduction of taxes and bans on certain activities considered damage to the environment (Alberich et al., 2023). Therefore, these legal measures taken at the macro level are key to push CE (Nowicki et al., 2023), but they are not the only ones.

Thus, Alonso-Almeida et al. (2021, p. 124840) explained the importance of initiatives to “*to reduce climate change and promote innovations in companies and industrial and technological networks by means of economic incentives supporting the adoption of renewable energies and recycling aimed at companies*”. Therefore, institutional initiatives based on subsidies or other positive incentives for the implementation of

circular activities, ways to reduce energy dependence and the adoption of alternative energy solutions can also contribute to pushing the transition to a CE at the micro level (Hazen et al., 2017; Florido et al., 2019; Alonso-Almeida et al., 2021). Thus, the following hypothesis is proposed.

H1b. External drivers are likely to positively push the CE transition at the micro level.

Transition to a circular economy, organizational resilience, and business transformation at the microlevel.

The transition to a circular economy within the company is not without risks and uncertainties due to the involvement of numerous actors, some of whom may be reluctant or attempt to impede the transition (Verleye et al., 2023). Therefore, in accordance with organizational evolution theory, organizational transition theory can be employed to address environmental contingencies, reduce uncertainty, and enhance long-term survival possibilities (García-Contreras et al., 2021).

Previous research has demonstrated that transitioning to a Circular Economy (CE) necessitates changes in the company's existing core capabilities (Alonso-Almeida et al., 2021). In fact, according to TM, the CE transition contributes to positioning the organization with strengthening and enhancing capabilities (Nowicki et al., 2023). In addition, the transition period introduces the necessary changes to stay ahead of the market and achieve a new situational status and make the organization more resilient to environmental challenges (Manfield and Newey, 2018).

The transition to a CE, require the adoption of circular strategies starting by the main circular principles called 3 R "reduction, reuse and recycling" (Murray et al., 2017; Gaustad et al., 2018). These strategies are deployed reducing raw materials, energy and waste; recycling and using recycling materials (Gaustad et al., 2018; Grafström and Aasma, 2021; Choudhary et al., 2022). Furthermore, transitions require adjustments in the current business processes and create new business processes, structures, and businesses (Hofmann and Jaeger-Erben, 2020) and managing tensions among different internal and external actors (Verleye et al., 2024). Managing wisely these changes improve the knowledge about circular economy benefits and ways to deploy it, making easy the transition (Alonso-Almeida et al., 2021; Nowicki et al., 2023).

The transition to a circular economy can lead the company to a better position than it was before the transition began. In other words, it can make the company stronger and more resilient. Resilience is interpreted as the capacity of organizations and economic systems to confront situations of complex magnitude and still manage to recover. (Chingay et al., 2022). Thus, resilience can be a catalyst for the development of capabilities, being a bridge to achieve conditions for business transformation and sustainability (Sanchez and Acosta, 2020) and facing difficult and painful situations (Manfield and Newey, 2018).

Therefore, CE organizational transition allows companies to achieve both internal and external resilience. On the one hand, it pushes the realization of operational benefits through the acquisition of new and improved internal knowledge, skills and capabilities (Nowicki et al., 2023), a better work environment (Sehnem et al., 2019) and, consequently, risk reduction (Tognetti et al., 2015; Nowicki et al., 2023).

In this sense, the transition to a circular economy contributes to creative and dynamic responses to the challenges and resistances that arise within companies, aiming to enhance organizational resilience and pursue other higher objectives (Tosi et al., 2024). On the other hand, it promotes external resilience through collaboration among companies in the same or different sectors (Veleva et al., 2017; Barford and Ahmad, 2023), collaboration with other stakeholders such as suppliers or universities (Alonso-Almeida et al., 2021) and the achievement of a better relationship with local governments (Nowicki et al., 2023). Moreover, resilience can alleviate tensions with external actors and enhance collective learning (Dentoni et al., 2021). Thus, Kennedy and Linnenluecke

(2022) examined the engagement with the circular economy from a resilience perspective and concluded that circular economy business practices impact resilience at the social-ecological, firm, and industry levels. Nevertheless, some authors have suggested that resilience works more effectively within the organization than externally due to the control it exercises and the decision-making capacity (Rogel and Urquiza, 2019). In any case, summarizing the whole research, the following hypotheses are proposed.

H2. The transition to a Circular Economy (CE) is likely to positively impact both a) internal business resilience and b) external business resilience.

Thus, in a transition, a company provides a specific answer to each societal challenge to increase its resilience. Friedland and Gall (2012, p. 141) explained the concept of resilience pivots around "*persistence through continuous development, innovation, and transformation to attain new and better-adapted configurations*" in the understanding that organizations are dynamic and require continuous adaptation to their external environment. This organizational construction requires changes both inside the organization and outside in the nature of the relationship of the organization with the environment (Manfield and Newey, 2018). Therefore, resilience is presented as the organization ability and capacity to be strong in times of stress and change to survive (Tosi et al., 2024).

Resistance is provided from two different sources: internal and external. Resilient organizations have a set of capabilities oriented to take actions regarding specific conditions in the market (Medina, 2012). Thus, some authors have emphasized the role of internal resilience in the flexibility and capacity of learning and permanent reconstruction (Friedland and Gall, 2012). In other words, these companies are able to create the "interactive cycle of challenge-reaction-learning", where they develop operational and dynamic capabilities (Schepers et al., 2021). Dynamic capabilities are strategic capabilities that allow organizations to adapt and change, and operational capabilities allow them to fit the dynamic capabilities of organizational routines. Thus, internal resilience contributes to facing uncertainty, managing external risks and generating new skills and capabilities (García-Contreras et al., 2021).

Circularity resolves some issues related to resource scarcity, material reuse, and increased recycling, but further transformation in business practices is necessary (Kennedy and Linnenluecke, 2022). In the case of external resistance sources, the environment presents different opportunities to strengthen organizational resilience (García-Contreras et al., 2021). Additionally, some of these opportunities are win-win collaboration inside the supply chain, the use of governmental aid or the possibility of deploying growth strategies (Alonso-Almeida et al., 2021). Thus, external resilience enables companies to monitor their environment and respond more quickly to changes (Vogus and Sutcliffe, 2007). Moreover, reducing pressure on natural ecosystems (Kennedy and Linnenluecke, 2022) is a driver of circular business transformation.

For example, Hofmann and Jaeger-Erben (2020) suggested that successful circular organization transition could require new capabilities and competences and consequently, generate new circular business. These capabilities can be achieved by establishing new supply chain relationships, social networks, markets, and manufacturing places and processes which could articulate the acquisition of innovative environmental capabilities (Hillmann and Guenther, 2021). Thus, through gaining resistance, the company is able to extend the circular processes, establish a more solid circular structure and gain a competitive advantage even beyond competitors Lüdeke-Freund et al. (2019); Bockholt et al. (2020); Schepers et al. (2021); Schultz (2022). In other words, resilience pushes the transformation for circularity in the organization. Therefore, the following hypotheses are proposed.

H3. Higher a) internal b) external business resilience is likely to enable business transformation in the development of the CE.

The proposed working causal model is summarized in Fig. 1. The model includes the overall purpose of this study. First, it analyses the

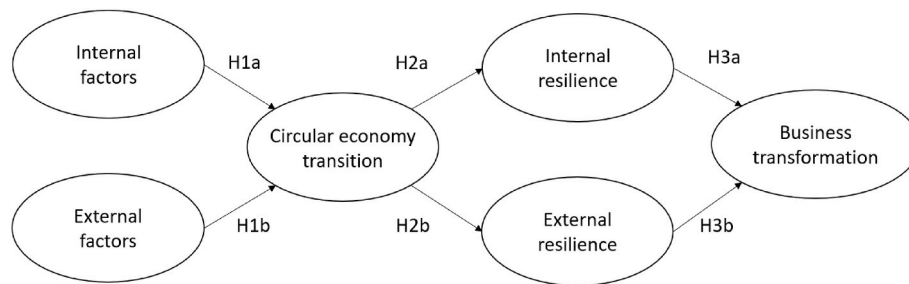


Fig. 1. Proposed working causal model.

impact of internal and external factors on the transition of the firm into the CE. Second, it assesses whether the transition impacts the internal and external resilience of the firm. Finally, the model analyses the impact of firm resilience on business transformation in the development of the CE.

3. Methodology

3.1. Data collection

Data were collected in September 2022 through an online survey uploaded to the Netquest (NetQuest, 2023) opt-in panel. The main reason for outsourcing the data collection was to ensure the validity of the data, as NetQuest is an international specialized company with the highest quality standards and ISO 20252 certification. The target population included all adults whose main residence was in Spain, specifically adults with senior positions in private SMEs to ensure they had a complete view of the practices and strategies implemented by the firm. A cross-quota for gender was used to guarantee a distribution of these variables in the sample similar to the population living in Spain (See Table 1). In total, 404 responses were collected for statistical analysis. Most of the respondents were between 35 and 54 years old (60.4%) and mostly working in firms with less than 50 employees (63.1%). Regarding the devices used to collect the data, 52.7% answered through smartphones, 45.5% through PCs, and only 1.7% through tablets.

One of the main limitations of collecting data with single respondents is the existence of bias. In order to avoid this common method bias, a Harman's single-factor test was conducted. Since a single factor with all the variables included in the study did not account for most of the covariance among the variables (48.5%), using confirmatory factor analysis, the existence of bias was rejected. Additionally, the sample was controlled by age, gender, and size of the firms, and no significant differences were detected.

3.2. Questionnaire

Based on the previous exhaustive analysis of the current literature, the questionnaire uploaded to Netquest was structured into three sections: descriptive data of the respondent and the firm, the Circular Economy (CE), and blockchain. At the beginning of the questionnaire, a question was included to confirm the existence of CE strategies in the firm. Only respondents who confirmed the existence of CE strategies in

the firm could continue answering the questionnaire. Additionally, respondents were informed about the purpose of the research and the confidentiality of the collected data.

3.3. Measures

For the purpose of the present paper and in light of the previously stated hypotheses, six dimensions were explored: (i) internal drivers, (ii) external drivers, (iii) CE transition, (iv) internal resilience, (v) external resilience, and (vi) business transformation.

All the statements included in the questionnaire, which represent each of the dimensions, were ranked on a Likert scale from 1 (totally disagree) to 5 (totally agree). Appendix A presents the statements by dimension, their main descriptive statistics, and the references on which they were based.

4. Results

The results section is structured into two subsections. In the first subsection, we validated the measurement model according to three criteria: convergent validity, internal consistency, and discriminant validity. The objective was to demonstrate the adequacy of the items that compose each of the six latent dimensions and to confirm that each dimension was independent of the others. In the second subsection, the hypotheses of the causal model are tested by analyzing the structural model. Based on a covariance-based approach, a structural equation model (CB-SEM) was performed.

4.1. Measurement model

Table 2 presents the loadings of the items by dimension. In total, six exploratory principal component factor analyses using Varimax rotation were conducted. Since all the items loaded significantly on their posited dimensions, with loading values over 0.7, convergent validity was confirmed.

The internal consistency of the dimensions was assessed with Cronbach's alpha and the average variance extracted (AVE). Since both indicators had values over the threshold of 0.7 (Nunnally and Bernstein, 1994) and 0.5 (Fornell and Larcker, 1981), the results confirmed the adequacy of the dimensions.

Table 3 states the discriminant validity of the dimensions. According to Fornell and Larcker (1981), since the interfactor correlation values

Table 1
Descriptive statistics of the sample.

Age	n	%	Gender	n	%	Size of the firm	n	%
18–24	1	0.2	Male	203	50.2	<10 employees	135	33.4
25–34	82	20.3	Female	201	49.8	10–49 employees	120	29.7
35–44	111	27.5				50–99 employees	79	19.6
45–54	133	32.9				100–249 employees	70	17.3
≥55	77	19.1						
Total	404	100.0		404	100.0		404	100.0

Table 2

Measures of factors.

Internal factors		External factors		Circular economy transition		Internal resilience		External resilience		Business transform.	
	Load.		Load.		Load.		Load.		Load.		Load.
INF1	0.809	EXF1	0.890	CET1	0.845	IRE1	0.891	ERE1	0.864	BT1	0.901
INF2	0.781	EXF2	0.921	CET2	0.801	IRE2	0.886	ERE2	0.848	BT2	0.911
INF3	0.715	EXF3	0.898	CET3	0.793	IRE3	0.883	ERE3	0.822	BT3	0.892
INF4	0.816			CET4	0.816	IRE4	0.892	ERE4	0.853	BT4	0.897
				CET5	0.827					BT5	0.885
α	0.784		0.886		0.875		0.910		0.867		0.939
AVE	0.610		0.815		0.666		0.788		0.717		0.805

Load.: loading; α : Cronbach's alpha; AVE: average variance extracted.**Table 3**

Discriminant validity of the dimensions.

	1	2	3	4	5	6
Internal factors	0.781					
External factors	0.284	0.903				
Circular economy transition	0.716	0.307	0.816			
Internal resilience	0.455	0.292	0.656	0.888		
External resilience	0.421	0.413	0.602	0.823	0.846	
Business transformation	0.507	0.400	0.717	0.770	0.772	0.897

Note: Diagonal represents the square root of AVE.

are less than the square root of the AVE, it is considered that each dimension represents a separate dimension.

4.2. Structural model

To assess the proposed causal model, structural equation modelling (SEM) was performed using EQS 6.4 software (Bentler, 1995). The use of SEM for testing causal models has been widely used in recent years among social science academics. In fact, it is considered the most frequently used approach (Bollen and Pearl, 2013). The main reason to apply SEM is because it allows the full model, embodying certain latent dimensions that are connected by one-way arrows (Perramon et al., 2022). These one-way arrows reflect the hypotheses bearing on the causal structure in the model (Byrne, 1994). From the various structural equation modeling (SEM) approaches available, the covariance-based SEM (CB-SEM) approach was utilized to estimate the model. The primary reason for selecting the CB-SEM approach is that it is the most suitable for factor-based models and is commonly employed for theory testing that requires a detailed model fit assessment (Dash and Paul, 2021). Using the maximum likelihood estimation method, Table 4 presents the main fit indices to demonstrate that these measures of overall fitness reflect the explanatory power of the proposed model. Since all the measures are over the cut-off values recommended by the literature, the global fit of the model is acceptable.

Fig. 2 presents the standardized solution of the causal model. According to the results, all the relationships between dimensions are positive and significant at the 5% level. Therefore, these findings confirm that several internal and external factors spur the firm to transition to CE, which, at the same time, has an impact on its resilience and, consequently, on its transformation.

Table 4

Explanatory power of the model.

Fit index	Value	Cut-off value (reference)
Satorra-Bentler scaled Chi-square/degrees of freedom	2.873	<3 (Carmines and McIver, 1981)
Bentler-Bonnett nonnormed fit index (BBNFI)	0.906	0.9 (Hu and Bentler, 2009)
Comparative fit index (CFI)	0.915	0.9 (Byrne, 1994)
Root mean-square error of approximation (RMSEA)	0.068	<0.08 (Jöreskog and Sörbom, 1993)

5. Discussion of the results

Several previous studies have focused on examining the drivers that facilitate the transition to a circular economy (CE) at the macro level (Ghisellini and Ulgiati, 2020; Gutberlet et al., 2023; Trigkas et al., 2020). Nevertheless, analyses of transitions at the micro level are less common, with the empirical research in this area being predominantly qualitative (Hofmann and Jaeger-Erben, 2020; Guzzo et al., 2022; Bertassini et al., 2021). Therefore, this study aimed to examine the micro-level transition to a CE, the role of resilience in this transition, and the impact on business transformation. By extending the research to the micro level, this study not only supports the existing body of literature, but also provides novel contributions that further our understanding of the workings involved in CE transitions.

The findings indicate that internal factors have a positive relationship with the transition to CE at the micro level. This is in line with the works of Awan and Sroufe (2022), Murray et al. (2017), and Nowicki et al. (2023), who emphasized that internal strategies of reusing, reducing, and recycling materials in production systems are pivotal drivers that enable the transition to CE in businesses. Internal enablers, as suggested by the data, reinforce the necessity for businesses to adopt early responses to emerging trends in circularity, allowing for a smoother transition within the company (Vedenik and Leber, 2015; Hofmann and Jaeger-Erben, 2020). Furthermore, the positive implications of adopting circular strategies have been confirmed by Nowicki et al. (2023), who posited that these strategies can significantly help businesses transition to a more sustainable model. Our research extends these findings by providing empirical evidence that internal enablers play a crucial role in pushing the CE transition at the micro level, thus confirming the importance of internal factors in facilitating the transition to a CE. Thus, hypothesis H1a is accepted.

In addition, the results show that external factors also play a positive role in the transition to CE, and hypothesis 1 b is also accepted. This finding confirms the literature that underscores the significant influence of external elements such as regulatory norms on the adoption of circularity (Loorbach and Wijsman, 2013; Barford and Ahmad, 2023). Moreover, this result is in line with other studies that argued that the macroeconomic environment, including industry trends and legislation, often drives companies to adopt CE practices (Hazen et al., 2017; Florido et al., 2019; Alonso-almeida et al., 2021). This study enhances these insights by quantitatively demonstrating the role of external factors in the microlevel transition to a CE, highlighting the importance of considering external pressures and opportunities when planning for a successful circular transition.

Regarding resilience, the findings support the hypotheses that the transition to CE positively impacts both the internal and external resilience of the company (H2a and H2b), confirming the views of previous literature. Additionally, the transition to CE is closely related to the concept of resilience, which is interpreted as the capacity of organizations and economic systems to face situations of complex magnitude and still manage to recover (Chingay et al., 2022). The CE transition contributes to positioning the organization with enhanced capabilities, thereby leading to organizational resilience (Nowicki et al., 2023). In

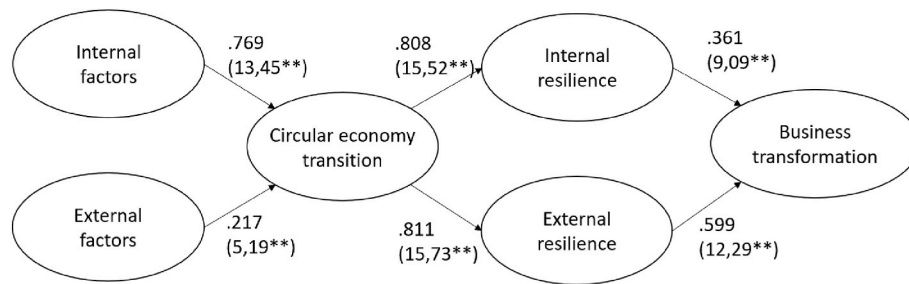


Fig. 2. Standardized solution of the model.

this context, the transition introduces changes that are necessary to gain an advantage in the market and achieve a new situational status, making the organization more resilient to environmental challenges (Manfield and Newey, 2018). This resilience plays a crucial role in the transformation of businesses, where transitions require adjustments to the current business processes and the creation of new ones (Hofmann and Jaeger-Erben, 2020). Consequently, the CE organizational transition enables the achievement of both internal and external resilience. Internally, the transition pushes the organization towards operational benefits through the acquisition of new and improved skills and capabilities, improved work environments, and risk reduction (Nowicki et al., 2023; Sehnem et al., 2019). Externally, the transition promotes resilience through collaboration among companies in the same or different sectors (Veleva et al., 2017; Barford and Ahmad, 2023) and the achievement of a better relationship with local governments (Nowicki et al., 2023).

Moreover, the results indicate that both internal and external resilience are crucial for business transformation. Therefore, on one hand, the implementation of internal resilience mechanisms such as providing a better working environment for employees, for example by offering them training to enhance problem-solving skills or fostering cooperation among them, facilitates the firm's transformation towards the collaborative economy. Similarly, on the other hand, such transformation could be supported by external resilience mechanisms, such as forming strategic alliances in the supply chain or expanding the company's operations into new areas.

Furthermore, the results of the study affirm the positive relationship between both internal and external resilience and business transformation. Thus, hypotheses H3a and H3b are accepted, following and expanding on the previous literature. In the face of societal challenges, each organization crafts its own unique response to enhance its resilience, requiring adaptations both within and in relation to its environment (Manfield and Newey, 2018). The results align with the concept of internal resilience as a source of flexibility and capacity for learning and continuous reconstruction (Friedland and Gall, 2012). This is exemplified in resilient organizations that develop an "interactive cycle of challenge-reaction-learning", building both operational and dynamic capabilities (Scheepers et al., 2021). In line with García-Contreras et al. (2021), we find that internal resilience allows organizations to better manage uncertainty and external risks, fostering the creation of new skills and capabilities.

In terms of external resilience, the findings highlight the role of environmental opportunities in strengthening organizational resilience, as suggested by García-Contreras et al. (2021). These opportunities can range from collaborative arrangements and the utilization of government aid to the deployment of growth strategies. As per Vogus and Sutcliffe (2007), external resilience enables organizations to monitor their environment and respond more quickly to changes, further fuelling business transformation.

Thus, the findings highlight resilience as a pivotal driver of circular business transformation. Aligning with Hofmann and Jaeger-Erben (2020), we find that a successful circular transition might necessitate the development of new capabilities, competences, and the generation of

new business. As organizations enhance their resilience, they are better positioned to grow, establish a solid structure, and gain a competitive advantage. Hence, resilience is not just a response to societal challenges, but a catalyst for transformation towards circularity in organizations.

These results also show some constraints and ramifications. Firstly, our investigation into the micro-level transition towards CE, while extensive, encounters inherent limitations in capturing the full spectrum of internal and external constraints that businesses face. For example, the adoption of circular practices such as creating new environmentally friendly packaging, reducing the use of plastics, or replacing some raw materials may require a substantial upfront investment in new technologies and processes. This can pose a significant barrier for small and medium-sized enterprises (SMEs) with limited financial resources. This financial constraint is critical, as it may slow down the pace at which these businesses can commit to CE principles, despite recognizing their long-term benefits.

Moreover, the study's focus on positive relationships between internal and external factors and the transition to CE might underplay the complexity of navigating these transitions in environments where regulatory support is inconsistent or lacking. While the findings underline the importance of regulatory norms in facilitating CE adoption, they also suggest at a broader challenge: the need for a more cohesive and supportive policy scenery that encourages businesses to undertake such transformative changes.

In terms of ramifications, our analysis points to the transformative potential of resilience in driving business adaptation to CE. However, this transformation is not without its challenges. For example, the development of new business models aligned with CE principles requires not only a change in organizational practices but also a shift in organizational culture and mindset. The readiness and ability of businesses to embrace such deep-rooted cultural and strategic changes vary, potentially leading to disparities in the adoption and success of CE initiatives across different sectors and regions.

Thus, the transition to a CE, shaped by internal and external drivers, bolsters organizational resilience and drives business transformation. The degree of transformation, however, can vary based on the specific circular strategies adopted by the organization, the nature of their human resources, and their ability to meet the evolving demands and needs of consumers.

6. Conclusions

This study extends the theoretical framework of Transition Management (TM) and Circular Economy (CE) by empirically validating the pivotal roles of internal and external factors in facilitating the CE transition. The findings not only reinforce the established understanding of TM's applicability in guiding organizational adaptation to novel environmental conditions but also show new insights into the mechanics of CE adoption. Specifically, the study demonstrates that an organization's internal dynamics, including green policies and cultural orientation, alongside external policies such as regulatory and government incentives, are facilitators for the transition towards a more sustainable, circular model. Regarding these mechanics of CE adoption, a first

contribution of the paper is observing that, although both dynamics have a positive relationship with CE adoption, the internal factors have more weight than external factors. In that sense, the results show that although government incentives are important, it's the green policies adoption and the green culture of the company what makes the difference. Management commitment to sustainability, together with the alignment of the company's strategy and culture, seem to be relevant drivers of the company's transition to the circular economy.

Significantly, the research clarifies the role of resilience as a beneficiary of the CE transition and a catalyst for business transformation. A second contribution of the paper is establishing that there's a positive relationship between the CE transition and organizational resilience, suggesting that embracing circular principles strengthens an organization's ability to endure and adapt to internal and external challenges. Besides, both internal and external resilience have a positive relationship with business transformation. This dual role of resilience, as an outcome and a driver, represents a contribution to the discussion on sustainable business practices, offering a new perspective on the interplay of resilience between CE transition and business transformation.

Moreover, the study contributes to previous research by illustrating how resilience derived from CE transition can foster transformative change. In that sense, the results show CE's impact beyond environmental sustainability, extending their influence into strategic management and organizational fields. This contributes to a more integrated view of the factors facilitating CE adoption and emphasizes the transformative potential of sustainable transition.

For practitioners, the insights from this study underscore the importance of holistic approaches in implementing CE strategies, emphasizing the need for internal green policies and the implementation of CE friendly government actions. Thus, for policymakers, our findings suggest that incentivizing green policies help both the transition to CE principles and to business transformation.

This research fills a critical gap in the literature by linking CE adoption with resilience and transformative change, offering valuable implications for academics, business managers, and policymakers alike. Our study paves the way for future research to explore the mechanisms through which circular strategies contribute to organizational resilience and transformation, marking a step forward in the pursuit of sustainable business models.

The present study is not without its limitations. One of the primary limitations, common to many surveys of this type, is the potential for subjectivity in data collection, as we surveyed only one manager per

company. However, the potential bias introduced by this approach is likely offset by the large number of surveys conducted, as indicated by the robustness of our statistical results.

Second, our results are confined to a specific industrial, cultural, economic and geographical context and thus may not be generalizable across different regions or countries. Consequently, future research could extend this line of inquiry to other geographical contexts to identify potential differences and similarities in the factors facilitating the transition to a CE, the role of resilience, and the impact on business transformation.

Furthermore, our results have opened up several avenues for future research. For instance, it would be beneficial to explore the impact of CE transitions and resilience on business transformation across different sectors. Industries vary in their degree of automation and labour intensiveness, which could influence the relationship between these variables. Moreover, the role of customers in driving the CE transition warrants further exploration. In addition, the findings of our study should be examined in different geographical contexts. Last, the influence of governmental policies on the adoption of the CE is another area that could be further investigated, as these policies could significantly shape the extent to which organizations adopt a circular model.

CRediT authorship contribution statement

Jordi Perramon: Writing – review & editing, Writing – original draft, Supervision, Conceptualization. **Llorenç Bagur-Femenías:** Writing – review & editing, Writing – original draft, Supervision, Data curation, Conceptualization. **Maria del Mar Alonso-Almeida:** Writing – review & editing, Writing – original draft, Supervision, Investigation, Formal analysis, Conceptualization. **Josep Llach:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Appendix B. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jclepro.2024.142279>.

Appendix A

Code	Dimension/statement	Mean	SD	Sources
Internal factors				
INF1	Have you reduced the use of single-use plastics?	3.58	1.210	Gaustad et al. (2018); Alonso-Almeida et al. (2021); Grafström and Aasma (2021); Gallo et al., 2022; Choudhary et al. (2022)
INF2	Have you reduced the consumption of raw materials in production processes?	3.11	1.160	
INF3	Have you created a packaging process using recycled products?	2.73	1.283	
INF4	Have you replaced some materials with recycled materials for product manufacturing?	3.25	1.143	
External factors				
EXF1	Do you have government incentives for the implementation of circular activities?	2.21	1.181	Barford and Ahmad (2023); Alonso-Almeida et al. (2020); Alberich et al. (2023)
EXF2	Do you have government incentives to reduce energy dependence?	2.18	1.165	
EXF3	Do you have government incentives to implement alternative energy solutions?	2.29	1.219	

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(continued)

Code	Dimension/statement	Mean	SD	Sources
Internal factors				
Circular economy transition				
CET1	Reduce energy, raw materials, and water in production processes	3.24	1.160	Loorbach and Wijsman (2013); Gaustad et al. (2018); Bertassini et al. (2021); Grafström and Aasma (2021); Gallo et al., 2022; Choudhary et al. (2022)
CET2	Increase in the use of recycled raw materials	3.33	1.124	
CET3	Improve knowledge about the circular economy	3.16	1.131	
CET4	Reduce the use of single-use plastic	3.59	1.183	
CET5	Reduce waste	3.55	1.103	
Internal resilience				
IRE1	Improving risk management?	3.24	1.090	Nowicki et al. (2023); Sehnem et al., 2019
IRE2	Improving cooperation among employees?	3.28	1.135	
IRE3	Providing a better working environment to face environmental challenges?	3.28	1.120	
IRE4	Providing the acquisition of skills such as solving new problems?	3.12	1.042	
External resilience				
ERE1	Contributing to the construction of strategic alliances in the supply chain?	3.09	1.075	Veleva et al., 2017; Alonso-Almeida et al. (2020); Barford and Ahmad (2023)
ERE2	Providing new fields of action for the company?	3.18	1.128	
ERE3	Providing access to new subsidies and government aid?	2.88	1.228	
ERE4	Enabling the creation of an energy community?	2.89	1.211	
Business transformation				
BT1	The acquisition of innovative organizational environmental capabilities derived from adopted circular processes	3.03	1.103	Lüdeke-Freund et al. (2019); Bockholt et al. (2020); Schultz (2022)
BT2	Greater acquisition of organizational environmental capabilities than its competitors	3.12	1.114	
BT3	Greater reach and extension of the circular economy to all functional areas than competitors	3.00	1.105	
BT4	Establishment of circular procedures as a strategic and differentiating resource	3.04	1.131	
BT5	Creation of new circular businesses	2.94	1.168	

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