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How Much Does the Business Development of Circular Eco-Efficient Practices Improve by Shaking Stakeholders up?

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ABSTRACT

European firms are currently in a process of transition toward a circular economy, which is expected to guarantee sustainable growth over time. Developing eco-efficient practices is a necessary step in this transition. This study analyzes the impact of stakeholder engagement in a circular business ecosystem on the development of these circular eco-efficient practices. Past literature has evidenced the impact of stakeholder environmental pressure on firm strategic decisions and outcomes. We adopt the stakeholder theory from a more recent vision, arguing that "shaking stakeholders up" within a circular ecosystem is a more advanced strategy than the traditional approach of reacting to stakeholder pressure. Using structural equation modeling, we examine the data of 14,726 European firms and their relationships with five primary stakeholder groups. The results offer theoretical and empirical support for the idea that firms can go further in adopting eco-efficient circular practices by shaking stakeholders up, selecting them, and managing relationships with them.

1 | Introduction

Overcoming one of the greatest challenges of economic growth today, namely, adapting production and consumption to the principles of a circular economy, requires companies to reduce the input–output flows with the natural environment. Minimizing both the extraction of natural resources (inputs) and the return of waste, pollution, and effluents (outputs) requires a coordinated adaptation of production and consumption habits. One of the mechanisms that enables companies to contribute to this challenge is the development of more eco-efficient production processes that implement actions such as reducing, recycling, reusing, repairing, and others, summarized as the so-called "Rs." To facilitate the implementation of these actions in the European context, the Best Available Techniques (BAT), that is, those practices for which the economic and technical viability has been verified, have been detailed by the regulators for each sector of activity, through the BREF (Best Available Techniques Reference) documents. These documents detail the most advanced techniques that production plants can put into practice in order to use renewable energy; optimize the consumption of water, energy, and other materials; reuse, recycle or exploit waste, heat or other gases generated in the processes; or to minimize the generation of effluents or gases, among other practices. The literature in management has paid increasing attention to the development and implementation of these circular eco-efficient practices in production, that is, practices aimed at minimizing waste and maximizing efficiency in the use of resources, contributing to a circular economy (Borland and Lindgreen 2013; Braungart, McDonough, and Bollinger 2007; Lovins and Lovins 2001).

In this study, we focus on the development of these practices within a circular ecosystem that offers better environmental results when stakeholders are truly engaged. We use the circular ecosystem concept, understood as a set of actors than evolve and jointly contribute to the circular economy (see Trevisan et al. 2022, for a review), precisely because it entails this engagement. The construct of stakeholder engagement allows operationalizing stakeholder theory to explain the relationships between firms and their stakeholders (Kujala et al. 2022). Stakeholder engagement refers to "*the aims, activities, and impacts of stakeholder relations in a moral, strategic, and/or pragmatic manner*" (Kujala et al. 2022, 1160). This construct implies a long-term reciprocal relationship between the firm and its stakeholders to co-create sustainable value (Andriof et al. 2002; Scuotto et al. 2020; Tian 2022).

Studies on stakeholder engagement (Griffin 2017) show that this strategy influences firm decision-making (for a review, see Kujala et al. 2022), financial outcomes (Ayuso et al. 2014; Gupta, Crilly, and Greckhamer 2020), and environmental outcomes, mainly focused on eco-innovation (Chen and Liu 2020; Garcés-Ayerbe et al. 2019; Plaza-Ubeda et al. 2009). However, the literature on stakeholder engagement in a collaborative circular business ecosystem is still scarce and fragmented, as past studies have analyzed company relationships with specific stakeholder groups (e.g., Cao and Zhang 2010; Moreno-Mondéjar, Triguero, and Cuerva 2021; Tian 2022) and/or focused only on the individual environmental requirements and preferences of previous company stakeholders (e.g., Graham 2020; Scuotto et al. 2020). Hence, this literature stream lacks the integrative approach necessary to operationalize stakeholder theory (Barney and Harrison 2020). In this study, to explain the mechanisms of stakeholder engagement, we adopt Sulkowski, Edwards, and Freeman's (2018) revised version of stakeholder theory. First, and in line with the stakeholder engagement construct, Sulkowski and colleagues question the traditional view that firm behavior is a response to stakeholder pressure or devotion to profit maximization. The authors suggest that a firm can initiate changes in the ecosystem and be the proactive actor "shaking up" stakeholders to change their behaviors and strategies. Second, they suggest that the ecosystem involved in the value creation and distribution processes comprises collaborative relationships that allow not only the co-creation of value but also the sharing of a novel value that better fits the challenges of a circular economy.

Therefore, this study investigates the following research question: How much does shaking stakeholders up, engaging them in a collaborative circular ecosystem, help firms develop circular eco-efficient practices? To answer this question, we adopt an approach less common in the literature, in which a company selects internal and external primary stakeholders and requests their involvement in a circular ecosystem. We posit that firms initiate changes within their ecosystems through their relationships with primary internal and external stakeholders. Progress toward a circular economy requires firms to substantially modify their organizational structure and processes, and exhibit flexibility in incorporating the new skills, knowledge, experience, and vision necessary to implement this transition (Scuotto et al. 2020; Stubbs and Cocklin 2008). However, the circular economy paradigm assumes that the value chains and mindsets of actors involved in the ecosystems are interconnected (for instance, see Saavedra et al. 2018). Furthermore, the strategic alignment between a firm and its stakeholders is a pre-requisite to achieving favorable economic and environmental outcomes (Igarashi, de Boer, and Fet 2013; Plaza-Ubeda et al. 2009; Scuotto et al. 2020). Thus, we conjecture that to maintain the strategic alignment realized after firms shake up stakeholders, firms must further develop their own eco-efficient practices in response to their stakeholders' adaptation (Scuotto et al. 2020; Tian 2022).

Overall, this study contributes to the growing body of literature that investigates how firms move away from the linear economy status quo and encourage their ecosystem to engage in a circular economy (see also Holzer et al. 2021). In particular, we address the question of deep stakeholder engagement, which remains underestimated by some firms (Holzer et al. 2021) despite its importance in developing a circular economy.

Our paper makes two key contributions to the literature. First, it contributes to the body of literature that analyzes the impact of stakeholder engagement—with multiple possible stakeholder combinations—on a firm's endeavor to achieve a circular economy (Acebo, Miguel-Dávila, and Nieto 2021; Garcés-Ayerbe et al. 2019; Graham 2020), particularly through the adoption of eco-efficient practices (Bodas-Freitas and Corrocher 2019; Hrovatin et al. 2021). Indeed, our results show that encouraging suppliers, customers, employees, external support agents, and other companies in the circular ecosystem has a positive impact on firms' own development of circular eco-efficient practices. Second, it contributes to understanding the role of firms in fostering the transition toward a circular economy in Europe. We found that European firms do enjoy a strategic position within their ecosystem, allowing them to identify and foster important systemic changes that could boost their own eco-efficient practices, which may then lead to more complex practices in a circular economy.

The remainder of this paper is structured as follows. In Section 2, we review past literature and develop our hypotheses. In Section 3, we present the materials and methods applied in this study. We present the results in Section 4 and discuss them in Section 5, along with theoretical and practical implications, concluding remarks, and avenues for further research.

2 | Literature Review and Hypotheses Development

The consideration of stakeholder theory aligns with the advanced mindset required in a circular economy; hence, we analyzed the impacts of deep stakeholder engagement on firms' own development of eco-efficient practices. Stakeholder engagement impacts firms' strategic decision making in areas signaled by systemic change; for instance, the transition from a linear to a circular economy (Bridoux and Stoelhorst 2022; Garcés-Ayerbe et al. 2019; Hörisch, Freeman, and Schaltegger 2014; Tapaninaho and Heikkinen 2022). In this sense, Bridoux and Stoelhorst (2022) highlight that stakeholder engagement in cooperative activities to co-create joint value is most relevant in the case of collective action problems, that is, situations in which short-term individual interests conflict with long-term collective interests.

We focus on the primary stakeholders, both internal and external, because they are necessary to the operations in the firm (Freeman, Harrison, and Wicks 2007). It seems obvious that firms that consider the demands of secondary stakeholders—those who can influence firms' primary stakeholders (Freeman, Harrison, and Wicks 2007)—and even "*new*" stakeholders, as the natural environment or future generations (Ortiz-de-Mandojana and Bansal 2016), will be especially proactive in implementing a circular economy. However, analyzing the advantages of shaking stakeholders up, to engage them in a circular business ecosystem, requires a fundamental focus on traditional primary stakeholders. We therefore adopt a systemic approach in which both internal and external primary stakeholders, in the terminology of Buysse and Verbeke (2003),[1] must necessarily be considered. Hence, we focus on the relationships between firms and both primary internal stakeholders (i.e., employees) and primary external stakeholders (i.e., suppliers, customers, external support agents and other companies) in the circular ecosystem. The relevance of involving these traditional primary stakeholders in circular value chains or ecosystems has been highlighted in previous literature (see Eisenreich et al. 2022, for an overview). Value creation and distribution processes differ for each stakeholder (Schlierer et al. 2012); therefore, we review various mechanisms of engagement for each stakeholder in the following subsections.

The circular manufacturing approach considers practices extensively, often classified into a typology that includes up to 10 different mechanisms (the "10Rs"), such as refusing, rethinking, reducing, reusing, repairing, refurbishing, remanufacturing, repurposing, recycling, and recovering (Kirchherr, Reike, and Hekkert 2017; Reike, Vermeulen, and Witjes 2018). This study focuses on four eco-efficient practices that require the adaptation of manufacturing processes considering these 10R mechanisms: saving water, saving energy, saving materials, and minimizing waste. Implementing such eco-efficient practices in companies is a necessary step to reach greater circularity (Borland and Lindgreen 2013; Holzer et al. 2021). Moreover, eco-efficient practices represent the type of circular practices mostly adopted by companies, especially in the European context (Calzolari, Genovese, and Brint 2021; Darmandieu et al. 2022). Note that eco-efficient practices are actually one type of eco-innovation, and eco-innovation refers to a new business approach adopted by an organization (or its industry) that reduces negative environmental outcomes, thereby improving the organization's environmental performance (de Jesus et al. 2018; Kemp and Pearson 2007).

2.1 | Engaging Suppliers in the Circular Business Ecosystem

As firms monitor corporate sustainable performance, they adapt their supply chain practices to the overall demands of their primary stakeholders (Graham 2020; Igarashi, de Boer, and Fet 2013; Morali and Searcy 2013). Consequently, environmental requirements are increasingly considered when firms select suppliers and negotiate with them to define responsible sourcing standards (Graham 2020; Morali and Searcy 2013).

The purpose of developing stronger relationships with supply chain stakeholders is to increase inter-organizational cooperation and reduce the negative externalities firms might face, which in turn impact corporate strategy (Cao and Zhang 2010; Morali and Searcy 2013) and may improve innovative behavior for sustainability purposes (Acebo, Miguel-Dávila, and Nieto 2021). The relationship between firms and their suppliers goes beyond inter-organizational cooperation, as strategic alignment regarding sustainability is a key dimension of supplier selection (Igarashi, de Boer, and Fet 2013; Wu et al. 2014). For example, the replacement of materials or components with those that are recyclable or have a lower environmental impact often requires suppliers to have a certain level of quality, as well as a willingness to cooperate and reach agreements (Eisenreich et al. 2022). In general, the application of criteria such as recycling, rethinking, refusing, or remanufacturing, among others, summarized in the so-called 10Rs, requires a true engagement of suppliers in the circular ecosystem. This means that firms engaging in a circular business ecosystem revise their production and requirements specifications, and search for partners with a strategic vision that aligns with their own and the needs of society. This strategic alignment impacts both firm (Cao and Zhang 2010) and sustainability (Morali and Searcy 2013) performances. Furthermore, supply chain integration (e.g., the development of collaborative approaches with key suppliers and customers) fosters firm performance (Cao and Zhang 2010) and enables the transition toward a circular economy in supply chains (Calzolari, Genovese, and Brint 2021; Eisenreich et al. 2022). Thus, we propose that:

Hypothesis 1. *Shaking suppliers up with circular criteria positively impacts the development of eco-efficient practices in the company.*

2.2 | Engaging Product/Service Customers in the Circular Business Ecosystem

Customer demands and consumption patterns drive development of circular products and services (Chen and Liu 2020; Horbach and Rammer 2020; Khan and Haleem 2021; Tian 2022). From a business ethics perspective, contributing to individuals' well-being and integrating society's moral expectations are effective means to engage in sustainability (Sauser 2005).

In practice, achieving a circular economy requires substantial modifications in both production and consumption patterns because the way we produce is inherently linked to the way we consume (Ghisellini, Cialani, and Ulgiati 2016). Firms and consumers are engaged in two-way relationships in which production and consumption patterns are co-developed (Chen and Liu 2020; Haddock-Fraser and Tourelle 2010; Melander 2018; Tian 2022). Through these collaborations, firms accumulate experience and knowledge regarding customer demands and more efficient production patterns (Cai and Li 2018) that foster an "eco-innovation mindset" and eco-innovation performance (Acebo, Miguel-Dávila, and Nieto 2021). Consequently, eco-innovations in products and production can complement each other (Reichstein and Salter 2006). Both types of eco-innovation address the reduction of the environmental burden of products throughout their life cycle (de Jesus et al. 2018). Overall, when implementing circular criteria at the micro-level, new business models must be developed, and this requires revisions of current products and production processes (de Jesus et al. 2018). These eco-innovations, especially those applied to products, necessarily require consumer involvement, both in the purchasing process and during product use and disposal. The need for customers' active involvement in the co-creation of circular practices, based on product modularity, production of spare parts, or reduction of transportation and packaging has been praised in previous literature (Eisenreich et al. 2022). Thus, we propose that:

Hypothesis 2. *Shaking product/service customers up with circular criteria positively impacts the development of eco-efficient practices in the company.*

2.3 | Engaging Other Companies in the Circular Business Ecosystem

In the transition from a linear to a circular economy, companies willing to develop relevant practices are strongly encouraged to change their business models to reduce the use of inputs, allow the proper recovery of materials, or extend product life cycles (İncekara 2022; Korhonen, Honkasalo, and Seppälä 2018). Since these goals are highly complex and difficult to achieve in practice, inter-organizational cooperation and connection among agents of circular ecosystems are necessary to tackle such challenges (de Jesus et al. 2018; Geissdoerfer et al. 2018; Takacs, Brunner, and Frankenberger 2022). Stakeholders such as waste contractors, recyclers, or reverse supply chain actors are often integrated into the business circular ecosystem to carry out novel activities necessary to close material loops (Eisenreich et al. 2022). Promoting collaboration with other companies' buyers, sellers, or distributors of waste will improve the development of eco-efficient practices. This is because the current stakeholders may be unable to offer solutions for the utilization of scrap materials or master the technology required to extend product life cycles, among other difficulties that arise in moving toward a circular economy. For example, in the fashion industry, collaborative economic platforms of resellers and charities are integrated to upcycle clothing (Provin et al. 2021).

Circular ecosystems allow products to be used for a purpose different than the one defined at the conception stage, as often happens in the clothing (Provin et al. 2021) or electronic device (Bridgens et al. 2019) industries. If conceived within a circular economy paradigm, this new purpose would have been anticipated and facilitated through ecosystems that close the material loops (Bridgens et al. 2019; Provin et al. 2021).

The configuration of these circular ecosystems requires collaboration and logistical coordination with other companies that contribute to closing the material loops (Eisenreich et al. 2022). Bridgens et al. (2019) provide as an example the CLEVER project, which closes the loop of the material flows of mobile electronic devices to tackle e-waste issues. These products are created by changing the business model, organizational structure, and/or practices of the actors involved, including the initiators of the collaborative networks. Therefore, we propose that:

Hypothesis 3. *Shaking other companies up with circular criteria positively impacts the development of eco-efficient practices in the company.*

2.4 | Engaging Workers in the Circular Business Ecosystem

A green job is defined in the Flash Eurobarometer 498 as "*one that directly deals with information, technologies, or materials that preserves or restores environmental quality. This requires specialized skills, knowledge, training, or experience (e.g., verifying compliance with environmental legislation, monitoring resource efficiency within the company, promoting and selling green products and services)*" (European Commission 2022). A green job preserves or restores environmental quality, which has the dual benefits of generating positive environmental impact and satisfying vocational aspirations (Shah et al. 2021).

Several factors might explain the relationships between green jobs and firm proactivity in a circular economy. First, the transition toward a circular economy is accompanied by macro-level policies and strategic economic reorganization that might favor, at least in the short term, labor-intensive sectors (Cecere and Mazzanti 2017). Second, innovative firms save costs, which in turn improves their competitiveness, thus allowing them to hire new recruits to cover new demand and grow the operation (Horbach and Rennings 2013; Miranda, Cruz-Cázares, and Saunila 2023). Third, green jobs and green human resources management contribute to developing business models that are more sustainable (Masri and Jaaron 2017), including not only shifts in labor and skills but also proactivity and innovation with a sustainability mindset and in collaboration with stakeholders (Stubbs and Cocklin 2008).

Past literature provides insights into the positive relationship between firm performance in a circular economy and the internal capacity of green jobs. In one study, European SMEs with green jobs were found to implement practices that are more cost-efficient for a circular economy, compared with SMEs that do not have green jobs (Darmandieu et al. 2022). This finding aligns with those of two other studies. Specifically, the proactivity of firms in a circular economy was found to be associated with the internal capacity of green jobs and tasks (Cecere and Mazzanti 2017; Moreno-Mondéjar, Triguero, and Cuerva 2021). Therefore, we propose that:

Hypothesis 4. *Shaking workers up with circular criteria positively impacts the development of eco-efficient practices in the company.*

2.5 | Engaging Support Agents in the Circular Business Ecosystem

The transition toward a circular economy requires the support of stakeholders that are not necessarily involved in the business value chain (Ghisellini, Cialani, and Ulgiati 2016; Korhonen, Honkasalo, and Seppälä 2018). This external support can take many forms, from financing to regulatory instruments or knowledge transfer. We focus on external support in the form of financing and knowledge transfer.

In the past, European firms improved their competitiveness by obtaining public funds to foster eco-innovations (Flachenecker and Kornejew 2019). Public investments in R&D also helped improve European SMEs' proactivity within a circular economy paradigm (Garrido-Prada et al. 2021). Notably, the initiative had created a transfer from micro-level firm investments in a circular economy to macro-level country investments in environmental and energy R&D (Garrido-Prada et al. 2021), consistent with the reality that financing and investments are often an important barrier faced by firms (Miranda, Cruz-Cázares, and Saunila 2023). In an empirical study, the difficulty in accessing financing was an important barrier for 22% of the European firms that had not yet developed circular economy practices (Garcés-Ayerbe et al. 2019). Thus, it seems that European firms either have the ability to make investments to develop such practices and enhance their performance (Darmandieu et al. 2022) or search for an external partner that can bear this cost, thereby allowing them to experience greater circular performance (Garrido-Prada et al. 2021).

Knowledge and continuous learning are also critical in the transition toward circular business models (Miranda, Cruz-Cázares, and Saunila 2023; Pitkänen et al. 2016). These refer to a profound understanding of the circular economy principles and the technical knowledge necessary to implement them. In the past, the lack of expertise and knowledge was found to be an important limitation to firms' development of circular economy practices. In Garcés-Ayerbe et al.'s (2019) study, almost 21% of the European firms that had not yet implemented circular economy practices were hindered by the lack of expertise to implement them. Almost 26% of European firms had no clear understanding of the corresponding costs and benefits. Approximately 21.5% had no clear understanding of the investments required, and almost 17% thought the administrative and legal procedures were complex. Overall, the difficulties firms encountered in developing circular economy practices were due to the complexity of circular business models that require more expertise and resources (Geissdoerfer et al. 2018). By contrast, firms that collaborated with scientific partners improved their eco-innovative endeavors (Acebo, Miguel-Dávila, and Nieto 2021). Similarly, firms that accumulated technical knowledge improved their competitiveness (Cañón-de-Francia, Garcés-Ayerbe, and Ramírez-Alesón 2007). In this vein, Hart (1995) argues that some of the key strategic resources necessary to foster firm competitiveness are tacit (assets resulting from accumulated and refined experience) and socially complex (based on large groups of individuals and their ability to coordinate a large amount of knowledge and experience to produce unique outcomes).

Finally, external financial and knowledge support have complementary effects, at least on eco-efficient practices of European businesses. Specifically, while external financial support addresses the go/no-go question, external knowledge support addresses the diversity and complementarity of eco-efficient practices (Bodas-Freitas and Corrocher 2019). Hence, firms that allow their ecosystem to engage in a circular economy proactively ask for both types of external support. Thus, we propose that:

Hypothesis 5. *Shaking external support agents up with circular criteria positively impacts the development of eco-efficient practices in the company.*

In the following sections, we discuss the methods and results of the empirical study conducted to test our theoretical assumptions.

3 | Materials and Methods

3.1 | Data

We used data from the Flash Eurobarometer 498 "SMEs, Resource Efficiency and Green Markets" (Wave 5; European Commission, Brussels 2022). The Flash Eurobarometer 498 survey was requested by the European Commission, Directorate General for Internal Market, Industry, Entrepreneurship and SME and coordinated by the Directorate General for communication. The Flash Eurobarometer comprises a series of surveys (launched in the 1980s) that pursue a new topic each month. These surveys are conducted in the European Union but can occasionally include fewer member states or be enlarged to include non-European member states, depending on the survey's objectives (European Commission 2022).

We used these data because this study is part of a larger project on the role of companies in transitioning from a linear to a circular economy in Europe. In addition, the roadmap adopted by the European Union in March 2020 to reach carbon neutrality by 2050 is that of a circular economy (European Commission 2020).

3.2 | Sample and Data Collection

The fieldwork was conducted between November and December 2021 by Ipsos European Public Affairs (European Comission 2018). Interviews were conducted by phone and followed a common questionnaire initially written in French and English and then translated into the national language by local institutes of the network in charge of the fieldwork. Each Flash Eurobarometer involved a new and independent sample (European Commission 2022). The Flash Eurobarometer 498 used in this study was conducted in the 27 member states of the European Union, plus Albania, Iceland, North Macedonia, Moldova, Montenegro, Norway, Serbia, Turkey, the United Kingdom, and the United States. The unit of analysis was a firm with at least one employee. The total sample comprised 17,662 companies.

We focused on European countries and the United Kingdom. Removing answers from other countries provided a valid sample of 14,726 companies. The sample is described in Table 1.

Regarding the representativeness of the sample, it includes companies of varying sizes from different sectors and countries that partially reflect the European business structure (Table 1). Samples range from approximately 250 companies (Cyprus,

TABLE 1 | Description of the sample.

	N	%
Size—Number of employees		
Between 1 and 9 employees (microenterprises)	5911	40.2%
Between 10 and 49 employees (small enterprises)	5288	36.0%
Between 50 and 249 employees (medium-sized enterprises)	2580	17.5%
250 employees or more (large enterprises)	924	6.3%
Total	**14,703**	**100.0%**
Sector (NACE)		
B—Mining and quarrying	156	1.1%
C—Manufacturing	2974	20.2%
D—Electricity, gas, steam and air conditioning supply	288	2.0%
E—Water supply; sewerage, waste management and remediation activities	227	1.5%
F—Construction	2543	17.3%
G—Wholesale and retail trade; repair of motor vehicles and motorcycles	4109	27.9%
H—Transportation and storage	1065	7.2%
I—Accommodation and food service activities	973	6.6%
J—Information and communication	746	5.1%
K—Financial and insurance activities	463	3.1%
L—Real estate activities	356	2.4%
M—Professional, scientific, and technical activities	826	5.6%
Total	**14,726**	**100.0%**
Country		
FR—France	615	4.2%
BE—Belgium	604	4.1%
NL—The Netherlands	605	4.1%
DE—Germany	600	4.1%
IT—Italy	601	4.1%
LU—Luxembourg	256	1.7%
DK—Denmark	501	3.4%
IE—Ireland	507	3.4%
GB—United Kingdom	511	3.5%
GR—Greece	602	4.1%
ES—Spain	600	4.1%
PT—Portugal	601	4.1%
FI—Finland	501	3.4%
SE—Sweden	601	4.1%
AT—Austria	514	3.5%
CY—Cyprus	252	1.7%
CZ—Czech Republic	601	4.1%
EE—Estonia	507	3.4%
HU—Hungary	534	3.6%
LV—Latvia	504	3.4%
LT—Lithuania	502	3.4%
MT—Malta	255	1.7%
PL—Poland	609	4.1%
SK—Slovakia	500	3.4%
SI—Slovenia	561	3.8%
BG—Bulgaria	518	3.5%
RO—Romania	611	4.1%
HR—Croatia	553	3.8%
Total	**14,726**	**100.0%**

(Continues)

TABLE 1 | (Continued)

Malta, and Luxembourg) to 500–600 (the rest of the countries). Small, medium, and large companies are overrepresented compared to micro-enterprises.

3.3 | Variables

3.3.1 | Dependent Variable: Eco-Efficient Practices

Eco-efficient practices prioritize productivity and incremental improvements in resource efficiency, including energy resources (Braungart, McDonough, and Bollinger 2007; Calzolari, Genovese, and Brint 2021). In other words, they strongly focus on reducing negative environmental impacts (Khan and Haleem 2021). Such practices include ways to use (raw) materials more efficiently because materials often weigh heavily on manufacturers' production costs (Choi, Thangamani, and Kissock 2019). Although improvements in eco-efficiency may not challenge the linear flow of materials (Braungart, McDonough, and Bollinger 2007; Calzolari, Genovese, and Brint 2021), they can be viewed as the first step toward implementing transformational practices for building a regenerative circular economy (Borland and Lindgreen 2013). Accordingly, eco-efficient practices are an important component of the 4R framework (reduce, reuse, recycle, or recover) adopted in the European Union to promote a circular economy (Kirchherr, Reike, and Hekkert 2017). In this framework, eco-efficient practices relate mostly to the "reducing" strategy, that is, minimization and reduction of inputs for the preservation of natural capital to develop environmentally efficient products and manufacturing processes (Kirchherr, Reike, and Hekkert 2017).

Firms consider eco-efficient practices related to resource efficiency to be an important step toward developing a circular economy (Holzer et al. 2021). Thus, we measured whether European companies actually moved from the status quo of a linear economy. To measure business development of *eco-efficient practices*, we used four indicators from the Flash Eurobarometer 498. Specifically, respondents were asked about their practices regarding "*saving water*," "*saving energy*," "*saving materials*," and "*minimizing waste*." These dummy variables take a value of 1 if firms indicated they had already implemented the practices, and 0 otherwise. These items are aggregated into a latent variable (see the Results section for details of its construction).

3.3.2 | Independent Variables

3.3.2.1 | Shaking *Suppliers* up.

For the first time in the series of Flash Eurobarometers on sustainable practices, respondents were asked about their supply chain management practices, particularly whether they proactively selected suppliers with circular criteria.[2] This dummy variable takes a value of 1 if firms indicated they had already implemented the practice, and 0 otherwise.

3.3.2.2 | Shaking Product/Service Customers up.

Since the first wave of the Flash Eurobarometer, respondents have been asked whether their company offers eco-innovative products and services to their customers. This denotes the early identification of the proactive role of firms in developing green markets. In the current fifth wave, respondents could select from three possible answers: "*Yes*," "*No, but planning to do so in the next two years*," and "*No and not planning to do so*." We recoded this categorical variable as a dummy variable that takes a value of 1 if the company was already offering such products, and 0 otherwise.

3.3.2.3 | Shaking Other Companies in the Circular Ecosystem up.

Respondents were asked about the possible interconnections between their own value chain and the value chain of other companies in the context of selling residues and waste. An important principle of a circular economy is the valorization of such materials as new resources (Ghisellini, Cialani, and Ulgiati 2016; Korhonen, Honkasalo, and Seppälä 2018). This dummy variable takes a value of 1 if firms indicated they had already implemented the practice, and 0 otherwise.

3.3.2.4 | Shaking *Workers* Up.

Like eco-innovative products, respondents of the Flash Eurobarometer series have been asked about green jobs since the first wave. Specifically in the fifth wave, respondents were asked, "*In your company, how many of your full time employees, including yourself, work in green jobs some or all of the time?*" We recoded this continuous variable as a dummy variable that takes a value of 1 if the company already had green jobs, and 0 otherwise. The objective of this variable is to analyze whether the efforts of developing the internal capacity of a green workforce impact firms' development of eco-efficient practices.

3.3.2.5 | Shaking External Support Agents up.

We were interested in the effect of an active search of external support, in the form of external financing and transfer of knowledge, on firms' development of eco-efficient practices. A dummy variable was created, taking a value of 1 if the firm indicated receiving either or both types of support, and 0 otherwise.

3.3.3 | Control Variables

In order to minimize the effects of possible bias in representing the population in our results, we have included country, size, and activity sector as control variables. The effects of these variables on both the endogenous and exogenous variables were controlled. We used nominal variables for the United Kingdom and the 27 countries of the European Union, and for the sectors that follow the European NACE classification. They were all recoded as dummy variables. We also determined firm size based on total number of employees.

3.4 | Data Analysis

We used the Mplus version 8.6 software (Muthén and Muthén 2017) to first calculate our measurement model and then perform structural equation modeling. The measurement model was specified to confirm the statistical definition of latent variables within a dataset of observable variables that contains possible measurement errors (Jöreskog 1993). Structural equation modeling is typically used to control for these measurement errors when testing a theoretical model that features relationships between latent variables (Cheung et al. 2021). In particular, we performed structural equation modeling based on latent variables with categorical indicators. We used the expectation–maximization algorithm to optimize the complete-data loglikelihood in our model (Dempster, Laird, and Rubin 1977). We used this procedure because our endogenous variable is a categorical variable (Muthén and Muthén 2017). We combined this expectation–maximization procedure with the maximum likelihood with robust standard errors estimator.

3.5 | Common Method Bias

To control for possible common method bias within this secondary set of data, we first applied Harman's single-factor test to evaluate the effect of a single unmeasured latent method factor (Chang, van Witteloostuijn, and Eden 2010). All the observed variables underwent principal components analysis, and the first un-rotated component explained less than 25% of the variance in our data. Moreover, we estimated a single-factor confirmatory analysis with the nine variables of our model, as well as a six-factor confirmatory analysis with one latent variable (eco-efficient practices) and five other observed variables corresponding to our hypotheses. As the model fit to the data improved from the single-factor (AIC = 128,615.469; BIC = 128,747.862) to the six-factor (AIC = 54,119.429; BIC = 54,215.046) model, no single factor could explain the structure of our data.

Finally, as Chang, van Witteloostuijn, and Eden (2010) point out, simple models increase the risk of common method variance. However, this is not the case for our model (see Figure 1) given that we control for the effects of several variables (country, sector, and company size) on all the variables of our model.

Overall, given the results of Harman's single-factor test, the fit of the confirmatory analysis to our data, and the characteristics of our theoretical model, we deem that common method bias is not an issue here.

4 | Results

In the present study, given that our variables are dichotomous, we present tetrachoric correlations (using the "theta parameterization" in Mplus), along with descriptive information in Table 2. The intra-construct correlations among the indicators of the endogenous variable *eco-efficient practices* are all above 0.5. By contrast, with only one exception, the inter-construct correlations between latent variables are all below 0.5.

In the second step, we conducted a confirmatory factor analysis with the first four variables displayed in our correlation matrix to test the convergent validity and structure of the endogenous latent variable of our model, *eco-efficient practices*. The results are presented in Table 3. Model 0 includes the indicators of our endogenous latent variable; Model 1, the control variables, and Model 2, the exogenous variables. Note that all the results are highly significant. Moreover, in each model, the average variance extracted is greater than 0.5 and lower than the composite reliability index, which, in turn, is greater than 0.7. Thus, all three models of confirmatory factor analysis verify the dimensionality of our dependent latent variable.

In the third step, we performed structural equation modeling to empirically test the relationships between the latent variables hypothesized in our model (Cheung et al. 2021); that is, whether firms that proactively foster the adoption of circular economy practices by their stakeholders develop more eco-efficient practices themselves. Model 1 includes only endogenous and control variables, whereas Model 2 includes all variables. The model fit to the data improves from Model 1 (Log-likelihood = −33,598; AIC = 67,294; BIC = 67,665; Sample-size adjusted BIC = 67,510) to Model 2 (Log-likelihood = −77,188; AIC = 154,915; BIC = 156,958; Sample-size adjusted BIC = 156,103), suggesting that the relationships envisioned between the latent variables of our model fit the data. The results are detailed in Table 4.

According to the results obtained, there are significant differences in both the endogenous and exogenous variables depending on the size, sector, and country of the firm. Regarding the five proposed hypotheses, none of them were rejected. Specifically, for Hypothesis 1, which states that shaking up suppliers with circular criteria has a positive impact on firms' development of eco-efficient practices, $\beta = 0.331$ ($p < 0.00$). For Hypothesis 2, which postulates that offering eco-innovative products and services has a positive impact on firms' development of eco-efficient practices, $\beta = 0.031$ ($p < 0.00$). For Hypothesis 3, which states that connecting value chains by selling residues and waste to other companies has a positive impact on firms' development of eco-efficient practices, $\beta = 0.199$ ($p < 0.00$). For Hypothesis 4, which posits that assigning green jobs and tasks has a positive impact on firms' development of eco-efficient practices, $\beta = 0.098$ ($p < 0.00$). Finally, for Hypothesis 5, which states that searching for and obtaining external support either in the form of financing or knowledge transfer has a positive impact on firms' development of eco-efficient

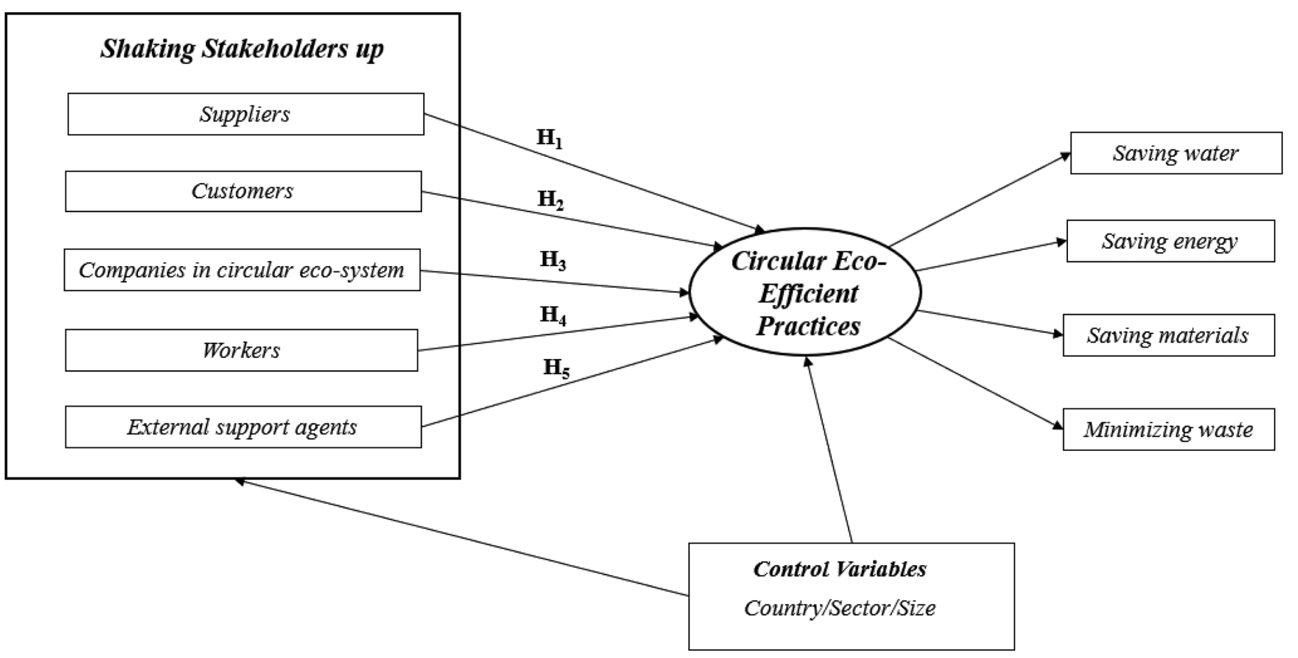

FIGURE 1 | Theoretical model.

TABLE 2 | Descriptive statistics and tetrachoric correlation matrix.

	Mean	N	1	2	3	4	5	6	7	8
Circular eco-efficient practices										
1. Saving water	45.3%	14,580								
2. Saving energy	63.1%	14,580	0.629***							
3. Saving materials	57.4%	14,580	0.541***	0.535***						
4. Minimizing waste	64.3%	14,580	0.553***	0.523***	0.596***					
Shaking stakeholders up										
5. Suppliers	35.9%	14,580	0.396***	0.383***	0.428***	0.458***				
6. Customers	36.5%	14,040	0.128***	0.156***	0.162***	0.159***	0.348***			
7. Companies in circular ecosystem	33.3%	14,580	0.234***	0.281***	0.323***	0.368***	0.227***	0.111***		
8. Workers	46.4%	13,679	0.202***	0.201***	0.215***	0.255***	0.326***	0.516***	0.190***	
9. External support agents	28.8%	12,861	0.107***	0.128***	0.101***	0.143***	0.160***	0.099***	0.141***	0.112***

***$p<0.00$
**$p<0.05$
*$p<0.10$

practices, $\beta=0.050$ ($p<0.00$). Note that our model explains 36% of firms' development of eco-efficient practices.

5 | Discussion and Conclusions

Our results are consistent with Sulkowski, Edwards, and Freeman's (2018) proposition that firms can identify and address specific issues within their circular ecosystem through deep engagement of their stakeholders. Particularly, in this study, we found that the larger the size of the firm, the greater the stakeholder engagement and the greater the implementation of circular eco-efficient practices. The levels of adoption are also different depending on the country and activity sector in which the company operates. The results lead us to conclude that shaking up both internal and external primary stakeholders, selecting them, and involving them in a circular business ecosystem encourages the implementation of eco-efficient circular practices related to both correcting the effects of polluting outputs generated (corrective measures) and preventing the generation of such outputs at source (preventive measures). With this objective European firms proactively alter the internal and external primary stakeholder portfolio (including suppliers, customers, other companies in the circular ecosystem, employees, and external support agents) and their behaviors. This, in turn, boosts their own development of circular eco-efficient practices, such as saving water, energy, and materials and minimizing waste. These practices, based on criteria such as reducing, reusing, refusing, and recycling, among others detailed in the circular actions known as the 10Rs, contribute to the necessary reduction of input–output flows between the economy and the natural environment.

In particular, our results stress that the integration of both internal and external primary stakeholders in the transition toward a circular economy is occurring in the context of European firms. This collaboration takes place with not only upstream stakeholders (i.e., suppliers), but also downstream noncompetitive stakeholders (i.e., customers). In this sense, our results are consistent with the principles of a circular economy in that they support the need to develop both the production and consumption patterns to move away from a linear economy paradigm.

Our results also reveal that collaborating only with current stakeholders is not enough. A circular economy implies overcoming barriers to develop new skills and activities; hence, firms should seek new partners with which the value chain can be intertwined, to move toward circular business (Takacs, Brunner, and Frankenberger 2022). The finding of the positive effects of selling residues and waste to other companies through firms' own eco-efficient practices reinforces the idea that such an endeavor contributes to fostering the transition toward a circular economy within the ecosystem.

Our results also offer empirical support for the relation between green jobs and positive environmental outcomes (Darmandieu et al. 2022; Hrovatin et al. 2021; Moreno-Mondéjar, Triguero, and Cuerva 2021). Interestingly, our results are consistent with previous findings of the positive effects of both employee energy efficiency awareness programs and the search for external knowledge on Slovenian SMEs' energy efficient practices

TABLE 3 | Results of the Measurement Model.

Circular eco-efficient practices	Model 0		Model 1		Model 2	
	λ	R^2	λ	R^2	λ	R^2
Saving water	0.760***	0.578	0.724***	0.524	0.698***	0.487
Saving energy	0.732***	0.536	0.716***	0.513	0.698***	0.487
Saving materials	0.712***	0.507	0.728***	0.530	0.728***	0.530
Minimizing waste	0.717***	0.514	0.748***	0.560	0.760***	0.578
AVE	0.534		0.532		0.520	
CR	0.730		0.729		0.721	

Note: Standardized coefficients. Model 0 contains the endogenous variables. Control variables are added in model 1. Exogenous variables are added in model 2.
Abbreviations: AVE, average variance extracted; CR, composite reliability.
***$p < 0.00$
**$p < 0.05$
*$p < 0.10$

(Hrovatin et al. 2021). Developing green jobs allows organizations to not only strengthen technical knowledge with external support, but also develop adaptive capabilities for conducting the necessary technical and social changes within the firm (Nudurupati et al. 2022). Indeed, green jobs and skills foster double-loop learning at the individual (competence development) and collective (organizational/structural) levels within firms (Bliesner, Liedtke, and Rohn 2014).

Furthermore, the positive effects of external support agents reveal that, overall, European firms still largely face obstacles related to both the adoption and diversification of eco-efficient practices, thus reinforcing preliminary past results on the subject (Bodas-Freitas and Corrocher 2019). Therefore, it is all the more relevant for European firms to incorporate green jobs and tasks to develop some core skills internally and further develop collaboration and synergies with the other external stakeholders mentioned above.

This study shows how eco-efficient practices are developed by collaborating with not only noncompetitive external primary stakeholders (Acebo, Miguel-Dávila, and Nieto 2021), but also internal primary stakeholders (Graham 2020). Indeed, the diversity of primary stakeholders implies various strategies that can help create systemic changes within the ecosystem and lead to increased sustainable value creation. In this respect, we have broadened the scope of stakeholder engagement mechanisms from communication and cooperation (Garcés-Ayerbe et al. 2019) to the proactive identification of the necessary systemic changes, increased stakeholder awareness and skills, and the strategic alignment of the network (Sulkowski, Edwards, and Freeman 2018).

5.1 | Theoretical Implications

First, our results show that European firms are engaging primary stakeholders within their circular ecosystems to foster systemic changes aimed at minimizing both the use of natural resources and the return of waste to the natural environment. The convenience of this proactive attitude, claimed by Sulkowski, Edwards, and Freeman (2018), who proposed the expression "shaking stakeholders," should nevertheless be further investigated. In this line of research, our results suggest that European firms have expanded their role in their ecosystem, from a simple linear economic view to a circular one, aligning and relating primary stakeholders to create higher sustainable value. However, our results imply that the ability to develop eco-efficient practices and foster the adoption of circular economy principles may not be restricted to a few actors (i.e., internal or external ones). Our results suggest a systemic vision, in which both internal and external agents with the capacity to influence company operations, namely primary stakeholders, can also contribute to developing eco-efficient activities. From a theoretical point of view, a new perspective in stakeholder theory, in which "the company agitates the stakeholders" and not "the stakeholders agitate the company" should also be considered in studying the transition toward a circular economy. Here, the prevalence of a circular economy in the European agenda may have positively changed the structure and dynamics of the relationships between companies and their stakeholders. This represents important conceptual and methodological challenges for stakeholder theory to analyze such large numbers of relationships with varying but more spread-out intensity.

Second, our results call for additional research on not only stakeholder engagement in the circular economy paradigm but also the different layers of a sustainable ecosystem. Indeed, the barriers firms face and the practices they implement with their stakeholders involve all of these layers (see for instance Nudurupati et al. 2022; Takacs, Brunner, and Frankenberger 2022). When European firms seek collaborations with other companies to connect value chains, they tackle barriers such as the lack of expertise and resources by associating with partners that do have the complementary resources and expertise to close material loops at the meso-level of the ecosystem. As such, our results call for more research on Takacs, Brunner, and Frankenberger's (2022) rationale to adopt an integrated perspective when analyzing barriers/drivers and practices in a circular economy.

Third, our study contributes to assessing the progress toward a circular economy in Europe based on Borland and Lindgreen's (2013) distinction between transitional and

TABLE 4 | Results of the structural equation models.

	Model 1	Model 2					
		Shaking stakeholders up					
	Circular eco-efficient Practices	Suppliers	Customers	Companies in circular ecosystem	Workers	External support agents	Circular eco-efficient Practices
Size							
10–49 employees	0.037***	0.029***	0.005	0.119***	0.062***	0.079***	−0.006
50–249 employees	0.104***	0.069***	0.037***	0.150***	0.108***	0.135***	0.036***
250 or more employees	0.116***	0.087***	0.060***	0.116***	0.147***	0.105***	0.047***
Sector							
Mining and quarrying	−0.010	−0.009	−0.034***	0.008	0.004	−0.009***	−0.007
Manufacturing	0.090***	−0.006	−0.060***	0.135***	0.039***	0.020**	0.067***
Electricity, gas, steam, and air conditioning supply	−0.002	−0.017**	−0.008	0.005	0.019**	0.011	0.001
Water supply, sewerage, waste management and remediation activities	0.020**	0.009	−0.004	0.036***	0.045***	0.046***	0.004
Construction	0.005	−0.018**	−0.071***	0.017**	0.023**	−0.006	0.011
Transportation and storage	−0.048***	−0.020**	−0.100***	−0.027***	−0.021**	0.024**	−0.032***
Accommodation and food service activities	0.063***	0.053***	0.015*	−0.001	0.012	0.034***	0.043***
Information and communication	−0.043***	−0.025***	−0.077***	−0.071***	−0.017**	−0.026***	−0.016
Financial and insurance activities	−0.030***	−0.022***	−0.059***	−0.069***	−0.034***	−0.004	−0.003
Real estate activities	−0.024**	−0.022***	−0.075***	−0.044***	−0.026***	0.021**	−0.004
Professional, scientific, and technical activities	−0.008	−0.025***	−0.066***	−0.041***	0.003	0.001	0.010
Shaking stakeholders up							
Suppliers							0.331***
Customers							0.031***
Companies in circular ecosystem							0.199***

(Continues)

TABLE 4 | (Continued)

	Model 1	Model 2					
		Shaking stakeholders up					
	Circular eco-efficient Practices	Suppliers	Customers	Companies in circular ecosystem	Workers	External support agents	Circular eco-efficient Practices
Workers							0.098***
External support agents							0.050***
R^2	0.202	0.053	0.099	0.060	0.086	0.059	0.360
AIC	67,294	154,915					
BIC	67,665	156,958					
Adjusted BIC	67,510	156,103					
Loglikelihood	−33,598	−77,188					
No. free parameters	49	269					
H0 S. correction factor	1.012	0.984					
N valid [b]	14,560	14,688					

Note: Standardized coefficients. Size base category: *1–9 employees*. Sector base category: G—Wholesale and retail trade; repair of motor vehicles and motorcycles.
Abbreviations: AIC, Akaike's information criterion; BIC, Bayesian information criterion.
[a]We controlled for the effects of the variable *country* on the exogenous and on the endogenous variables; country base category: France.
[b]We used the pairwise deletion of cases.
***$p < 0.00$
**$p < 0.05$
*$p < 0.10$

transformational strategies, echoing Braungart, McDonough, and Bollinger's (2007) concepts of eco-efficiency and eco-effectiveness. It appears that both strategies are still very much intertwined in European firms progressing toward a circular economy. At the ecosystem level, some practices start to tackle more complex elements of the paradigm, such as the offer of eco-innovative products and services, the definition of green jobs, or the connection of value chains. At the micro-level, the way European firms relate to their stakeholders has a positive retroactive effect on their eco-efficient practices, meaning that transitional practices are not abandoned at once but rather improved while the ecosystem's transformational strategies mature. In this regard, the development of green jobs is an important shift. It should allow for developing the workforce with the necessary skills, creativity, and mindset to boost transformational strategies through circular business models (Asgari and Asgari 2021; Geissdoerfer et al. 2018) that will help not only restore but especially regenerate the potential of the natural capital (Lovins and Lovins 2001; Morseletto 2020).

5.2 | Practical Implications

From a managerial perspective, our results encourage firms to deeply engage with both internal and external primary stakeholders to develop eco-efficient practices. Our results also encourage firms to become changemakers within their circular ecosystem and engage their internal and external primary stakeholders to develop eco-efficient practices that reduce both input extraction flows from the natural environment and output return flows through waste reduction, through corrective measures, for example recycling, using waste to generate energy or reforesting to offset the generation of greenhouse gases; and preventive measures, such as using renewable energy sources or using machinery that minimizes the generation of polluting outputs. These eco-efficient practices, based on the so-called 10Rs, contribute to the transition toward a more circular economy. Their strategic alignment should not be considered at the level of each firm–stakeholder relation, but rather expanded to a multistakeholder or network perspective. Moreover, firms should be aware that the economic and environmental gains that can be obtained from developing eco-efficient practices are not the end of the path for them. Rather, if they engage their stakeholders in the circularity path, these practices and gains can contribute to accumulating knowledge, skills, and experience that will help them subsequently further engage in a circular economy.

In practice, implementing eco-efficient corrective practices might be easier in the short term than addressing eco-effective preventive practices. In this sense, the R framework provides an interesting guideline on which types of practices lead to which environmental and circular benefits. We referred to the 4R framework, but Kirchherr, Reike, and Hekkert (2017) also reviewed more extensive frameworks, such as the 10Rs (recover, recycle, repurpose, remanufacture, refurbish, repair, reuse, reduce, rethink, and refuse). If unable to tackle eco-effective practices directly, practitioners may want to start by addressing the most realistic strategies for them in the short term. From this starting point, they can strive to move up the ladder from the least to the most eco-efficient strategies and progressively engage in eco-effective strategies and the transformation of their business model.

From a policymaking perspective, our results suggest that regulatory and financial instruments should continue to address the obstacles that firms face individually, such as the lack of financial resources or knowledge. However, our results suggest that regulators might want to also (or mainly) target instruments that could address multistakeholder obstacles and the challenges related to developing sustainable ecosystems. For example, further developing societal awareness of circular principles, especially the cradle-to-cradle school of thought (Braungart, McDonough, and Bollinger 2007), as well as academic careers and training on green skills and jobs (Bliesner, Liedtke, and Rohn 2014), could address numerous cross-layered challenges within firms' ecosystems from consumption to workforce skills and eco-design challenges (see Takacs et al.'s overview of these integrated barriers, Takacs, Brunner, and Frankenberger 2022).

5.3 | Concluding Remarks

This study adopted a revised stakeholder theory approach to analyze firms' proactivity in developing eco-efficient practices by "shaking stakeholders up." Based on structural equation modeling of the data of 14,726 European firms, we found that the act of engaging stakeholders in circular economy practices has a positive impact on firms' own development of circular eco-efficient practices, such as saving water, energy, and materials and minimizing waste, based on the so-called 10Rs. This means that European firms are indeed strategically positioned within their circular ecosystems to foster systemic changes that facilitate the transition toward sustainability. European firms are shaking their stakeholders up and contributing to the creation of sustainable value in their circular ecosystems by demanding more circular supply chain solutions, searching for solutions to close material loop cycles in inter-organizational cooperation, shifting the workforce task structure through the development of green jobs and tasks, and proactively searching for and obtaining financial and knowledge support from stakeholders further from the value chain.

Nonetheless, this study has several limitations that provide avenues for further research. First, a longitudinal framework could allow a separate analysis of the effects of firm behavior on stakeholder behavior, and the effects of adaptive stakeholder behavior on firm adaptive behavior at different points in time. Indeed, cross-sectional studies do not facilitate the capture of all the dynamics and influence mechanisms that occur in the two-way relationships between firms and their stakeholders. In view of this, Freeman, Phillips, and Sisodia (2020) argue that the preferable unit of analysis in studies relating to stakeholder theory is the relationship rather than the economic transaction.

Second, our results suggest that the dynamics in European ecosystems work in favor of the circular economy paradigm, and that European firms are finding stakeholders to be strategically aligned with them. However, it appears that European firms still have a long way to go in this endeavor, and more research is needed to investigate the structural and operational changes required in each stakeholder area (e.g., in supply chains, the possible evolution of actors' numbers and profiles, adoption of certain sustainable sourcing practices). The consideration of secondary stakeholders, besides primary ones, would also expand the contributions of the study.

Third, our data have not captured many of the processes and micro-level changes happening in the background to allow the strategic alignment to be maintained in the whole circular ecosystem. More specifically, the secondary database that supports our empirical study limits the possibility of considering all the circular actions that are summarized in the so-called 10Rs. Our endogenous variable considers four types of eco-efficient practices, based on only some of the 10Rs, thus delimiting the practical contribution of the study.

Future research could also more precisely address the impact of sectorial differences on firms' involvement in a circular economy. Several past studies have highlighted noticeable differences due to sectorial norms and standards, practices, level of technology, access to capital, possible collaborations, and so forth (Bodas-Freitas and Corrocher 2019; Darmandieu et al. 2022; Garcés-Ayerbe et al. 2019; Takacs, Brunner, and Frankenberger 2022). Although examining these differences in detail was beyond the scope of this study, they imply structural and normative differences that should be integrated in future research to better comprehend firms' progress toward a circular economy.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available in the Eurobarometer Data service GESIS, https://doi.org/10.4232/1.13934.

Peer Review

The peer review history for this article is available at https://www.webofscience.com/api/gateway/wos/peer-review/10.1111/beer.12768.

Endnotes

[1] Buysse and Verbeke (2003) distinguish between internal primary stakeholders, such as employees or shareholders, and external primary stakeholders, such as customers and suppliers.

[2] Waves 1 and 3 of this Flash series asked if firms were improving the efficiency of their resources because of either supplier or customer pressure, but this was the first time that a proactive supply chain initiative was considered.

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